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Katrin Glatzel, Hannah Ameye, Vivien Hülsen, Matin Qaim

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Authors' contacts

Katrin Glatzel
Center for Development Research (ZEF), University of Bonn
Genscherallee 3
53113 Bonn, Germany
E-mail: kglatzel@uni-bonn.de
www.zef.de

Hannah Ameye
Center for Development Research (ZEF), University of Bonn
E-mail: hameye@uni-bonn.de

Vivien Hülsen
University of Göttingen
Wilhelmsplatz 1
37073 Göttingen
E-mail: vivien.huelsen@uni-goettingen.de

Matin Qaim
Center for Development Research (ZEF), University of Bonn
E-mail: mqaim@uni-bonn.de

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Abstract

Driven by urbanization and demographic changes with a growing middle class and more economically active women, food environments are changing across the African continent with important dietary consequences on a region already contending with the triple burden of malnutrition. Over the past two decades, African countries have experienced rapid growth in the number and spread of supermarkets making (ultra)processed foods available at all times and in convenient and attractive forms that align with consumers' changing lifestyles and time-use. The demand for processed foods (of all types) is expected to continue to rise over the next decades, presenting both challenges and opportunities. Carefully crafted policies, incentive structures, and regulations are powerful tools through which to address 'food entry points', and factors influencing consumer choices including the availability, affordability, accessibility, and desirability of foods. The paper further examines how food environments are changing and adapting in two African countries, Tanzania and Malawi. Drawing on data collected in five regions in Tanzania and six districts in Malawi, the findings provide important insights into how food consumption patterns and dietary health vary between rural and urban areas.

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Contents

1. Introduction

Over the past decades, much progress has been made to understand and address the multiple and overlapping challenges of agrifood systems transformation in Africa. However, within the context of urbanization, demographic changes, a growing middle class, and a nutrition transition already underway, a much better understanding is required of how food environments are changing and the extent to which this impacts how people in rural and urban areas interact with the agrifood system.

The role of the food environment, defined as *the physical, economic, and sociocultural context in which consumers engage with food systems* (HLPE, 2017) has been acknowledged as a central factor determining individual consumption and hence, diets and nutrition. More narrowly defined and as depicted in Figure 1, *the food environment is the space or the interface where consumers interact with the food system to acquire and consume food* (Herforth et al., 2015; Turner et al., 2018; Fanzo et al., 2021;). The food environment approach hence offers a shift in how food choices and consumption patterns are thought about and addressed, as it directs the responsibility of consuming healthy diets partially away from the consumer by recognizing that consumers make choices given the context they are embedded in.

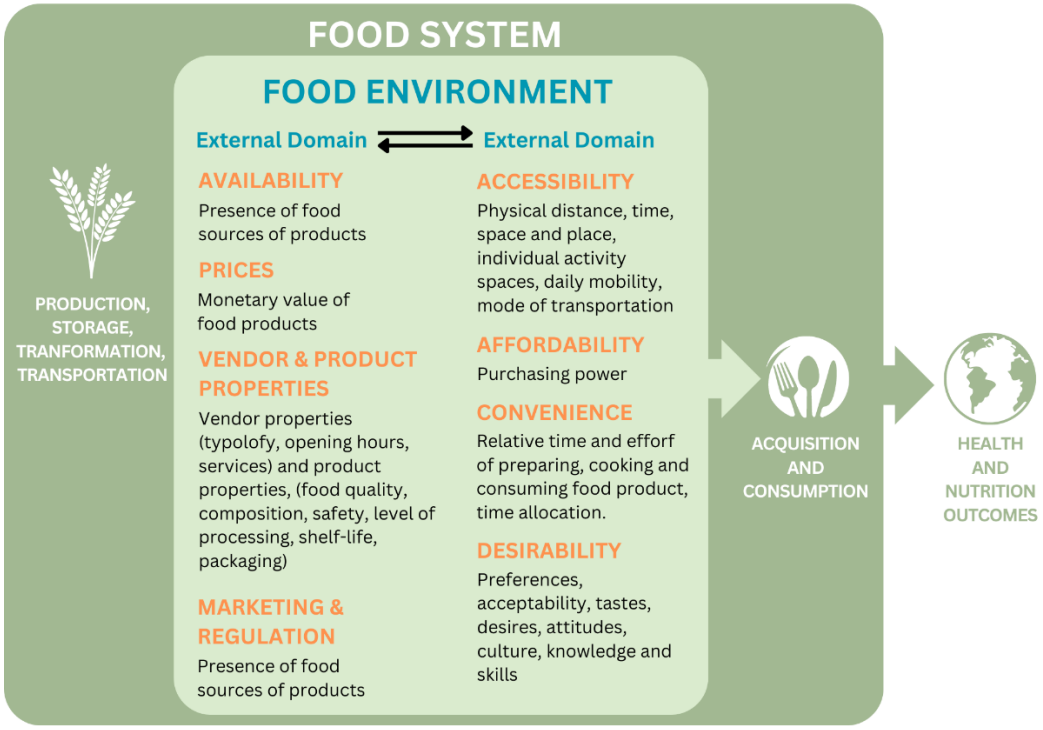


Figure 1: Key dimensions are mapped to external and personal domains. Interactions between these domains and dimensions shape people's food acquisition and consumption (Own presentation based on Turner et al., 2018)

The modernization of urban agrifood systems is largely driven by consumer preference changes resulting from urbanization, a growing (urban) middle class with higher disposable incomes, demographic changes, new lifestyles, and globalization. However, conversely, consumer preferences and demand are also shaped by the changing food environments within which they operate. For example, the rapid expansion of cities and peri-urban areas shifts the traditional rural-urban continuum with impacts on those living and working in rural areas, such as the accessibility and availability of fresh produce. Moreover, the spread of modern supermarkets also has effects on the types of food offered and promoted, as well as on food variety and food prices, all of which may influence consumer choices (Kimenju et al., 2015; Demmler et al., 2018; Khonje and Qaim, 2019; Otterbach et al., 2021).

The quality of the rural-urban continuum – including the connectivity of rural-urban areas and the degree of the continuum - affects food environments, food security, and the availability, access, and affordability of healthy diets, and shapes the livelihoods of urban and rural consumers, smallholder farmers, processors, and traders (Blay-Palmer et al., 2018). Rural agricultural livelihoods often depend on their connection to peri-urban and urban food markets, while cities depend on surrounding peri-urban and rural areas for food and ecosystem services (Akkoyunlu, 2015). It is, therefore, crucial to deepen the understanding of the links between the changing rural-urban continuum and the resulting changing food environments to promote food and nutrition security and sustainable and healthy diets and to design targeted policy interventions.

Following the introduction, section two of this paper provides an overview of how food environments in Africa are changing along the urban-rural continuum. It highlights the main drivers including population growth, demographic changes, urbanization, and the associated changing diets. Section three addresses the challenges of urbanization, including the triple burden of malnutrition, i.e. the co-existence of undernutrition, overweight, obesity, and micronutrient deficiencies; the rise of ultra-processed food (UPF) availability; affordability and availability of healthy diets in urban settings; and food loss and waste. The following section addresses the opportunities of changing food environments, with a focus on fresh food markets; a thriving local agro-processing sector; understanding and leveraging individual-based motives beyond accessibility, affordability, and convenience; and the digital food environment. Section five provides concrete insights into the changing food environments in Malawi and Tanzania, drawing on household and individual diet and nutrition data integrated with a survey of markets and food environments. It hence provides important insights into household-level consumption of food items in rural, peri-urban, and urban areas, as well as a breakdown and overview of

different patterns across household income levels. It analyzes the role of markets and investigates the impacts on nutrition, in particular by deepening the understanding of what type of food is consumed (fresh/lightly and highly processed foods), and where that food is accessed (fresh food markets, supermarkets). This is against the backdrop that fresh food market access is stressed to be an important factor for healthy and diverse diets.

The paper concludes with a set of policy recommendations to facilitate agile policy design and implementation by governments and their partners to respond to the emerging opportunities and challenges associated with changing food environments in Africa (section 6).

2. The drivers of changing food environments in Africa

The current rate of population growth and urbanization is driving changes in Africa's agrifood systems with a direct bearing on the dynamics of the rural-urban continuum and food environments. Food environments are changing rapidly, ranging from where food is produced and by whom, to where it is sold, to what type of food is consumed. Urbanization is seen as the crucial driver of structural changes in food consumption patterns and this holds especially true in the context of Africa, where the urban population is growing significantly with the growth of megacities, new secondary towns, and emerging peri-urban areas (JRC, 2019). Furthermore, urbanization is commonly associated with the nutrition transition, igniting and accelerating shifts in food consumption patterns and physical activity and giving rise to a prevalence of the triple burden of malnutrition (Popkin, 1998).

An improved understanding of the impact of urbanization on food environments and hence individuals' food consumption will be key for policymakers to design the appropriate strategies, policies, and incentive structures to ensure access to and consumption of nutritious foods that contribute to healthy diets. A healthy diet is defined as "health-promoting and disease-preventing. It provides adequacy without excess, of nutrients and health-promoting substances from nutritious foods and avoids the consumption of health-harming substances" (Neufeld et al., 2021). Although there is no universally agreed upon definition of what constitutes nutritious foods, generally, "a nutritious food provides beneficial nutrients (e.g. protein, vitamins, minerals, essential amino acids, essential fatty acids, dietary fiber) and minimizes potentially harmful elements (e.g. anti-nutrients, quantities of sodium, saturated fats, sugars)" (ibid.).

Several key drivers contribute to changing food environments, including population growth and urbanization; a growing middle class with more disposable incomes and more sedentary

lifestyles; and dietary changes. Understanding these drivers and their interplay can contribute to a better understanding of the dynamics of changing food environments and enable better planning and policy design by governments and other stakeholders.

2.1. Characterizing food environments

At the beginning of this paper, we presented the HLPE (2017) definition of food environments as *the physical, economic, and sociocultural context in which consumers engage with food systems* and the more recent definition by Fanzo et al. (2021) that *the food environment is the space where consumers interact with the food system to acquire and consume food*. It is worth noting that there are different, overlapping approaches to framing food environments: the socio-ecological, the agrifood systems, and the global health perspectives.

Table 1: Framing the food environments across disciplines

Socio-ecological perspective	The collective physical, economic, policy, and sociocultural surroundings, opportunities, and conditions that influence people's food and beverage choices.
Agrifood systems perspective	The interface that mediates one's food acquisition and consumption with the wider food system, encompasses multiple dimensions such as the availability, affordability, desirability, convenience, marketing, and properties of food sources and products.
Public health perspective (the Dahlberg-Whitehead rainbow model)	The relationship between the individual, their environment, and health, places the individuals at the center surrounded by levels of influence: lifestyle, social and community networks, living and working conditions, and general socioeconomic, cultural, and environmental conditions.

Food environments are complex and vary greatly between countries and regions. To better understand how food environments are changing and what drives food purchases and consumption choices is crucial to design effective agricultural, food, and nutrition policies underpinned by appropriate interventions targeting education, public health, and urban- and regional planning to encourage the uptake of healthy diets. A nuanced view of the dynamics of changing food environments along the rural-urban continuum is thus crucial. In the context of changing food environments in Africa, Holdsworth and Landais (2019) propose a framework that captures four different levels of influence on urban food environments, including the individual,

social, physical, and macro-level environment. Importantly, factors across these four levels all interact in different ways to influence dietary behavior. Evidence is still scarce about the causal pathways through which different factors influence dietary choices in Africa; however, the drivers discussed in this paper present some of the major factors underpinning changing food environments. More research will be needed to be able to establish causal pathways.

2.2. Population growth and urbanization

Projections estimate that changes over the next five decades—in terms of growth of city land area from 2020 levels—will mostly take place in low-income countries (LICs) (141 percent), low and middle-income countries (LMICs) (44 percent), and high-income countries (HICs) (34 percent). Changes in upper-middle-income countries (UMICs) are projected to be relatively small at just 13 percent. This growth is projected to be highest in Oceania and Sub-Saharan Africa, where it is estimated to (almost) double (UN-Habitat, 2022). African countries (alongside South Asia) are projected to face the most rapid increases in urbanization, both in absolute and relative increases (Global Panel, 2017). Although much of this growth will be taking place in Africa's megacities, such as Lagos or Cairo, secondary cities are growing too and represent an important element of the continent's urbanization patterns (Hannah et al., 2022): the number of cities with populations between 5-10 million is expected to increase across the continent, from just three in 2014 to at least eight in 2030, alongside a growth in secondary towns. Indeed, some studies suggest that the growth and urbanization of medium-sized cities (population over 500,000) are the most pronounced (UNDESA, 2016), with almost 60 percent of the continent's population already residing in cities with 300,000 – 500,000 inhabitants (Global Panel, 2017). At the same time, smaller cities (with less than 250,000 inhabitants) cover almost half of the city land (about 45 percent) in LICs, a trend that will persist over the coming decades (UN-Habitat, 2022).

In most regions in the world, urbanization has been largely driven by structural transformation, with an economic transformation from mainly agriculture to a more diversified national economy and attracting people to move from rural to urban areas (de Bruin et al., 2023). While many countries follow the pathway of structural transformation, this has not been the case for many African countries (Badiane, 2014). In countries with such development pathways, overall population growth leads to growth in both urban and rural areas. However, without increases in agricultural productivity, rural population growth results in land fragmentation and hence smaller and often economically unviable farms, with a lack of employment opportunities in rural areas as a direct consequence. In anticipation of better opportunities, those living in rural areas

migrate to urban areas where opportunities may be limited, resulting in increased levels of urban poverty. This is particularly the case in LIC contexts with rapidly growing urban areas, where investments have not kept pace with urban expansion; this is visible in many large and mega-cities across the African continent (Jedwab et al., 2015). In such situations, living standards will not rise to the level normally associated with urbanization (Adger et al., 2015; Selod et al., 2021) with a direct bearing on living conditions, including a lack of employment or underemployment, infrastructure, or access to services, coupled with food insecurity, and unhealthy diets (Wanyama et al., 2019). As a result, around 60 percent of the urban population in Sub-Saharan Africa currently resides in informal settlements or slums with little or no access to basic services and infrastructure, including proper sanitation, or access to affordable and healthy food with the means to prepare a healthy meal (ACRC, 2022). With rapid urbanization and oftentimes little urban planning, informal settlements in urban areas are likely to expand further.

2.3. A growing (urban) middle class

Population growth, urbanization, and overall strong economic performance over the past two decades have been accompanied by the emergence of a sizeable African middle class and a robust growth in consumption expenditures as a result.

Box 1: Defining the middle class

The middle class, as defined by the African Development Bank (AfDB), is the share of the population that can afford to spend between US$2 – US$20 per day. In 2010, around 326 million people (or 34.3 percent of the continent's population) fell into this group, which marks a threefold increase from 1980. Some estimates suggest that Africa now has the fastest-growing middle class in the world and that by 2060, it could increase to 1.1 billion (equivalent to 42 percent of the total population) (AfDB, 2011a; AfDB, 2011b).1 This growth is driven by several factors, including economic and population growth as well as improved access to education and healthcare (UNIDO, 2023). It is important to note that the AfDB's definition of middle class captures three distinct categories: the floating class living on US$2-4 per day; the lower-middle class living on US$ 4-10 per day; and the upper-middle class living on US$10-20 per day. The lower and upper-middle classes are comparatively stable and robust. The floating class, however, is more vulnerable to shocks and hence at higher risk of quickly slipping back into poverty. In addition, it is crucial to stress that the purchasing power varies greatly between countries. Defining the middle class in US$ terms hence makes comparisons between countries – and partly within countries – challenging and slightly flawed. A more nuanced, relative definition that defines the middle class as individuals or households that fall between the 20th and 80th percentile of the

[1] Defining and measuring Africa's middle class has been challenging due to a lack of reliable, quality data, while different institutions measure/define the middle class differently.

consumption distribution or between 0.75 and 1.25 times median per capita income, respectively (AfDB, 2011a). However, the absolute definition in US$ terms remains the more commonly used definition.

The different categories making up the middle class (Box 1) are of particular importance as stakeholders seek a better understanding of how food environments are changing and as governments set out to develop interventions and policies aimed at improving nutrition outcomes. In this respect, income is one of the main determinants of consumption decisions. As incomes rise, diets become more diversified and healthier, yet, consumption of unhealthy, ultra-processed foods tends to increase at the same time (Qaim, 2019). This, of course, influences the food environment, adjusting to the preferences of this growing middle class.

With the growth of the middle class and increased urbanization, the triple burden of malnutrition has accelerated in some countries due to poor diets (Popkin et al., 2003). It is not uncommon to find undernutrition and obesity coexisting within the same country, the same community, or even the same household, while increasingly, the coexistence of obesity and micronutrient deficiencies are found in the same person. In such situations, child stunting coexists alongside overweight in adults (particularly among women), as well as in stunted but overweight children. Those affected by overweight or obesity may also manifest multiple micronutrient deficiencies (Ecker et al., 2016). One survey of households in Nairobi in 2013-14 showed that 41.5 percent of children were stunted and 74 percent were anemic, while 29 percent of women were overweight and nearly 26 percent were anemic (Global Panel, 2017). Evidence also shows that as economies grow and urbanization accelerates, child stunting tends to decrease at a slower rate than the concurrent rise in adult overweight and obesity, while micronutrient deficiencies also persist. Importantly, evidence also shows that stunting does not only affect the poorest households (Global Panel, 2017). In East Africa, child stunting even worsens between secondary towns and large cities of over 1 million inhabitants, driven by rising levels of stunting amongst the richest cohorts (Ameye & De Weerdt, 2020). A shift in dietary patterns and physical activity levels is leading to a nutrition transition, with an increased prevalence of overweight and obesity levels (see section 3.1). Changes in eating habits, such as the consumption of ready-to-eat, nutrient-poor, highly processed foods, combined with a reduced physical workload from increasingly deskbound economic activities in urban areas, have increased obesity levels at a much faster rate than undernutrition has been reduced (WHO, 2016).

Rapid urbanization, population growth, and a growing middle class put pressure on Africa's agrifood systems to produce more food that is also diverse and nutritious. An understanding of the changing food environments across Africa is also needed to better understand and enable consumers to make healthy and affordable food choices consistent with optimal nutrition outcomes. This is of particular importance in a context where projections estimate a 2.5-fold increase in overall food expenditure across Africa South of the Sahara (SSA) by 2050 (FAO, 2023).

2.4. Changing diets

While much attention has been paid to urbanization, agrifood system transformation, and changing dietary patterns in recent years, the shared understanding of how the nexus of these processes affects nutrition and food security remains limited. There is still limited comprehensive data on what type of food people actually consume and where, however, research in recent years confirms that diets in LMICs are changing rapidly, often referred to as the "nutrition transition". It is commonly assumed that urbanization is the key driver behind the nutrition transition (JRC, 2019; Popkin et al., 2012) linked to changes in activity patterns (more sedentary lifestyles and office employment), eating away from home, and the availability of more highly processed foods, amongst other factors. While it holds that the pace of change is generally much more pronounced in urban and peri-urban areas than in rural, remote areas, evidence suggests that the dietary transition is also occurring in rural areas (Sauer et al., 2021). This trend is the same in both, high- and low-food-budget countries (Global Panel, 2017; FAO, 2023).[2]

According to Popkin (2009) and Popkin and Ng (2022), the nutrition transition describes the shifts that have occurred in human diets and activity patterns with countries converging on diets high in saturated fat, sodium, sugar, and refined carbohydrates and low in fiber and other key natural components. This phenomenon is often termed the "Western diet" because it is common among a large proportion of the United States and Europe. At a global level, highly or ultra-processed foods increasingly dominate this diet (see section 3.2. and the NOVA classification). These trends are reflected in nutritional outcomes, such as overweight and obesity and related chronic diseases.

[2] Most recent studies differentiate between high-food budget and low-food budget countries in their analysis, as well as between rural, peri-urban, and urban areas to gain a more detailed understanding of how diets are changing and what factors might play the most prominent role in household food choices. Food budget is the market value of total food consumption per capita per day: high-food-budget countries (average 2.3 PPP US$ per capita per day) and low-food-budget countries (average 1.6 PPP US$ per capita per day).

Evidence from the FAO (2023), spanning 11 African countries, points to the fact that food purchases (expenditure on food) are high among urban households, but they are also surprisingly high across the rural-urban continuum, even among rural households living far from an urban center. It also suggests that although consumption of processed foods, including highly processed foods, is higher in urban areas, it only declines gradually moving to peri-urban and rural areas. Moreover, the consumption of vegetables, fruits, fats, and oils is fairly uniform across the rural-urban continuum relative to total food consumption. And although there are some variations, the consumption of sweets, condiments, and beverages is also fairly uniform. As summarized in Table 2, there are some interesting and at times counterintuitive findings. What is evident is a transition away from "traditional diets" to more "Western diets" across the rural-urban continuum and across both food-budget country groups, although this transition is taking place at varying degrees and speeds. This is important for two reasons: first, in understanding the interplay between urbanization and overall increasing disposable incomes and implications on food choices; and second, for improved planning and more effective policy design targeted at rural and growing peri-urban areas.

However, most crucially, evidence suggests a strong effect of income on food purchase shares across all food-budget countries (FAO, 2023). This is also in line with other studies that show that urbanization does not impact diets and consumption in a vacuum but rather, that it is an interaction between rising overall incomes, the globalization of food environments, and personal preferences and cultural norms that influence nutritional outcomes (JRC, 2019; McCullough, 2024; Dzanku et al., 2024). While much focus currently remains on the affordability of a healthy diet (Hirvonen et al. 2020; Heady et al. 2024), it is crucial to note that as incomes rise, consumers tend to start consuming unhealthy foods, thus slipping from one burden into the next (Ecker et al., 2023). Section 3.1. provides additional analysis of the implications of changing diets.

Table 2: Differences in food consumption patterns

Overall consumption	• Urbanization elasticities of food demand are always positive: higher degrees of urbanization always correspond to increases in consumption (JRC, 2019) • Urban populations tend to consume more calories (Global Panel, 2017) • The share of food purchases among households in urban centers is 78-97 percent of total consumption and in contrast to own production; for those living 1-2 hours from an urban center it is 56 percent; for those living more than 2 hours away it is 52 percent (FAO, 2023)
Staples	• Staple foods as a share of household food consumption in value terms are on average 30 percent in high-food-budget countries and 28 percent in low-food-budget countries in urban areas (FAO, 2023) • These figures are roughly 12 percentage points higher in peri-urban and rural areas (FAO, 2023)

	• The average share of staple foods in total household food consumption is similar in high- and low-food-budget countries: 41 percent and 40 percent (respectively) in peri-urban areas, and 42 percent and 43 percent (respectively) in rural areas (FAO, 2023) • As household incomes rise, the share of staple foods in total household food consumption falls across the rural-urban continuum (FAO, 2023) • Rural-to-urban migration leads to a strong shift away from home consumption of traditional staples (JRC, 2019)
Fruits and vegetables	• Consumption of vegetables is largely driven by access and availability rather than income (FAO, 2023) • Large, intermediate, and small cities less than 1 hour from large and intermediate cities have higher shares of vegetables than towns (FAO, 2023) • If a household is led by a woman there is a positive effect on the share of vegetable consumption in both food-budget country groups (FAO, 2023)
Pulses, seeds, nuts	• There is a notable decrease in the value shares of pulses, nuts, and seeds in urban areas compared to peri-urban and rural areas (FAO, 2023)
Ultra-processed foods (UPFs)	• Urban populations tend to consume more highly processed foods (Global Panel, 2017) • At the same time urban consumers have access to more healthy processed foods (Global Panel, 2017) • There are substantial dietary differences between high and low-income groups: as incomes rise, highly processed foods take an increasing share of the food basket value (in rural and urban areas) (Global Panel, 2017) • Highly processed foods account for a small proportion of total consumption, however, it is slightly higher in peri-urban areas of small cities and towns and in rural areas of low-food-budget countries compared to the same areas in high-food-budget countries (transport and storage as key factors) (FAO, 2023) • The shares of highly processed foods are greater in urban than in rural areas in all countries (FAO, 2023) • Women substitute processed foods for meal preparation to free up time for other household chores as well as off-farm work (FAO, 2023)
Street food & food away from home	• Shares of food away from home are higher in urban areas and decline steeply moving from peri-urban to rural areas (FAO, 2023) • The urban poor frequently rely on cheap and convenient street food (Global Panel, 2017) • There is a growing reliance on street foods in urban centers (JRC, 2019) • More male non-farm employment leads to a higher share of food away from home and the effect is higher in high-food-budget countries (FAO, 2023) • The larger the city, the higher the share of food away from home in total consumption (FAO, 2023)
Animal sourced foods	• Urban inhabitants consume more animal-sourced foods (Global Panel, 2017) • Animal-sourced food consumption value shares (incl. milk, eggs, meat, fish, insects) are 40 percent higher in urban compared to peri-urban areas and 44 percent higher than in rural areas (FAO, 2023) • Animal-source food consumption value shares are strongly driven by income across the rural-urban continuum (FAO, 2023)
Own production	• Own production is not the main source of food in rural areas; the average share of own production in rural areas only represents 37 percent and 33 percent of total household consumption in high- and low-food-budget countries (FAO, 2023) • The share of food purchases among households in urban centers is 78-97 percent; for those living 1-2 hours from an urban center it is 56 percent; for those living more than 2 hours away it is 52 percent (FAO, 2023)

Given the rapid urbanization described in section 2.2., there is growing recognition of the roles played by cities and peri-urban areas in the transformation of Africa's agrifood systems. While once perceived as mere points of consumption at the end of a rural-to-urban food chain (Romero et al., 2023), cities are increasingly being recognized as key actors in addressing both national and global food systems challenges, including those related to food and nutrition security, but also environmental degradation, and climate change adaptation and mitigation. There is also a growing recognition that the current trajectory of urban food systems can have a strong bearing on the ability of cities to realize their own broader aspirations including health, sustainability, and resilience. While urban centers are vital for contributing to progress in the transformation of national and global food systems, conversely, local food system performance strongly impacts the competitiveness and livability of cities.

A better understanding of how the shifting rural-urban continuum impacts the food security and nutritional status of those living and working in *both* rural and urban areas is crucial for policymakers and relates to questions about the **availability and affordability of healthy food; food loss and waste; and changes in dietary habits and patterns**.

Within a context where levels of chronic hunger and malnutrition in Africa are increasing, while simultaneously witnessing a meteoric rise in obesity and overweight-related non-communicable diseases (NCDs), the cost of inaction is too high. In fact, in 2013, FAO estimated the economic costs associated with undernutrition at US$1-2 trillion per year, equivalent to about 2-3 percent of global GDP; while the global economic cost of obesity and associated diet-related NCDs was estimated at US$2 trillion per year, about 2.8 percent of global GDP (FAO, 2013). Similarly, the World Bank in 2020 estimated that 4 million deaths globally were attributable to obesity and projected that by 2035, the costs of obesity in low- and middle-income countries (LMICs) alone will amount to US$7 trillion. Better understanding the dynamics and future trends of changing food environments is hence crucial for promoting healthy diets while it also makes economic sense.

3. The impacts of urbanization on Africa's food environments

Urbanization can be an immense opportunity to access affordable healthy diets and to end hunger, food insecurity, and malnutrition in all its forms (FAO, 2023). The opportunities - and emerging challenges - follow the change from traditional and mostly rural agrifood systems to a system with a more complex market continuum and more diverse employment opportunities,

including in processing, marketing, and distribution (Badiane et al., 2022). It has been well-documented that urbanization offers significant opportunities, with direct benefits on diets and nutrition, which tend to be more diverse, nutritious, and healthy in urban areas, and less influenced by seasonality than in rural areas (Cockx et al., 2019; de Bruin et al., 2021; de Bruin & Holleman, 2023). Moreover, many urban residents have higher disposable incomes and better access to healthcare and formal education or training.

However, if not addressed carefully through agile policymaking, the expansion of urban centers can come at the expense of (peri-urban) cropland, with a direct negative bearing on the production of cereals, fruits, and vegetables in these areas (de Vos et al. 2024). This has implications for the availability of nutritious and healthy foods both in cities and rural areas, as well as for those traditionally farming the land. Agrifood systems have traditionally been within the remit of rural areas; as cities across Africa expand, new models for farming and the provision of healthy foods must be designed.

However, in countries where urbanization is not substantially driven by economic growth, vulnerable urban dwellers, including rural migrants, often have limited access to affordable nutritious foods as they are disproportionately impacted by high food prices. Additionally, urbanization is often accompanied by increased economic inequality and an increase in the urban poor population (Battersby and Watson, 2019). While future urbanization is projected to evolve alongside rising overall welfare, highly entrenched inequalities will persist, with major consequences for access to affordable healthy diets. Challenges include the greater availability of cheaper, convenient, pre-prepared, and fast foods, often energy-dense and high in fats, sugars, and/or salt that can contribute to malnutrition (overweight, obesity, NCDs); insufficient availability of vegetables and fruits to meet the daily requirements of healthy diets for everyone; and the loss of lands and natural capital due to urban expansion.

Governments and their partners must harness the opportunities that urbanization offers while carefully managing the emerging challenges and risks to ensure that rural and urban populations can enjoy reliable and affordable access to healthy and nutritious diets within planetary boundaries. Doing so requires a detailed understanding of the challenges and a set of enabling conditions that can contriute to realizing the opportunities.

3.1. Urban malnutrition: co-existence of undernutrition, overweight, and obesity

As discussed in section 2.4., diets are transforming along the rural-urban continuum, albeit at varying speeds and degrees. It is clear that urbanization, in combination with income growth, shifts diets from traditional foods to more high-value products including dairy, meat, fish, vegetables, and fruits but also to more convenient lightly and ultra processed foods rich in saturated fats, sugars, and salts. While significant efforts have been made to address undernutrition, in many African countries, obesity levels have increased alongside urbanization.

The World Health Organization (WHO) notes that while African countries continue to deal with the problems of undernutrition, they are also experiencing a rapid upsurge in nutrition-related non-communicable disease risk factors such as obesity and overweight, particularly in urban settings (WHO, 2024). According to the Global Burden of Disease (2019), malnutrition is by far the top risk factor driving the burden of disease in SSA (Figure 2).

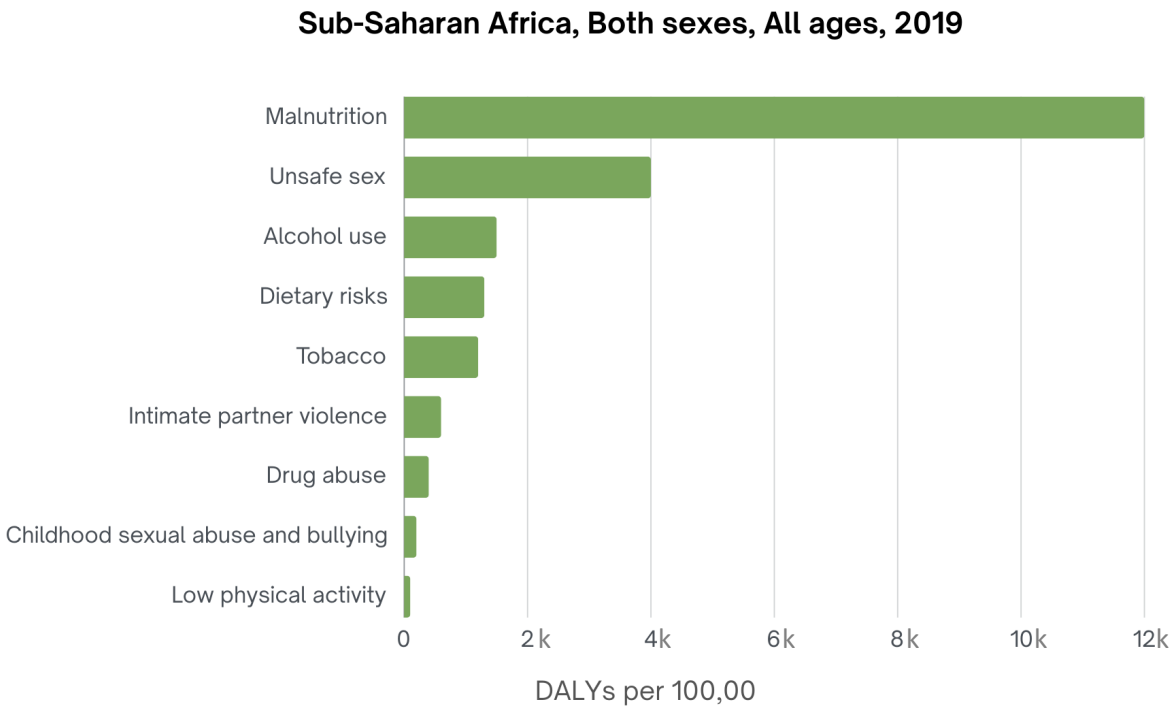


Figure 2: Top risk factors contributing to the burden of disease in Sub-Saharan Africa, 2019. Source: Own presentation based on Global Burden of Disease Study, 2019

The 2022 Global Nutrition Report found that the urban prevalence of stunting is on average 19.2 percent compared to 26.8 percent in rural areas (Global Nutrition Report, 2022). In Africa, rural populations face a much higher burden of child undernutrition than urban populations; for example, the proportion of stunted children (below the age of five) in rural areas was estimated at 30 percent in 2022 (FAO, 2023b). However, despite rapidly growing cities and large poor urban populations, relatively little disaggregated data is available on childhood undernutrition in urban areas.

At the same time, overweight and obesity are on the rise in LMICs, including in Africa. The 2022 Global Nutrition Report showed that 124 countries (of the 141 countries for which there is sufficient data) experience more than one form of malnutrition based on three metrics and their respective thresholds: childhood stunting, anemia in women of reproductive age, and overweight in adult women (Global Nutrition Report, 2022).

In Africa, the number of overweight and obese children nearly doubled from 5.4 million to 10.3 million between 1990 and 2014 (WHO, 2016), while one in five adults and one in 10 children and teenagers were projected to be obese by the end of 2023 in 10 high-burden African countries (WHO, 2022).[3] According to WHO the prevalence of obesity among adults in the 10 high-burden countries ranges from 13.6 to 31 percent, while in children and adolescents, the range is between 5 to 16.5 percent. In 2019, nearly a quarter (24 percent) of all overweight children under the age of five lived in Africa (WHO, 2022).

A 2024 study by the Lancet, analyzing data from 200 countries over a period of 30 years (1990-2022), shows that the combined prevalence of underweight and obesity has increased in most countries since 1990, mostly driven by the increase in obesity prevalence surpassing the underweight decline. Some countries displayed a decrease in the combined burden of underweight and obesity, driven by decreasing underweight levels. The study also showed an increasingly early onset of obesity among children (Phelps et al., 2024).

Under a scenario where rapid urbanization takes place without sustained and equally rapid economic growth, urban undernutrition levels are set to rise and co-exist along with rising overweight and obesity levels. Specifically, there is mounting evidence on the role of ultra-processed foods in the development of overweight, obesity, and related NCDs. Tackling the

[3] Algeria, Botswana, Egypt, Eswatini, Lesotho, Libya, Morocco, Namibia, South Africa, Tunisia, (Zimbabwe)

emerging triple burden of malnutrition in the context of rapidly changing food environments presents a formidable challenge for Africa's policymakers.

3.2. The role of the food industry and the rise of ultra-processed foods

As previously discussed, globally, the nutrition transition is shifting towards high levels of obesity and overweight driven by an increased consumption of UPFs and drinks combined with significantly lower levels of physical activity. Analysis by Reardon et al. (2021) shows that consumers in Africa have indeed been consuming increasing amounts of processed foods over the past 50 years, with the trend having accelerated with the surge on the supply side through growing agro-processing SMEs and largeprivate food and beverage companies flooding the market with packaged, UPFs and sugar-sweetened beverages. Increasingly, this has been coupled with aggressive marketing strategies and advertisements in the absence of targeted regulation.

A common system to classify processed foods - the NOVA classification - was introduced in 2009 (Monteiro et al., 2019). It lists four categories considering the degree to which a food is processed and the purpose of these modifications: **Unprocessed or minimally processed foods; processed culinary ingredients; processed foods; and ultra or highly processed foods.** Processing increases the durability of foods or modifies or enhances their flavor and texture by adding salt, sugar, and/or fat. Examples can include canned fruits and vegetables, some cheeses, freshly made bread, and canned fish. Ultra or highly processed foods are those foods that go beyond the incorporation of salt, sugar, and fat to include artificial colors and flavors, preservatives, thickeners, emulsifiers, and artificial sweeteners that promote shelf stability, preserve and enhance texture, and increase palatability. Several processing steps using multiple ingredients are involved in an ultra-processed food. They are often mass-produced with low-cost ingredients making them cheap and highly profitable.

While processing *per se* can also be an opportunity (see 4.1.), it is, in particular, the overconsumption of those ultra or highly-processed foods that are linked to increasing levels of overweight and obesity and above all, to several NCDs, such as type 2 diabetes, hypertension, and cardiovascular disease (Global Panel, 2017).

In Africa, the demand for processed foods of all types is expected to continue to rise over the next decades driven by urbanization, changing food environments, higher rural non-farm employment, and the greater demand for convenient ready-to-eat foods as a result of the drivers discussed in section 2. Evidence further suggests that while the consumption of UPFs is

currently predominant amongst the urban and higher-income populations, the trend will be visible both in rural and urban areas as well as among the rich and the poor (Reardon et al., 2021; de Bruin, 2023). The transformation of food systems and food environments has also occurred earlier, faster, and more pronounced in the relatively better-off coastal countries compared to landlocked countries (Reardon et al., 2021). Dolislager et al. (2017) find that in East and Southern Africa, processed foods have penetrated the diets of rural and urban households at 36 and 63 percent of food consumption expenditure, respectively, across all income groups. Dolislager (2022) and Reardon et al. (2021) also find that consumption of UPFs (including soft drinks) constitutes 12 percent of the total food consumption expenditure of the poor, 20 percent for the lower-income group and 32 percent for the middle-income group. FAO's (2023) analysis shows that consumption shares of UPFs are slightly higher in peri-urban areas of small cities and towns and rural areas in low-food-budget countries. The shares of highly processed foods are also generally higher in urban areas in both sets of food budget countries. These results show that the penetration of highly processed foods is evident not just in urban areas, but also in rural areas including those 1 to 2 hours or more away from a city or town.

According to WHO (2024), children in LMICs and in particular in fragile country contexts, remain more vulnerable to inadequate pre-natal, infant, and young child nutrition. At the same time, they are increasingly exposed to highly processed, energy-dense, and micronutrient-poor foods, such as breastmilk substitutes excessively high in sugars, which tend to be more affordable and convenient to prepare, but also lower in nutrient quality. These dietary patterns, in conjunction with lower levels of physical activity, result in sharp increases in childhood obesity while the challenges of undernutrition remain unsolved. Importantly, according to the Barker Hypothesis[4], those facing undernutrition *in utero* or early childhood, are found to have adjusted metabolic systems which increase their propensity for obesity in resource-rich environments (see Special Insert; Barker, 1990; Roseboom et al., 2006).

Urban food environments are diverse and vary between countries and regions. However, the increasing availability and consumption of UPFs, especially in urban centers, can be partly explained by the greater diversity and choice of food products and places to buy food (supermarkets, food vendors, restaurants, kiosks); in addition, the urban middle class spends a larger share on eating out; and lastly, diets are becoming more globalized. The higher consumption of food away from home, ready-made meals, and snacks is strongly linked to

[4] A hypothesis proposed in 1990 by the British epidemiologist David Barker (b. 1939) that intrauterine growth retardation, low birth weight, and premature birth have a causal relationship to the origins of hypertension, coronary heart disease, and non-insulin-dependent diabetes, in middle age.

commuting distances and women increasingly taking up employment outside of the home, so the opportunity cost of time spent buying and preparing food is high. Simultaneously, studies have observed a shift in the composition of diets in rural areas too, from mainly home-produced to increasingly supermarket/store-purchased products and are in fact net food buyers (de Bruin, 2023). This can be partly explained by the opportunity cost of preparing meals at home, but also that those living and working in rural areas – and thus further away from supermarkets - buy processed foods that are less perishable in bulk to stock them for later use. Evidence from Nigeria, Tanzania, and Uganda also shows that the share of all types of processed foods is high among the poor in urban and rural areas.

However, consumer behaviour is not changing in a vacuum and is heavily influenced by the largely unregulated rapid introduction of UPFs in supermarkets (Box 2), smaller grocery stores and kiosks across countries. By ensuring that UPFs are readily available, accessible, affordable and desirable the global food and beverage industry bears much responsibility for the nutrition transition and the associated rise in overweight and obesity related NCDs. Governments must, therefore, play a more proactive role in shifting the burden of responsibility of consuming a healthy diet away from the consumer only, and towards the private sector through carefully crafted regulation, norms and standards.

Box 2: The rise of supermarkets

Over the past two decades, African countries have experienced rapid growth in the number and spread of supermarkets. The format and location of supermarkets have evolved over the years, moving away from serving only affluent neighborhoods in urban areas to penetrating new markets in peri-urban and rural areas (das Nair et al., 2015; Kimenju et al., 2015; Demmler et al., 2018). However, evidence varies on the degree of supermarket expansion, the share of food purchases made in supermarkets as opposed to more informal and local retailers as well as the impact of supermarkets on nutrition outcomes. Data from Zambia indicates that while two-thirds of urban households use modern and traditional retailers simultaneously, wealthier households are still more likely than poorer ones to use supermarkets and hypermarkets (Khonje et al., 2019; Wanyama et al., 2019). At the same time, while in some African countries international supermarket chains dominate, recent years have seen a surge in local or regional supermarket chains (Nickanor et al., 2021). Generally, supermarkets offer a greater diversity of products at relatively cheaper prices, given economies of scale and global sourcing strategies, compared to local, independent retailers in many countries. Studies in Kenya (Kimenju et al. 2015; Debela et al. 2020) and Zambia (Khonje et al. 2020) also show positive micronutrient consumption effects of supermarkets and positive effects on child linear growth (HAZ). The notion of a "supermarket revolution" in Africa gained traction after 2000 and was underpinned by the assumption that the trends overserved in Europe, the US, and Latin America would gradually be mirrored in Africa. However, some studies suggest that much of the supermarket development has taken place in larger cities and only in specific countries, including South Africa, Kenya, Zambia, and

Zimbabwe, with less influence in secondary cities (Hannah et al., 2022). One explanation could be lower levels of large-scale commercial agriculture, inadequate transport, and storage infrastructure, lower overall spending power, a weak regulatory environment, and the strength of the informal food sector and other traditional forms of retail such as urban fresh food markets could slow the further expansion of supermarkets on the continent. Even in countries and cities dominated by supermarkets, including, for example, Namibia and South Africa, informal food retailing continues to supply much of the daily food needs of lower-income consumers (Nickanor et al., 2019), while households in two secondary cities in Nigeria were found to predominantly procure food through open-air markets and informal means (Resnick et al., 2019). Moreover, while the use of modern retailers is positively associated with higher consumption of ultra-processed foods, after controlling for income and other socioeconomic factors, studies also show that the use of traditional stores and kiosks is equally positively associated with the consumption of ultra-processed foods, suggesting that modern retailers are not the only drivers of dietary transitions (Khonje et al., 2019). A better understanding of the effects of changing food environments on different socioeconomic groups and age cohorts and in different contexts is important to design policies and strategies that can empower consumers to make healthier food choices.

While the consumption of ultra-processed foods undoubtedly bears a significant health risk and burden, processed foods *per se* can bring multiple benefits and opportunities, including a growing local agro-processing sector and SME employment in processing, transport, and marketing, as well as extended shelf life with reduced food loss and waste (FLAW) and nutritional opportunities. These opportunities will be further discussed in section 4.

3.3. Malnutrition amongst the urban poor

As discussed in 2.2., urbanization across Africa has largely taken place without economic growth, with the result that rural-urban migration is often associated with rising rates of urban poverty and a rising number of rapidly expanding informal settlements, commonly referred to as slums (Wanyama et al., 2019). Rapid urbanization combined with poor urban planning and continued weak economic growth in some African countries has meant that African governments have not kept pace with the provision of adequate basic services and decent living conditions, including access to basic public services, such as sanitation and education. In 2020, an estimated 60 percent of the total urban population in Africa was living in slums (UNICEF, 2020), while it has been estimated that by 2035 the majority of individuals in extreme poverty will live in urban areas (UNDESA, 2018). Those people living in informal settlements belong to the most vulnerable to environmental and socio-economic shocks, food insecurity, low dietary quality, and poor health, yet limited data and a limited number of studies on the nutritional and food security status of the urban poor are available.

A study by Wanyama et al. (2019) explores the food security and dietary quality in slums in Nairobi and Kampala. The findings show that food security in urban areas primarily depends on a household's ability to purchase food. In other words, access to employment and income are likely the main factors influencing urban food security and nutrition (Wanyama et al., 2019). The data collected in Nairobi and Kampala point to high levels of food insecurity and malnutrition in informal settlements: based on the household food insecurity access scale (HFIAS), 87 percent and 93 percent of the sample households were food insecure in the slums of Nairobi and Kampala, respectively, while 31 percent of households in Nairobi and 59 percent in Kampala suffered from calorie deficiencies – compared to 24 percent for Kenya and 41 percent for Uganda (as individual countries as a whole). The study further suggests that dietary diversity in urban slums is similar to that in rural areas although the proportion of women below the recommended dietary diversity threshold is even higher in urban slums than in rural areas. Moreover, the study showed that more than 20 percent of children in urban slums did not reach the recommended minimum thresholds for balanced diets and micronutrient adequacy.

These findings are in line with a systematic review by Vilar-Compte et al. (2021) of 68 papers around four key themes: (i) elements that affect access to healthy eating in individuals in urban poverty, (ii) food insecurity and urban poverty, (iii) risk factors for the nutritional status of urban poor and (iv) coping strategies to limited access to food. Moreover, it identifies the challenge of food deserts and food swamps – areas with very limited or difficult access to healthy food choices - that are generally more common in low-income urban areas and informal settlements.

While urban areas are generally associated with better food security and nutrition, this does not hold for low-income households or those living in informal settlements. The urban poor often rely on the informal economy, live in overcrowded settlements, and have limited access to basic social services including water, sanitation health, and formal social safety nets. Moreover, urban livelihoods tend to be less diversified, irregular, unstable, and predominantly informal; they are more reliant on fresh food and informal markets, and the cash economy. In this context, the loss of income combined with price surges, and the sometimes ad-hoc or arbitrary closure of informal markets on which the urban poor rely on for a large part of their food supplies, undermine their ability to access nutritious foods. To ensure the resilience of poor urban households and cities as such, policymakers and planners must take these factors into account when designing policies and long-term strategies in response to changing food environments.

3.4. Availability, accessibility, and affordability of a healthy diet

To ensure access to a healthy diet, nutritious foods must be both available and affordable. FAO (2023) defines availability as "the existence of food coming from either own production or the market" while affordability is defined as "people's financial capacity to acquire sufficient food, which in turn depends on household income and food prices". Lower incomes have a direct bearing on how much food households can afford to buy, however, food price spikes, relative prices, and food price dispersions have a significant influence on the types of food and products selected at a store or market and, as a result, may shape diets and nutrition outcomes. Affordability is hence a measure of the number of people who are not able to afford a healthy diet as opposed to those who – despite their economic means – choose not to.

Within a context where 78 percent of urban households and about half of peri-urban and rural household food consumption is derived from food purchases, food prices, and food price fluctuations are crucial factors determining household food consumption and nutrition outcomes. Unintended consequences of food hoarding – either when prices are expected to rise and shortages are to be expected – further drive up prices and exacerbate the situation.

To be able to project future patterns of food demand and craft policies accordingly, it is important to understand how food demand and consumption respond to rising incomes and which segments of a population are most likely to be threatened by hunger. Generally, the income elasticity of food demand (the percentage change in food consumption in response to a 1 percent change in income) is positive but smaller than 1, i.e. spending on food increases less than proportionally with total expenditures (Melo et al., 2015). For poor people, food makes up an important share of household spending. However, as people get richer, they tend to allocate proportionally more of that additional income to non-food items, reducing the share they spend on food. As a result, even though total spending on food increases, the share of total income devoted to food declines (Engel's Law). This also explains why, as people become richer and their daily calorie demand is fulfilled, they start spending more on the taste, quality, and diversity of their food instead of the amount of food (Jensen and Miller, 2011), i.e. the "trading up" of food consumption. In addition, and unsurprisingly, food demand is more responsive to changes in income (i.e. income elasticities are higher) for beverages, meat, fish, eggs, and dairy products, compared to foods that tend to constitute more basic diets (e.g. cereals, legumes and nuts, fruit and vegetables, and fats and oils, tubers). For most types of food, elasticities tend to be lower in urban areas or countries with a larger share of the urban population (Melo et al., 2015). **Data shows that the cost of a healthy diet in urban areas is about 1.2 times higher than**

in peri-urban areas. Additionally, the price of nutritious commodities such as vegetables and animal-sourced foods has increased much more in the past decades than the price of staples or unhealthy ingredients such as oils and sugar (Ameye et al., 2021).

Infrastructure and road networks, landlocked vs. coastal countries, and the presence of secondary towns are just some factors that impact food price structures across countries. **Analysis shows that a more dispersed level of urbanization, with a higher number of secondary towns and cities and decentralized markets served by local producers, can lower the cost of a healthy diet and hence make it more affordable to a larger number of households** (FAO, 2023). In fact, studies conducted in Kenya and Zambia show that households in peri-urban areas predominantly purchase food from open-air markets and vendors, and only a subset of households purchase their food from supermarkets (Hannah et al., 2022). This suggests that although supermarkets will continue to rise in Africa's urban areas, low- to middle-income households in smaller towns and secondary towns will likely continue to purchase food at open-air markets in the coming years. Urban planning and governance priorities and policies must hence reflect the varying trends and patterns across the rural-urban continuum to ensure that Africa's agrifood systems can meet food security and nutrition needs.

Special insert: Food environments in a fragile context

Over the past few years, a rise in the number of conflicts, protracted crises, and famine has elevated the relationship between crises and food security and nutrition to a top policy priority. While food insecurity itself can be a reason for conflict, conflicts impact food security and nutrition through direct influences such as damage to crops and arable land and indirect influences, including the diversion of labor away from the agricultural sector and in some cases the reduction of capital investments in the agricultural sector (Teodosijević, 2003; FSIN, 2021). Although starvation as a weapon of war was outlawed by UN Security Council Resolution 2417 in 2018, it has become more commonplace in several ongoing conflicts since 2010. In conflict zones, where nearly 60% or 158 million hungry people live, conflict has displaced populations, destroyed economies, and infrastructure, and led to high prices for scarce goods (Lancet, 2024). This also includes a disruption to supply chains, with less foods available and higher food prices as a result. Sudan is currently facing a famine due to conflict with nearly 18 million people experiencing acute food insecurity. Evidence shows that those living in conflict-affected regions are three times more food insecure than those living in more stable countries (Martin-Shields et al., 2018), while conflict-induced changes in food prices tend to extend over several years with profound impacts on the nutritional status and health of the affected populations (Zereyesus, 2023).

In some countries in the Sahel region, one of the politically most unstable regions of the continent, up to 40 percent of the population currently lives below the poverty line, and although malnutrition levels have improved, the situation is alarming (Mirzabaev et al., 2021; World Food Programme, 2024). For example, in Burkina Faso and Mali, the most recent

Global Hunger Index (GHI) indicates a score of around 25.5 for both countries and 35.1 and 34.6 for Niger and Chad, respectively (von Grebmer et al., 2023). In other parts of the continent too, the GHI remains at alarming levels, with Sudan scoring 27 and the Central African Republic 42.3 – ranking it last out of 125 countries ranked5.

Climate change and biodiversity loss are set to further compound those challenges, with some of the politically most fragile African countries also belonging to the countries most severely affected by climate change and biodiversity loss, including land degradation and desertification.

What is generally known is that food prices and income elasticities of micronutrients increase during economic crises (Hussein et al., 2021; Skoufias et al., 2012). However, the majority of studies operate on two ends of the food system: the impact of conflicts on agricultural production (in fisheries, livestock, and crops) vs. their effects on food security and nutrition at the other end. Moreover, a lack of comprehensive data prevents a full understanding of the mechanisms of food insecurity and changes in food environments under extreme circumstances such as armed conflicts (Béné et al., 2024).

What is known, however, are the immediate and long-term consequences of famine or acute food and nutrition insecurity in early childhood (during the first 1,000 days) including wasting and stunting, with irreversible consequences on physical and cognitive development. Moreover, the Barker hypothesis suggests that adverse nutrition in early life, including prenatally as measured by birth weight, increased susceptibility to metabolic syndrome later in life, which includes obesity, diabetes, insulin insensitivity, hypertension, and hyperlipidemia and complications that include coronary heart disease and stroke (Barker, 1990; Paneth et al. 1995; Roseboom et al. 2001; Edwards, 2017).

A better understanding of how conflicts impact the availability, access, affordability, and related food elasticities as well as nutrition outcomes, will be crucial for anticipatory planning and humanitarian responsiveness.

3.5. Food loss and waste

Food loss and waste (FLAW) is a major challenge in African agrifood systems. The simultaneous coexistence of FLAW and the prevalence of hunger, undernourishment, and malnutrition represents a failure of contemporary food systems (von Braun et al., 2023). While the reduction in FLAW is a Sustainable Development Goal (SDG) target, it can also help in meeting other SDGs, including zero hunger and a reduction in greenhouse gas (GHG) emissions (von Braun et al., 2023), meeting African continental development targets under the AU Agenda 2063, and international climate goals.

[5] The GHI combines undernourishment, child wasting, child stunting, and child mortality indicators into one index, and is a tool designed to comprehensively measure and track hunger at the global, regional, and country levels. The scores of the GHI are categorized as per the GHI Severity of Hunger Scale, with GHI scores on a 100-point scale, where 0 is the best score (no hunger) and 100 is the worst: < 9.9 (low); 10.0-19.9 (moderate); 20.0-34.9 (serious); 35-49.9 (alarming); > 50 (extremely alarming).

Cities multiply the FLAW problem manifold because of their size, the constant need for availability and the relatively low cost of food, the partly higher incomes of city dwellers compared to rural areas, a limited understanding of food production systems and their environmental impact, and the lack of refrigerated storage. Food losses in the production, processing, and marketing segments of agrifood systems are part of the problem. However, within the context of urban food systems, food waste at the retail, household, and restaurant levels is increasingly a serious problem too. Already now, FLAW constitutes over half of the solid waste produced in urban areas and creates an enormous environmental, financial, and social problem for cities (World Bank; UNECE, 2023).

Moreover, evidence of measured household and consumer food waste suggests that food waste positively correlates with income. Several studies suggest that as countries develop and household incomes grow, consumer food waste increases (opportunity cost of time and Engel's Law). Similarly, higher-income countries are hence expected to have higher levels of food waste at the household and per capita level than lower-income countries (FAO 2023). In 2011, FAO estimated that per capita food waste at consumer levels in developed regions of North America and Europe is about 95-115 kg per year, compared to a per capita food waste in SSA and South Asia of 6-11 kg per year (FAO, 2011). However, the 2021 UNEP Food Waste Index report (UNEP, 2021) paints a very different picture and suggests that previous estimates of consumer food waste significantly underestimated its scale. It also concludes that levels of household food waste (the total of edible and inedible parts) are similar for HICs, UMICs, and LMICs. Although a robust estimate is challenging due to a lack of comprehensive data, UNEP's 2021 Food Waste Report estimates food waste at the consumer level in Africa at an average of a staggering 108 kg per capita per year. With increasing rural-to-urban migration expected in the coming years coupled with a growing middle class with higher disposable incomes, these challenges will be further amplified. Reducing FLAW requires a set of targeted policy interventions, coupled with behavioral change among consumers and producers along the agrifood value chain.

Rising levels of urban malnutrition, greater availability of highly or ultra-processed foods, and a rapid rise in FLAW combined are emerging dynamics changing and shaping Africa's agrifood systems and how consumers interact with the food environments. Understanding these trends and the implications on how consumers access and consume food will be crucial as urbanization rates accelerate. Yet, despite the challenges that Africa's changing food environments present, there are also significant opportunities that – with the right set of supportive policies and

interventions in place - can have positive impacts on nutrition and health, livelihoods, and overall economic growth.

4. Opportunities of an enabling food environment

Spatial inequality in access to local markets, storing and preparing nutritious meals at home, and knowledge about nutritious food are just some of the widespread challenges in urban areas discussed above. As a result, many urban dwellers resort to fast food, such as fatty and fried food or sugary snacks that are readily available along commuter routes, at workplaces, and locally in their neighborhoods. Understanding the barriers to accessing food markets and their role in the provision of healthy foods and fresh produce is crucial when designing interventions to adapt to Africa's changing food environments.

At the same time, changing food environments also presents enormous opportunities to government planners and policymakers. Formalizing and modernizing urban food markets offer a large and fast-growing commercial opportunity to Africa's farmers. Simultaneously, informal open markets, fresh food markets, and (street) food vendors for now continue to be the most important source of household food purchases. For example, in cities across Africa, markets are a vital space for intervention in food systems education and awareness, for direct improvements to infrastructure and services, and locations for value-addition to food and income generation. **As a result, effective urban agricultural policy requires new forms of governance, consultation, and coordination, and new actors — including mayors, city councils, district governments, urban planners, public health officers, private sector companies, and industry trade associations — emerge as central to the effective functioning of agricultural input and output markets, food processing, and food safety systems. Food environments can be directly reshaped by policies, incentive structures, and regulations that address 'food entry points', and the availability, affordability, accessibility, and desirability of foods.**

Changing food environments can also result in longer, more formal, and complex food value chains that can increase the variety of nutritious foods and expand income-generating activities in off-farm employment, especially for women and youth. Farmers often gain better access to agricultural inputs and services as urban areas grow closer to rural areas and can engage in the production of higher-value crops and trade. There is hence an opportunity to tap into this trend by encouraging/stimulating the growth and consumption of climate-smart and highly nutritious (indigenous) crops.

This section provides an overview of some of the opportunities that governments and their partners can leverage when designing and implementing healthy food environment policies, strategies and interventions. These include the role of fresh food markets and their positioning within urban centers (Box 3); the role of local agroprocessing sectors in delivering nutritious foods; the role of regulation, including taxation of unhealthy foods and nutrition and environmental impact labelling; the emerging digital food environment; and lastly, measing and monitoring food environment policies.

Box 3: Fresh food markets

Various studies have shown that in cities across Africa, Asia, and also Latin America fresh food markets (street vendors, informal and farmers markets, etc.) are a significant source of urban food supply alongside retail and wholesale markets (UN-Habitat, 2022; Hannah, 2022). Fresh food markets involve moving fresh products (vegetables, fruits, meat, fish) from farms to markets across the urban-rural continuum. Characteristically fresh food markets also bring together different actors (such as producers, vendors, local governments, market committees and managers, communities, etc.) and are positioned at the intersection of multiple sectoral policies (agriculture, health, infrastructure, transport, energy, etc.), and multiple enterprises (including the ''hidden middle', including micro, small, and medium enterprises, farmers' and women's cooperatives). Beyond their complexity, well-designed and well-functioning fresh food markets have the potential to be one of the key entry points for addressing some of the most pressing challenges that the food sector is facing, including resilience to climate change, biodiversity protection, ensuring food security, and improving nutrition. Informal markets were and are especially critical to urban communities in LMICs including in Africa and South Asia where regular access to sufficient and safe food with dietary adequacy is often outside the reach of the (rural and urban) poor.

Several studies in Africa found that a large proportion of the urban poor rely heavily on open-air markets to access food. For example, a study of 11 southern African cities found that 70 percent of households frequently obtained food from open-air markets (Frayne et al., 2010), while a study in 18 secondary cities in Kenya and Zambia showed that most households source their food from open-air markets and vendors, as opposed to more formalized and modern supermarkets (Hannah et al., 2022). In Kenya, 30 percent and 28 percent of respondents reported purchasing their food at vendors and open-air markets, respectively. In Zambia, 78 percent of respondents reported purchasing their food at open-air markets, followed by local shops (12 percent) and vendors (5 percent). Only 5 percent of respondents in Zambia purchased their food at supermarkets, compared to 22 percent in Kenya.

Studies have shown that households value markets in terms of the relational experiences that they provide, meeting their dietary preferences, and offering product quality and availability that is not always guaranteed or matched at supermarkets, especially for fruits and vegetables (Hannah et al., 2022). Fresh food/open-air markets have also shown a high degree of resilience during the widespread shutdowns in cities across during the Covid-19 pandemic (UN-Habitat, 2022) and in the context of secondary cities, offer convenience, easier accessibility, and competitive pricing structures (Hannah et al., 2022). In fact, Kenya is home to one of the largest

open-air markets in Central and East Africa (Karatina), serving as a hub facilitating economic exchange between rural and urban areas and trade across the region (Mbataru, 2017).

Fresh food/open-air markets linking rural and urban communities are likely to continue playing an important role in supplying fresh produce to consumers, particularly in peri-urban areas and secondary cities. This is driven by socio-economic, cultural, and dietary preferences and purchasing power. This calls for support by national and municipal governments through investments in upgrading transportation and market infrastructure and a supportive policy and regulatory environment to ensure that fresh food markets remain an important pillar of inclusive and sustainable urban food environments.

4.1. Local agro-processing sector and value addition

Africa's economic growth over the past two decades, coupled with urbanization and demographic changes, has accelerated food demand and changed the patterns of what type of food is being demanded. This has resulted in rapid increases in food imports, particularly of processed goods, despite a relatively strong agricultural sector growth performance in many African countries (Christiaensen 2020; Seleshi 2021). A thriving and competitive local agro-processing sector would hence not only allow countries to deliver on the African Union's Agenda 2063 targets of economic growth, wealth generation, and employment (Aspiration 1) (AUC 2015), it would also reduce food import dependencies and vulnerability to global supply shocks, and generate opportunities for significant incremental wealth generation among rural and urban populations. In addition, the agro-processing sector can play a central role in improving diets and achieving nutrition outcomes, and addressing the trade-offs of women's time use: while women become more economically active, pursuing employment outside of the home, in many countries, preparing meals at home remain the sole responsibility of women. However, this must not replace wider efforts to address systemic gender inequalities

As discussed above, a greater consumption of ultra-processed HFSS foods will exacerbate the rising prevalence of overweight, obesity, and NCDs in the continent. However, agro-processing also has the potential to increase the availability of healthy foods, including underutilized crops, traditional staples, and dairy by offering them in convenient forms that are more accessible for urban households and can allow consumers to incorporate nutritious choices with longer shelf life that would otherwise not be available (Badiane et al., 2022; Khonje et al. 2020; Hülsen et al., 2024). This can also be coupled with the fortification of products with important micronutrients. For example, consumption of millet and fonio – nutritious, local, largely underutilized crops with important climate-resilient features - has risen in West Africa as ready-

to-cook and ready-to-eat products become more widely available. Moreover, nutrient density in dried fish is much higher than in fresh fish and is one of the most cost-effective sources of several nutrients (Ignowski et al., 2023).

As the dietary transition continues, attention needs to be paid to strategies that harness the potential of processing to increase the availability of healthy foods while addressing the significant risks of contributing to growing health issues. The nutritional content of processed products depends on product composition, processing technology, and the regulatory environment. Africa's processing sector is still at the beginning of its growth surge. As the sector matures and formalizes, norms and standards need to be developed—and firms can be supported to acquire the capacities to adhere to them—to mitigate the health risks of UPFs and to maximize the sector's contribution to healthy diets. Diets across the continent have changed markedly and are continuing to do so. Trends indicate that unprocessed produce will feature less prominently in diets, particularly in the more affluent urban areas and among the growing middle class driven by consumer demand, but also supply through the rise of supermarkets. It is also through competitive and well-performing processing sectors that African smallholders will be positioned to capture larger shares of the fast-growing urban demand (Badiane et al., 2022).

To minimize the health risks of processed foods, significant efforts will be required, including the development and adoption of norms and standards for nutrient content, the identification of methods to preserve or enhance nutrient content during processing, and education for consumers on the nutritional value of different products. Moreover, support will be required to strengthen the capacity of processing firms to meet standards and ensure transparency throughout the food system (Badiane et al., 2022).

4.2. Determinants of food choices: Understanding desirability as a driver of food choices

Nutrition and dietary habits are the consequences of several interrelated food choice factors influencing food consumption. *Food choice,* defined as "a process by which people select, acquire, prepare and consume foods which result from the competing, reinforcing and interacting influences of a variety of factors" (Karanja et al., 2022), interlinks with the *food environment* which describes the *spaces* within which consumers interact and make decisions about what to buy, prepare and consume determined by physical access, affordability, and convenience (see section 3). A complementing area that has so far received less attention is the

individual-based motives of food choices which are shaped by individual preferences, socio-economic conditions, the social environment (family, friends), psychological factors and personal attitudes, exposure and susceptibility to marketing, cultural traditions and habits (Blake et al., 2021). A 2015 study (Herforth and Ahmed, 2015) highlights that the "desirability" of food items is an often-overlooked element of food choices, while a systematic review of 110 studies by Karanja et al. in 2022 mapped the drivers of food choices in LMICs. Yet, research and knowledge gaps remain. A better understanding of the types of influences on food choices, how they interact with each other, and how they link to context-specific food environments will be crucial in shifting the supply-side components of the agrifood systems and addressing barriers to consumer behavioral change while enabling policymakers to design targeted interventions to shift consumer behavior towards healthier diets (Fanzo and Davis, 2021; Herforth and Ahmed, 2015).

Much focus is currently being directed on understanding the dynamics of changing food environments, with a focus on the accessibility, affordability, and convenience of food purchasing, preparation, and consumption. However, as pointed out by Herforth and Ahmed (2015), "consumption decisions cannot only be explained by decision-making having to do with monetary and time costs". An additional layer that has a direct bearing on food choices is sociocultural (Herforth and Ahmed, 2015) or socioecological or individual-based motives (Karanja et al., 2022). These motives determine what food is considered "desirable" and include personal preferences and taste, psychological factors, sociocultural factors, sensory appeal, nutrition and health perceptions, ethical concerns, social interactions, and socio-demographic variables (Karanja et al., 2022). Table 3 shows a summary of those key motives. Within the context of LMICs and amongst lower-income households in particular, access and affordability may still be the dominant factors influencing what types of food people purchase and consume. Amongst the middle class and as incomes rise, other individual-based motives may gain more importance on what food to spend the additional disposable income. A better understanding of these motives coupled with mainstreaming nutrition education can contribute to adopting healthier eating patterns.

Table 3: Individual-based motives of food choices

Motive	
Nutrition information	- Food labelling, such as the nutri-score, traffic light system, Fairtrade, or organic or environmental impact labeling, can influence demand and individual preferences for specific food items
Advertising/product placement	- Increased access to the internet, TV, and social media and the rise of supermarkets exposes the consumer to higher levels of product marketing - Marketing, food logos, and brand awareness have been found to enhance the sensation of hunger and stimulate appetite hormones for ultra-processed foods
Nutritional education /knowledge norms	- Consumer education campaigns and social marketing can influence attitudes about consuming certain foods Examples include community engagement and point-of-purchase awareness campaigns and information
Food safety	- Food safety and hygiene are critical determinants of food choices, especially for fruits, vegetables, and animal-source products - Factors influencing consumer food choice include vendor trust, food storage environment, and food freshness
Socio-cultural factors	- Food taboos, beliefs, and traditions restricting the consumption of certain foods, especially for children and pregnant or lactating women - Food and food abundance as a status symbol - The consumer perception of traditional crops as “poor man’s food” - Spousal, children’s, peers, and parental preferences and habits; morbidities (individuals’ and families’ knowledge and perceptions about infectious and noncommunicable diseases); cultural sharing via migration; and creative agency influenced decision-making about food purchasing, preparation, and consumption - A “dietary acculturation” that sees the diets of immigrants adapt to the new home country or city with multi-generational effects - Age

Author’s compilation based on Karanja et al. (2022); Herforth and Ahmed (2015); Ogundijo et al. (2022); Constantinides et al. (2021)

While access to information and knowledge is key, influencing and sustainably changingconsumer behavior is extremely difficult. Nutrition awareness education hence needs to be embedded into primary and secondary school curricula and coupled with better regulating the advertisement of unhealthy foods and snacks to children to facilitate a long-term impact on changing consumption patterns. This is crucial, as habits and beliefs acquired during childhood and at home will shape many food preferences later in life (Mahmood et al., 2021). This must be backed by continuous promotion of healthier consumption patterns, and awareness and education campaigns targeting women and men of all ages (Malabo Montpellier Panel, 2017).

A further area that has gained much traction in recent years is food labeling, including nutrition and environmental impact labeling (hereafter: ecolabelling). Simplified nutrition labeling schemes provide supplementary and concise nutritional information in the form of an easy-to-understand label displayed on food products (OECD, 2023), while ecolabels can support consumers to make more sustainable choices (Potter et al., 2023).

4.3. Government levers

According to WHO (2022), deaths attributable to diet-related risk factors and NCDs account for about 19% of all global mortality. While this is a substantial public health challenge, it also places a significant economic burden on countries, through productivity losses and high levels of social and healthcare expenditures. In OECD countries, obesity alone is estimated to cost 3.3% of GDP (Pineda et al., 2024). However, there are several population-based interventions, mechanisms and tools governments can employ to nudge the food and beverage industry towards supplying more nutritious food options while supporting consumers to adopt healthier eating patterns. This includes nutrition guidelines, regulation and fiscal measure, and front of package labelling.

4.3.1. Nutrition guidelines

Globally, more than 100 countries have developed, or are in the process of developing, food-based dietary guidelines. Regional guidelines have also been developed, for example, the guide “Promoting a healthy diet for the WHO Eastern Mediterranean region”. Most countries in Asia and the Pacific, Europe, North America, Latin America and the Caribbean have national dietary guidelines. Food-based dietary guidelines have also been developed in a few countries in the Near East and Africa, including (as of 2020) in Benin, Kenya, Namibia, Nigeria, Sierra Leone, and South Africa.

The European Food Safety Authority (EFSA) has encouraged Member States of the European Union to establish dietary recommendations focused on food groups based on dietary reference values. In this context, The World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO) have promoted the development of national food-based dietary recommendations in line with the Sustainable Healthy Diets; that is, considering the economic, cultural, social, and environmental conditions of each country (Camara et al., 2021).

Guidelines are an important policy tool that can contribute to the prevention of malnutrition in all its forms, promote human health, and reduce environmental impact. It can encourage and nudge individuals as well as institutions (such as kindergartens, schools, office canteens, hospitals, and jails) to opt for more nutritious food options and adjust consumption patterns and behaviours accordingly. Moreover, it provides leverage for civil society organizations – such as consumer rights groups – to demand their right to nutritious and healthy diets and for governments to implement regulation and fiscal measures to steer the food and beverage industry towards supplying healthier food options that are affordable and attractive to consumers.

4.3.2. Fiscal measures and regulation

As discussed in section 3.2, governments must ensure that the burden of responsibility of consuming a healthy diet is shifted away from the consumer only. Through carefully crafted regulation, norms and standards as well as fiscal measures, such as taxation, the food and beverage industry can be nudged and incentivized to readily supply healthier food options at affordable prices.

4.3.2.1. Taxation

Diet-related health taxes are increasingly recognized and applied as NCD prevention policy tools (Pineda et al, 2024). As of 2023, more than 50 countries globally have moved towards introducing a sugar-sweetened beverage (SSB) tax while 18 countries introduced taxes on foods that are high in fat, salt or sugar (HFSS) (Obesity Evidence Hub; World Cancer Research Fund International, 2024). Studies have shown that taxes, in particular on SSBs but also on HFSS reduce the sale, purchase, and consumption of unhealthy taxed foods, with positive impacts on the rates of obesity and other diet-related NCDs, especially where taxes are combined with subsidies for healthier foods. It has also led to a reformulation of products to reduce sugar levels. A review by Andreyeva et al. (2022) of SSB taxes implemented in different countries showed

that demand for SSBs is elastic to tax-induced price increases, with a mean reduction in SSB sales of 15%. The evidence base of the benefits of taxing HFSS foods remains limited, but studies so far show HFSS taxes lead to a decrease in purchasing and intake of HFSS foods as well as a reduced BMI or obesity rates (Aguilar et al. 2021; Taillie et al., 2017; Biro, 2021; Waterlander et al., 2019) and there are some countries leading the way (Boxes 5, 6, and 7).

Box 5: Taxation of unhealthy foods in Mexico

Globally, Mexico has led the way in implementing taxes on unhealthy food options, successfully helping to tackle obesity and related health issues. An 8% tax on non-essential, energy-dense foods - including sweets, chocolates, sugary cereals, crisps, and savory snacks – introduced in 2014 led to a reduction in the sale of taxed foods of 18% in supermarkets and up to 40% in other retailers. Low-income groups, who also made up the largest share of consumers prior to the tax being introduced, showed the biggest drop in consumption once the tax was implemented (Pineda et al., 2024).

Box 6: Taxing SSBs – the Health Promotion Levy

Within Africa, South Africa has one of the highest burdens regarding nutrition-related NCDs, which occurred simultaneously with a rapid rise of SSB sales. In 2018, the South African government, in response to a recommendation of the World Health Organisation, introduced a tax on SSBs known as the Health Promotion Levy (HPL) in an attempt to reduce citizens' sugar intake and to curb obesity in the country. The HPL equates to 2.1 cents per gram of sugar above a 4 gram sugar threshold per 100 millilitres – which amounts to a levy of approximately 11% on the price. As of June 2022, the sugar tax alone had raised more than R10 billion (US$750 million) in revenues that went directly to the treasury. Yet, only a mere R24 million (US$1.3 million) in 2019/2020 and R14 million (US$0.7 million) in 2020/2021 was allocated and re-invested to expenditure on “health promotion” (South African Revenue Service, 2024). The HPL is said to have led to a fall of urban household purchases of taxable beverages by 29% with sugar from these purchases falling by 51%. Importantly, lower socioeconomic urban households reduced their volume and grams of sugar from SSBs by 32%% and 57%, respectively (Hofman et al., 2021). However, other studies suggest that SSBs were substituted with other sugar-containing food items, leading to adverse compensatory behaviour, such as increased consumption of alternative but similarly unhealthy foods and beverages (Smit et al., 2023).

Box 7: Excise tax on HFSS foods

In 2020, Ethiopia introduced an Excise Tax Directive with higher taxes for HFSS foods including a 30-50% excise tax on edible fats and oils and their products, a 20% tax on any type of sugar (solid or liquid) excluding molasses, maple sugar, and maple syrup, as well as a 30% tax on chewing gums, confectionery, and cocoa-containing foods (UNC-Chapel Hill, 2023). The Directive was introduced in alignment with the National Nutrition Programme (NNP II) and the NCD Action Plan which had called for regulatory approaches to address unhealthy lifestyles and diets (replacing trans-fats and saturated fats, reducing salt and sugar), through the production and marketing of healthy foods while minimizing the effect of unhealthy marketing, front-of-package labeling of sugar and salt and taxation of SSBs (Government of Ethiopia, 2022).

As more countries move towards implementing taxes on SSBs and HFSS foods, nuanced, country-and context-specific approaches will have to be developed. These must factor in the effects on consumer behavior, such as unhealthy food substitution, impacts on producers and smaller retailers, as well as equity impacts such as financial impacts on households. A systematic review by Pineda et al. (2024) of 20 studies on the impacts of HFSS revealed that when taxes were salient to consumers – i.e. an effective communication and presentation of information to raise consumer awareness - and coupled with subsidies on healthy foods (low-fat dairy, fruits and vegetables, whole grain alternatives) there was an increased uptake of healthier substitutes and a decreased purchase of taxed foods as well as more lasting consumer behavior change. Moreover, the revenue generated from a high-rate tax on HFSS foods or SSBs could be used to subsidize healthier food options. For LMICs, where affordability is one of the key drivers of overconsumption of unhealthy snacks, foods, and drinks, this could be an important strategy in helping retailers of healthier options to compete with heavily promoted UPFs.

4.3.2.2. Regulating marketing of unhealthy foods

It is known that healthy dietary practices manifest early in life and form the foundation for good nutrition and healthy development; while food marketing has long been recognized to shape food preferences and consumption patterns, especially amongst children and young people. Indeed, a review by WHO in 2022 revealed that the most frequently advertised/marketed food categories included SSBs and HFSS foods such as chocolate and confectionery, savory snacks, sweet bakery items, breakfast cereals, and dairy products. The review also showed that food marketing promoting less healthy foods was particularly prevalent in settings where children meet (e.g. schools, sports clubs) and, in the context of TV advertisement, more frequent during children's typical viewing times, during school holidays, and on children's channels, including product placements (WHO, 2022).

Evidence shows that food advertising exposure influences not only children's food-related beliefs and attitudes and their food consumption behaviours but also their health outcomes (e.g. BMI, prevalence of dental caries) (Boyland et al., 2016; WHO 2022; Obesity Evidence Hub, 2024). Because of the direct link between marketing of unhealthy foods and drinks, and overweight and obesity in children, in 2010 the World Health Assembly endorsed a set of recommendations and implemented voluntary pledges and mandatory regulations to guide countries' efforts in designing new and/or strengthening existing policies on food marketing communications to children to reduce the impact of marketing of unhealthy foods and drinks on their health.

As a result, several countries have moved towards implementing codes of conduct, including the EU's Code of Conduct for Responsible Food Business and Marketing Practices, Australia's Food and Beverages Advertising Code, or Canada's Code for the Responsible Advertising of Food and Beverage Products to Children, while WHO in 2023 released a new tool, the WHO/Europe Nutrient Profile Model (NPM) which enables the classification of food products to determine whether they are healthy enough to be advertised to children. The tool can be used by decision-makers to design policies that improve the overall nutritional quality of diets and to support monitoring initiatives to ensure the promotion of healthier diets to lower the risks of overweight, obesity and nutrition-related NCDs. Another tool, the Nutrient and Promotion Profile Model (NPPM) developed by the WHO Collaborating Centre for Nutritional Epidemiology at the University of Leeds uses information on product packaging to assess commercial baby foods for infants up to 3 years old, while 146 WHO Members States have signed the Code of Marketing of Breast-Milk Substitutes, adopted by the World Health Assembly in 1981.

Box 8: The Code of Marketing of Breast-Milk Substitutes

In Africa, most countries have adopted or reinforced measures against inappropriate marketing of breast milk substitutes. The Code of Marketing of Breast-Milk Substitutes, adopted by the World Health Assembly in 1981, plays a crucial role in global efforts to help mothers make the best possible decisions about infant feeding based on impartial information and free of commercial influences, and to be fully supported in doing so. As of March 2024, 146 WHO Members States, had adopted legal measures to implement at least some of the provisions in the Code. Of these, 33 countries have measures in place that are substantially aligned with the Code. A further 40 countries have measures that are moderately aligned and 73 have included some provisions; while 48 have no legal measures at all. Alignment with the Code is highest in the WHO African, Eastern Mediterranean, and South-East Asia regions, with 37 African countries having at least some measures in place (WHO and UNICEF, 2024).

4.3.3. Nutrition labelling

To counter the trends of rising overweight and obesity levels and the associated NCDs across the world (section 2), in 2022, 44 countries globally introduced simplified nutrition labeling systems (also: front-of-package labeling (FOPL)), including the Nutrition Facts Panel (USA); menu calorie labels; "traffic light" and Nutri Score labels (Europe); logos such as "Green Keyhole" (Nordic European countries), "Choice" (Netherlands), and "Heart-Check" (USA); and other nutrition- or health-related claims (Giner et al., 2023; Shangguan et al., 2019). According to the international Codex guidelines CXG 2-1985[6], nutritional labeling consists of the nutrient declaration and optional supplementary nutritional information usually at the back of a food item. Simplified FOPL schemes, such as the ones mentioned above, provide supplementary nutritional information in the form of an easy-to-understand, attention-grabbing, and easily understandable label displayed on food products or via apps or online shopping tools (Bopape et al., 2022a). These schemes can be implemented on a voluntary or a mandatory basis.

While countries worldwide are increasingly moving towards introducing nutrition labeling, Nordic European countries have been frontrunners in the implementation of simplified nutrition labeling schemes. In 1989, Sweden became the first OECD country to implement a simplified nutrition label voluntarily; in 1993, Finland introduced a mandatory "high salt content" label to reduce its citizens' intake of salt from manufactured food products; and in 2013, the UK launched the voluntary traffic light food labeling scheme with red, amber and green color-coding to display the amount of energy, fat, saturated fat, sugars, and salt in food products (Giner et al., 2023). In 2014, New Zealand and Australia implemented voluntarily the Health Star Rating system, which rates food products from half a star to 5 stars, helping consumers choose a healthier option within the same food category. France implemented the voluntary Nutri-Score summary rating scheme in 2017, which assigns a grade to food products from E (lowest nutritional value) to A (highest nutritional value) based on a score. Since then, six other European countries have adopted or decided to adopt the Nutri-Score (Giner et al., 2023). Although the majority of labeling regulations exist in Europe, North America, Australia, and New Zealand, some countries in Asia, Africa, the Middle East, and Latin America have initiated regulations (Mandle et al., 2015). For example, in 2016, Chile introduced the "High-in" labels to signal consumers unhealthier food choices (Giner et al., 2023). However, within the context of LMICs, in particular in Africa, few governments have moved to introduce nutrition labeling.

[6] Codex Alimentarius: https://www.fao.org/fao-who-codexalimentarius/thematic-areas/nutrition-labelling/en/

Box 9: Food labelling in South Africa

South Africa is the only African country (at the time of writing) that is in the process of introducing mandatory nutrition labeling requirements through an updated draft regulation in 20237, requiring all manufacturers to include a comprehensive nutrition information table at the back of the food package as well as front-of-pack labeling (FOPL) for some food items.8 Like many countries worldwide, South Africa faces high rates of obesity and other diet-related diseases including type 2 diabetes, hypertension, and heart disease — all exacerbated by consuming a diet high in sugar, sodium, or saturated fat. Half of all adults are either overweight (23 percent) or obese (27 percent) (Boachie et al., 2022) and NCDs accounted for 59.3 percent of reported deaths in 2018 (government of South Africa, 2021). In 2023, the Government of South Africa launched the "Strategy for the Prevention and Management of Obesity in South Africa (2023-2028)" to reduce the prevalence of obesity and diet-related NCDs in the population.9 The Strategy includes specific objectives on education and communication at different levels to prevent and manage obesity and policy and legislation support a healthy food environment, including recommendations on the marketing and taxation of unhealthy foods. Currently, the food industry in South Africa applies a voluntary GDA (Guideline Daily Amounts). However, a recent study from South Africa comparing three different FOPL schemes found that a nutrient warning label could help more participants correctly identify unhealthy products and more strongly reduce their intention to purchase those products, compared to a "traffic light" label or the current GDA labels (Bopape et al., 2022a). Another study amongst parents in South Africa's Limpopo Province revealed that although some parents felt undeterred by the warning labels, others felt they would alter their food purchasing reduce the frequency or the amount purchased, or completely stop purchasing labelled products for their children. Factors such as pressure from children, taste, poor nutrition knowledge, and affordability seemed to influence parental food selection (Bopape et al., 2022b).

An increasing number of studies are analyzing the effects of food labeling on consumer behaviors. However, the results have been inconsistent, and the effectiveness of food labeling remains unclear. A 2019 systematic review and meta-analysis of 60 studies, including 111 intervention arms and more than two million observations in 11 countries, found that food labeling reduced consumer consumption of total energy and total fat while increasing consumption of vegetables. Food labeling, however, did not significantly alter consumer intakes related to other dietary targets, including sodium, total carbohydrates, protein, or saturated fat.

[7] The South African Department of Health has published draft regulations for the labelling and advertising of foodstuffs, known as R3337. These regulations are an update to the current regulations, R146, which were published in 2010. Draft legislation (R3337) was published for comment and the comment period has now closed. The legislation is still under revision (as of 11 April 2024)

[8] Nigeria, Zambia and Zimbabwe have voluntary guidelines on food labelling: https://www.globalfoodresearchprogram.org/wp-content/uploads/2022/08/FOP_Regs_maps_2022_08.pdf

[9] https://www.health.gov.za/wp-content/uploads/2023/05/Obesity-Strategy-2023-2028_Final_Approved.pdf

It also revealed that food labeling altered industry formulations for sodium and trans fat, but did not significantly affect product formulations for total energy, saturated fat, or dietary fiber (Shangguan et al., 2019). Another systematic review by Mandle et al. (2015) spanning 34 studies across 22 LMICs (including Botswana, Ghana, Lesotho, Malawi, Mauritius, Nigeria, South Africa, Morocco, and Tunisia) showed that several demographic factors were linked to consumer label use and understanding, including education, socio-economic status, gender, age, household size, family status, and ethnicity.

The fact that a warning labeling approach in South Africa, as well as in other countries including Mexico, showed a higher potential to enable consumers to identify and discourage purchasing unhealthy products – as opposed to the more widely used traffic light schemes – underlines the importance of further research into how nutrition labels are received in emerging economies, especially also among the urban and rural poor, to assess the effectiveness of different labeling policies. This will allow governments to craft carefully designed and context-specific guidelines and pathways for collaboration with the private sector and food industry.

4.3.4. Environmental impact labelling

At the same time as there is an urgent need to move towards healthier diets, this needs to take place within planetary boundaries (Willett et al., 2019). One pathway to change individuals' dietary choices can be through the use of environmental sustainability/impact labels (hereafter: ecolabels). Over the past years, there has been a surge in the supply of quantified environmental impact information in food systems while consumer interest too is increasing (Deconinck, 2023). Ecolabels are defined as "information or claims provided with a product that tell consumers about the quality, features or production methods that reduce environmental impact, aiming to facilitate informed decision-making" (Thogersen et al., 2010). A systematic review by Potter et al. (2021) of 56 studies and 76 interventions on the effect of ecolabels on the selection, purchase, and/or consumption of more environmentally sustainable food and drink products found that that ecolabels can promote the selection, purchase and consumption of more sustainable food and drinks. At the same time, ecolabelling can also act as an effective tool to enhance trade and access for African products to international markets. Today, several types of environmental labeling exist, including those classified by the International Organization for Standardization:[10]

[10] https://www.unep.org/explore-topics/resource-efficiency/what-we-do/responsible-industry/eco-labelling

- ISO Type I labels are those often referred to as ecolabels, and identify the overall environmental preference of a product within a product category based upon life cycle considerations. In contrast to a self-styled environmental symbol or claim statement developed by a manufacturer or service provider, an ecolabel is awarded by an impartial third party to products that meet environmental leadership criteria. They are also multi-criteria and multi-sectoral
- ISO Type I-like labels (often referred to as "certification schemes" or "sustainability labeling") share the same characteristics as Type I but often are focused on specific impacts (i.e. energy consumption, agricultural practice) and applied only to a specific sector (i.e. energy-using appliances, agricultural commodities), such as Organic labels or Rainforest Alliance labels
- ISO Type II is a self-declared environmental label (often a single attribute, sometimes a company's environmental logo)
- ISO Type III is a product declaration that provides more detailed quantitative information about products. It takes the form of a matrix and is similar to declarations of the nutritional characteristics of products.

Further research will be required, to what degree the design of labels, the type of information being presented, the presence of a certification label, or socio-demographic characteristics (e.g., gender, level of education) impact the relevance of ecolabels. Some studies also suggest that although sustainability standards can help improve the sustainability of production processes in certain contexts, they are insufficient to ensure food system sustainability at scale and do not advance equity objectives in agrifood supply chains (Meemken et al., 2021). In addition, the use of different methodologies and reporting requirements could lead to a fragmented landscape, while there is also a risk that poor producers, particularly in LMICs, will be disproportionately affected by the rapid introduction of ecolabels and standards (Deconinck, 2023). The potential for a combined system of eco-labeling with nutrition labeling, or the use of eco-labels only on products meeting certain nutritional criteria, is being explored. However, a lack of harmonization between nutrition, eco, and animal welfare labels could lead to consumer frustration or confusion and work by Michiel De Bauw (2022) finds that consumers will likely only consider one of the two. There is hence an urgent need for coordination by governments and the private sector to avoid such an outcome and to ensure that initiatives are evidence-based and match context-specific requirements and needs.

4.4. The digital food environment: an emerging (research) area

The application and use of digital technologies have already transformed and disrupted food environments and the way food is being produced and marketed (Malabo Montpellier Panel, 2019). At the same time, the spread of digital technologies is increasingly also affecting what food is purchased and consumed. The adoption of smart technology has expanded consumers' access to home grocery or meal delivery services; social media is reshaping food advertising practices; and AI-driven techniques are having a profound impact on how the food industry is targeting consumers. The increased use of digital technology over the past two decades has led to the rise of online food retail services, including food delivery apps, online groceries, and meal kits (Bennett et al., 2023). These services improve access to food and make food purchasing more convenient. Consumers now have more access to both unhealthy foods through food delivery apps and healthy foods through online groceries. While these developments are no unknowns, there is still a limited understanding of how exactly these trends shape food environments, i.e. how they change how consumers interact with food (Shen, J. et al., 2023).

While this may currently be a trend observed primarily in middle- and high-income countries, for many LMICs, including African countries, with a growing young population and middle class, a rapid spread of mobile technologies and internet penetration, and a meteoric rise in social media users (about 5 billion users in January 2024[11]), a better understanding of the digital food environment will be crucial when crafting policies and strategies to achieve better nutrition outcomes.

Granheim (2019) defines the digital food environment as "the digital components that may be part of food environments and influence health and nutrition. They are composed of digital actors (such as governments, academia, the food industry, and digital influencers) who perform digital activities (such as digital health promotion, digital food marketing, and information sharing) in digital settings (such as social networking sites, websites, blogs, smartphone apps)". A systematic review of 357 studies published between 2000 and 2019 on the topic of digital food environments showed that digitalization is impacting all dimensions of the food environment, and enabling the emergence of new forms of buying and selling food,

[11] Figures from 2022 indicate that just over 56 percent of social media users were in Asia, followed by North and South America with 9.47 percent and 6.68 percent, respectively. Although social media users in Africa still constitute a small share ranging from 0,46percent in Central Africa to 3,36percent in Northern Africa, numbers are set to rise. Statista. (June 15, 2022). Distribution of worldwide social media users in 2022, by region [Graph]. In *Statista*. Retrieved April 16, 2024, from https://www.statista.com/statistics/295619/regional-distribution-of-social-media-users-worldwide/

such as online grocery shopping and online food delivery, which may be changing the availability of foods and affecting the physical distance to shops and time allocated for shopping (Granheim et al., 2021). Changes in availability and access to food could potentially help mitigate food deserts in more rural areas, while at the same time, they could lead to an increased availability and consumption of unhealthy foods, or an increased preference for purchasing packaged food given a longer shelf life.

Moreover, new forms of digital food marketing and social media can influence individual food choices, preferences, and consumption behaviors. **Social media has changed how people are exposed to, use, and engage with information. While people now consume information in a planned manner by deliberately searching for it or actively and purposively visiting sources of information, they are also increasingly exposed to it in an incidental manner. This can be the result of other internet searches or social-media activities, such as visiting a social-networking sites such as Instagram or TikTok as well as through being exposed to targeted nutrition information or food advertising tailored through algorithms** (Granheim, 2019). As such, consumers – in particular children or young adults - may be more susceptible to adopting diets common in other regions of the world or as propagated by social media "influencers" (Añaña et al., 2023). There is an additional risk that people without the right expertise, knowledge, or credentials share nutrition information online thereby shaping people's beliefs and attitudes about food and impacting eating habits.

Current food environment frameworks give little recognition to the role of digitalization in shaping food availability, acquisition, and consumption, and the potential implications for healthy diets. However, given current trends, more research and a better understanding of how digital technologies are likely to shape Africa's food environments will be essential for effective policy design. Indeed, more research into leveraging the opportunities presented by a digital food environment could conversely contribute to healthier and sustainable diets.

Much research is being done to gain a better understanding of how access, affordability, and convenience shape how people interact with food environments and the implications on their dietary health. This also includes personal, individual factors influencing food choices, such as individual preferences and sociocultural contexts. Moreover, the changing dynamics of food environments not only implies challenges but also offers significant opportunities, that, if leveraged, can contribute to healthier and sustainable diets and improved nutrition outcomes. This includes a continued strong role of fresh food markets, a thriving local agro-processing sector that harnesses local – often underutilized – crops and focuses on the supply of healthier

crops, the use of new technologies as well as interventions to raise consumer awareness and shift behaviors, such as food labeling.

4.5. Monitoring food environments

While it is widely acknowledged that food environments are changing, there are still many unknowns. The exact realities of changing food environments and related drivers are not yet fully understood. There is also little evidence on those governments actions and policies, particularly in LICs and LMICs, that have proven successful in addressing the challenges of changing food environments and in how far they are context-specific or replicable in other settings. Neither is there a solid understanding of the unintended consequences of some of those policies. Yet, in order to make progress in controlling dietary risk factors associated with nutrition-related NCDs and at scale, an understanding of the status and progress in implementing food environment relevant policies, regulations, and interventions by governments is required (Laar et al., 2020).

One such tool is the International Network for Food and Obesity/Non-communicable Diseases Research, Monitoring and Action Support (INFORMAS), which was set up to monitor and benchmark food environments and policies globally. INFORMAS seeks to increase the accountability of governments and the food industry for action to reduce nutrition-related NCDs. In 2013, the Network developed the Healthy Food Environment Policy Index (Food-EPI) to support governments in adopting policies to improve the food environment. The Food-EPI is an international standardized tool that comprises 47 'good practice' indicators across seven food environment *policy domains* (food composition, food labeling, food promotion, food provision, food retail, food prices, food trade, and investment) and six *infrastructure support domains* (leadership, governance, monitoring and intelligence, funding, and resources, platforms for interaction, workforce development, health-in-all policies) that influence food environments. The Food-EPI tool and associated process – through national expert panels - can help identify critical gaps in national policy action, and support the identification and prioritization of actions to address them, by comparing national performance with international best practices.

However, currently, only six African countries (Ethiopia, Ghana, Kenya, Nigeria, South Africa, Uganda) are part of the Food-EPI and data is shared only sporadically. There is an opportunity to link reporting on healthy food environment policies to continental frameworks such as the

post-Malabo Declaration, or international processes such as the implementation of countries' UNFSS national pathways.

5. Food environment dynamics in two African countries: Tanzania and Malawi

Food environments are changing across the continent. This section provides an analysis of how food environments are changing and adapting in two African countries, namely Tanzania and Malawi. Drawing on data collected in five regions in Tanzania and six districts in Malawi, the findings provide important insights into food consumption patterns and dietary health between rural and urban areas.

5.1. Tanzania: How dietary quality differs between rural and urban areas in Tanzania

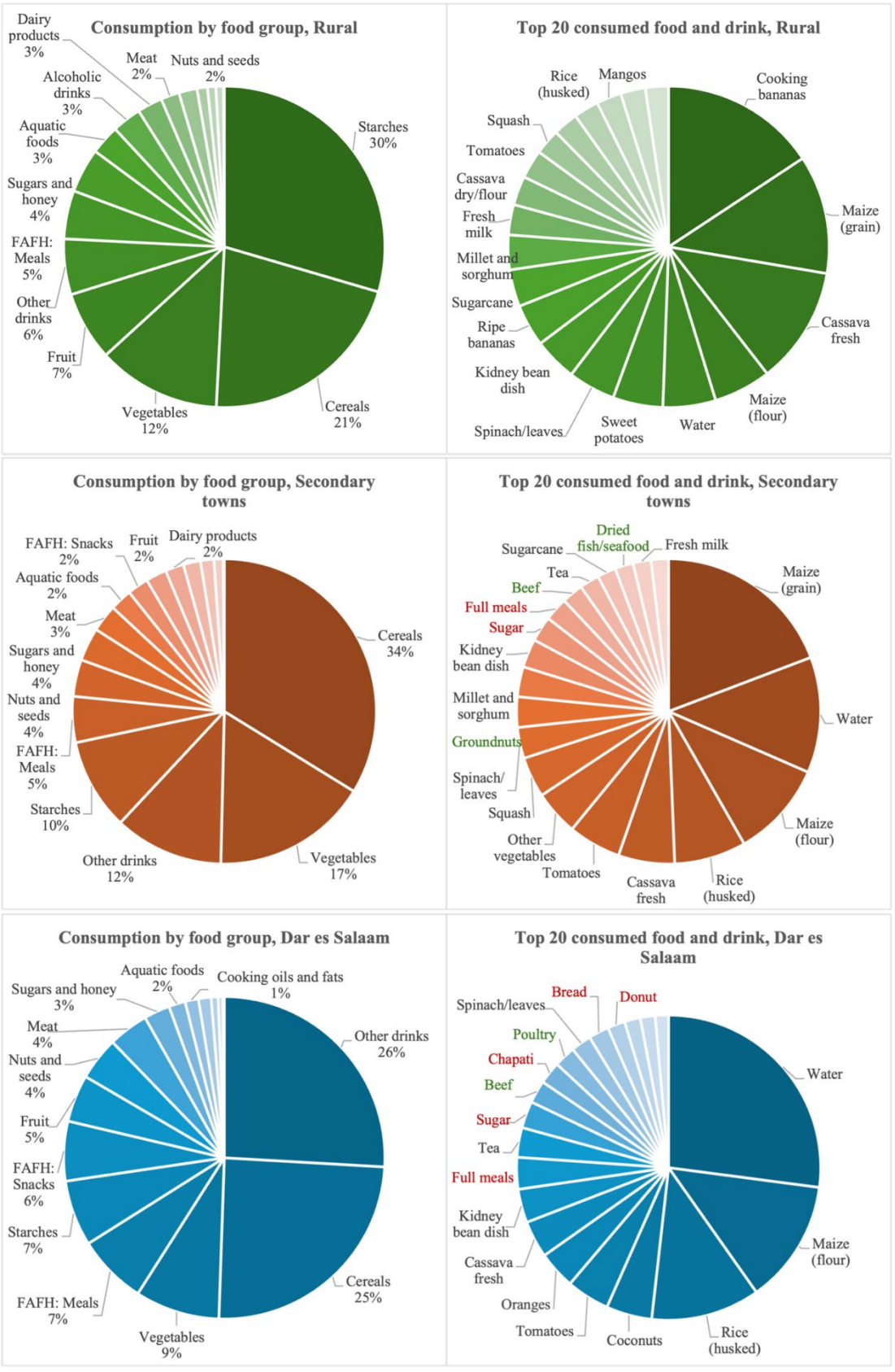
In Tanzania, about 35 percent of the population lives in urban areas (FAO & ECA, 2018), with Dar es Salaam hosting a population of about 5.3 million (about 28 percent of the urban population) (SWAC/OECD Africapolis, 2018). For the past decade, urban population growth has been around 5 percent annually (World Bank, 2021). This is expected to have major implications on the lifestyles and diets of urban inhabitants. To determine dietary patterns and nutritional adequacy across rural and urban areas in Tanzania, a recent analysis uses detailed food diaries from the Survey of Household Welfare and Labour in Tanzania 2007–2008 (Ameye, 2023). The data covers five regions in Tanzania: Dodoma, Pwani, Dar es Salaam, Shinyanga, and Kagera, purposely selected to capture variations in socio-economic and geographic climate between different rural and urban locations (Beegle et al., 2012). From these regions, communities were randomly selected from the 2002 Census, from which a random sub-village (cluster) and random selection of households was chosen. The sample includes 988 households living in rural areas, 304 households living in secondary towns with a population below 500,000, and 214 households living in Dar es Salaam.

Overall, findings from the analysis show that households living in secondary towns tend to consume more than rural households in terms of macro- and micronutrients, and so are less likely to face issues of hunger and micronutrient deficiencies. Dietary patterns in Dar es Salaam are less promising, with a higher consumption of fats and sugar, but a lower consumption of protein, fiber, and several key vitamins and minerals.

5.1.1. Diets in rural areas, secondary towns, and Dar es Salaam

Households in rural Tanzania primarily consume starches, cereals, vegetables, and fruit making up 29 percent, 21 percent, 12 percent, and 7 percent respectively of their diet (Figure 3). Plantains, maize, cassava, sweet potatoes, and spinach are the most consumed items (in grams) in rural areas. The composition of these diets is largely plant-based and unprocessed, but many households are underconsuming both in terms of macro- and micronutrients (Table 4).

Figure 3: Consumption of food groups and key food items in rural areas, secondary towns and Dar es Salaam (grams)



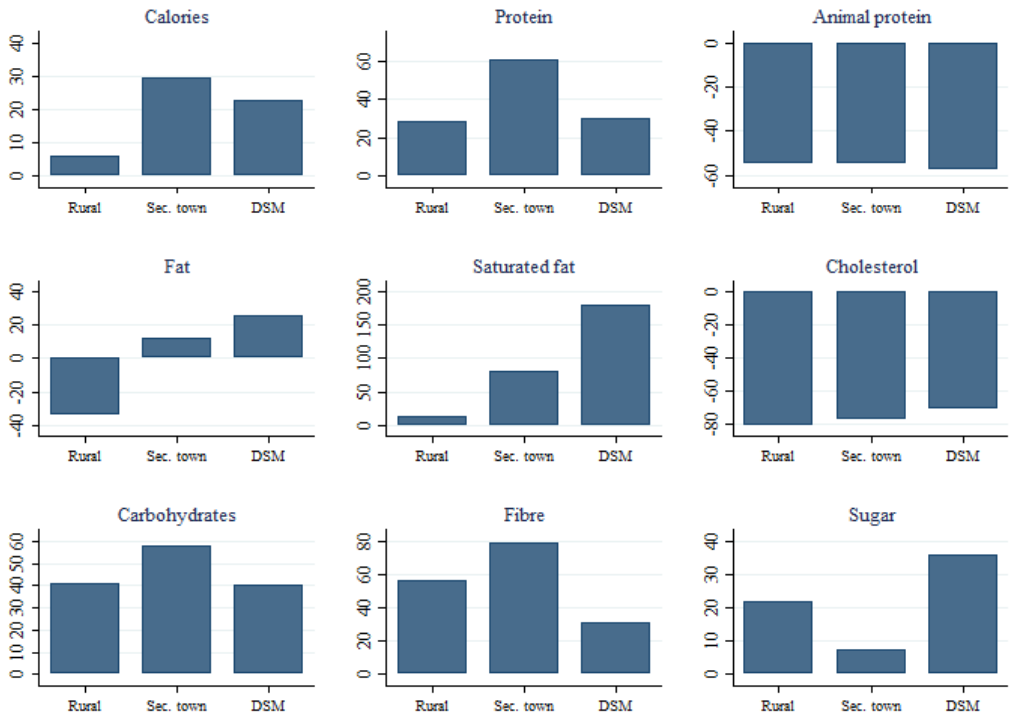
Households living in secondary towns mostly consume cereals (making up 33 percent of grams consumed), followed by vegetables (17 percent) and drinks such as water and tea (12 percent). Maize, rice, cassava, tomatoes, and squash are most consumed in secondary towns. In terms of magnitude, these households tend to consume more, leading to lower levels of nutritional inadequacies than in rural areas. The additional consumption of foods such as groundnuts, beef, and dried aquatic foods improves the nutritional sufficiency of diets in secondary towns (highlighted in green in Figure 6). In this sample, it seems that overnutrition is not yet a problem for this subgroup, but this could be if trends continue upwards. This is especially the case if the amount of purchased full meals (such as ugali, makande, wali dish) and snacks were to increase. Potentially unhealthy foods, such HFSS foods are highlighted in red.

The prevalence and consumption of highly processed foods and ready-made meals is particularly concerning in megacities such as Dar es Salaam. Vegetables are only the third most consumed food group for households in Dar es Salaam, at 8.5 percent, compared to other drinks consumption such as juice, coffee, and carbonated drinks at 26 percent and cereals at 25 percent. Households in Dar es Salaam consume larger quantities of highly processed cereal products like bread and pasta, compared to rural and secondary town households. In terms of food items, households in Dar es Salaam consume mostly maize, rice, coconut, tomatoes, and oranges. Full meals bought outside of the home (at street vendors, markets, and restaurants) are however the next largest category. The consumption of snack foods such as chapatis and donuts has also increased significantly.

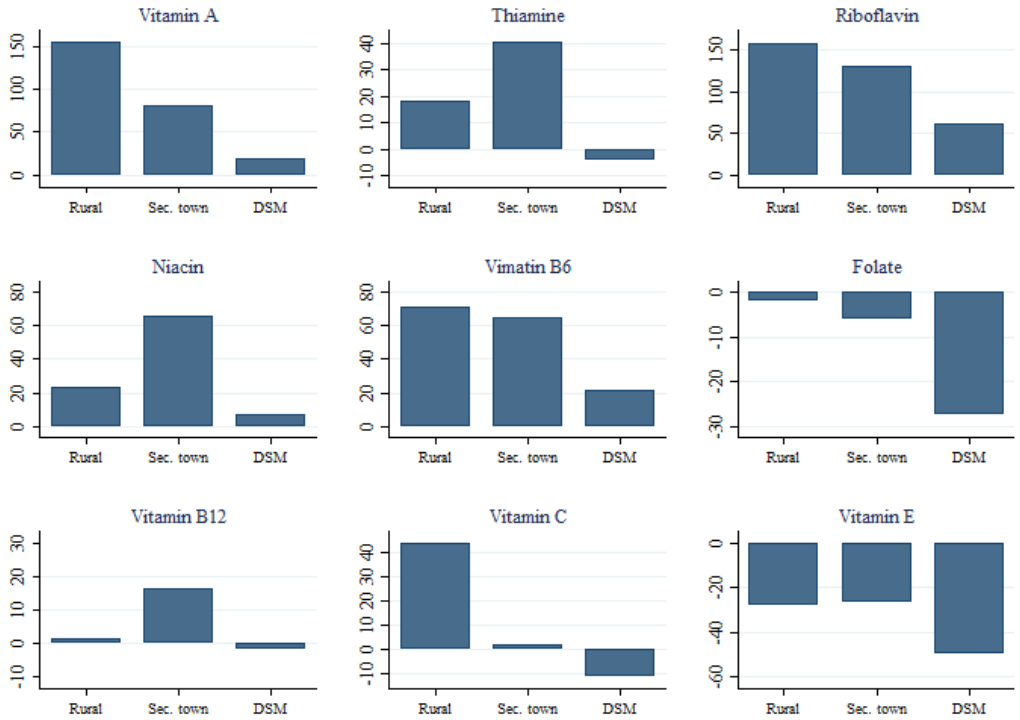
These dietary patterns also translate into worrying statistics at the macro- and micronutrient levels (Figure 4). Households living in the most urbanized areas are overconsuming fats, saturated fats, and sugar, and under-consuming key vitamins (Thiamine, Folate, Vitamin C and E), minerals (Calcium, Potassium), and fibre, exposing them to the risks of both overweight and obesity, and micronutrient deficiencies. Note that although, on average, for example iron and vitamin A consumption (per adult male equivalent household member) exceeds the minimum requirement (Figure 4), that does not mean that every household consumes sufficiently. Table 3 shows for iron, that about 47 percent, 25 percent and 49 percent of households in rural areas, secondary towns and Dar es Salaam respectively, are consuming below the dietary reference intakes (irrespective of magnitude). For vitamin A underconsumption worsens with urbanization, with about 26, 39 and 54 percent of households underconsuming in rural areas, secondary towns and Dar es Salaam respectively. This is also observable in Figure 4 as the average levels of consumption w.r.t the dietary reference intakes decline.

Figure 4: Average macronutrient, vitamin, and mineral consumption by urban classification

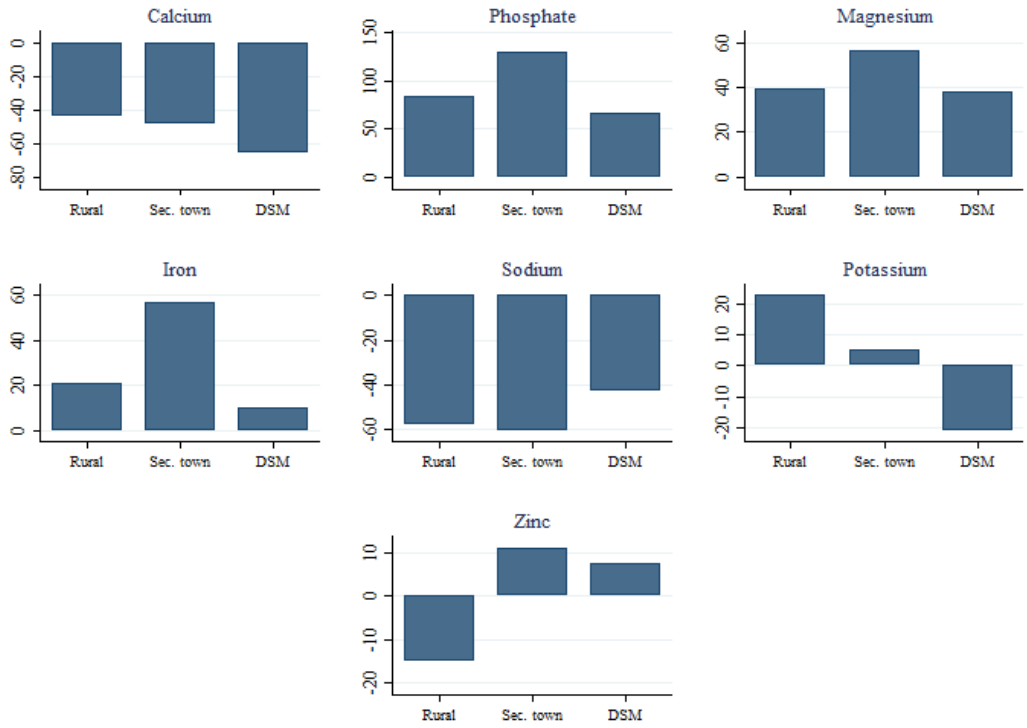
Panel A: Macronutrient consumption relative to DRIs (%)



Panel B: Vitamin Consumption relative to DRIs (%)



Panel C: Mineral consumption relative to DRIs (%)



Note: Values are presented relative to the dietary reference intakes (DRI), for which we use the recommended daily allowance (RDA). Positive values represent the percentage by which the minimum nutrient requirement is exceeded, and negative values are the percentage shortfall from the requirements. Data is presented in adult male equivalents.

Table 4: Percentage of households consuming under the minimum daily requirement

	Rural	Secondary towns	Dar es Salaam
Calorie	47.67	26.64	38.32
Macronutrients			
Protein	40.59	21.05	35.51
Fat	83.00	58.22	47.66
Saturated fat	61.23	36.18	11.68
Cholesterol	98.79	98.03	95.79
Carbohydrates	18.12	14.47	27.57
Sugar	48.99	52.63	31.31
Fiber	21.96	16.78	32.71
Vitamins			
Vitamin A	26.11	39.15	54.21
Thiamine	42.81	27.96	56.54
Riboflavin	21.46	17.11	27.10
Niacin	41.90	23.03	49.53
Folate	64.78	64.15	82.24
Vitamin B12	65.89	55.92	63.55
Vitamin C	34.31	57.89	66.36
Vitamin E	76.92	76.64	93.46
Minerals			
Calcium	87.85	91.12	99.07
Phosphate	18.52	8.55	17.29
Iron	46.56	24.67	48.60
Sodium	94.03	97.69	89.72
Potassium	26.62	48.36	75.23
Magnesium	20.55	19.41	25.70
Zinc	70.34	45.39	46.73
Observations	988	304	214

5.1.2. Drivers of dietary patterns

Agriculture remains the primary economic activity in rural areas, with smallholder farmers cultivating staple crops such as maize, rice, millet, and sorghum. Access to markets and transportation infrastructure is often limited, leading to challenges in obtaining diverse food items beyond locally grown staples. This might limit access to perishable foods including fruits, vegetables, and animal products, as well as the diversity of diets, which could result in nutritional deficiencies. Given that communities in rural regions mostly rely on their agricultural output for livelihood, food security is an urgent matter. The availability of food and nutrition may be significantly impacted by any changes in income or crop productivity.

In contrast to rural areas, the urban food environment in Tanzania is characterized by greater diversity and accessibility to food products. Urbanization has led to a higher prevalence of food vendors and the establishment of informal/formal retail markets offering a wide range of food choices. With the concentration of economic activities and job opportunities in urban centres, there is a higher level of education, income, and purchasing power among urban residents. This enables greater affordability and access to diverse food items, including fruits, vegetables, dairy products, and meat, as well as imported and processed foods.

In the same way as in secondary towns, food environments in megacities are also influenced by the rapid growth of street food vendors and small eateries, providing affordable and convenient meals. Around 40 percent of all food vendors in Dar es Salaam sell prepared foods (Ambikapathi et al., 2021), of which 55 percent are semi-formal and 27 percent are informal. However, the nutritional quality and safety of such foods may be a concern if not adequately regulated. In urban Tanzania, processed food's share of purchases is 78 percent, irrespective of income category (Sauer et al., 2021). Concurrently, Tanzania has experienced a 35 percent annual yearly growth in fast-food chain sales (Reardon et al., 2021).

In terms of the availability of fresh foods, urban households have less space for home gardening and consequently consumption of their produce. These foods specifically show a strong boost in the consumption of essential micronutrients. While Tanzania has a political background that supports urban agriculture, its potential is hindered by limited access to water and agricultural inputs (Dongus et al., 2009; Crush et al., 2011).

Similarly, a more densely populated area may mean less space for fresh produce markets and an influx of supermarkets selling ready-made, highly processed meals. Note that supermarkets in lower-income countries differ substantially from supermarkets in higher-income countries.

Whilst fresh produce, “superfoods”, and organic products are available in the latter, ready-made meals, imported foods, and ultra-processed foods dominate the majority of the supply in the former. Supermarkets have become popular in urban areas (Weatherspoon & Reardon, 2003; Hawkes, 2008; Swinnen & Vandeplas, 2010), especially in Dar es Salaam (Ijumba et al., 2015), contributing to an increase in the consumption of ultra-processed foods and calories (Khonje et al., 2020). In cities, food purchases account for about 90 percent of the total food consumed in terms of value, with processed foods making up 70 percent of all purchases in Southern and East Africa. Among processed foods, 40 percent were minimally processed items like flour, while 60 percent were categorized as highly or ultra-processed (Tschirley et al., 2015).

Despite the increased availability of diverse food options in urban areas, disparities in access persist, particularly among lower-income households. Some residents may still face challenges in accessing nutritious foods due to income and time constraints, and the spatial distribution of food outlets.

5.1.3. Lessons learned

In Tanzania, it seems that smaller urban areas may be most successful in providing a nutritious diet. Similarly to rural areas, small urban areas are prone to following traditional diets. Dietary composition remains relatively unchanged, however, those in secondary towns consume more overall, ensuring a higher probability of meeting dietary needs without exceeding the consumption of potentially harmful substances. Comparable results are observed when assessing child-feeding practices across various levels of urbanization across East Africa (Ameye & De Weerdt, 2020).

Additionally, households in secondary towns retain the opportunity for home production, as well as exposure to greater diversity and availability of foods. Households in secondary cities predominantly purchase food from open-air markets which focus largely on fresh produce, contrary to supermarkets providing more ultra-processed foods (Hannah et al., 2022). The higher educational and income opportunities in secondary towns compared to rural regions further exacerbate these positive trajectories. Similar findings are observed in secondary towns regarding poverty reduction (Ingelaere et al., 2018) and inclusive growth (Vandercasteelen et al., 2018).

The positive returns to scale between rural areas and secondary towns are less apparent in megacities. Although incomes and education are higher, opportunity costs for men and women have also increased substantially (Hirvonen, 2016). Higher consumption of processed foods is

mainly driven by opportunity costs of time, leading individuals to prioritize saving time spent on home processing and cooking (Sauer et al., 2021). Further, consumer preferences are expected to change drastically, along with a globalizing food environment and altering cultural norms (Reardon & Timmer, 2014; Resnick et al., 2019; Ameye & Swinnen, 2019). Several studies also find that as urban regions grow too quickly, healthcare and infrastructural developments fall behind (Fotso, 2007). These factors combined may cause the shift to a less nutrient-dense diet in highly urbanized regions. These findings are important in Tanzania and by extension in a quickly urbanizing Africa, where healthcare resources are already constrained. Attention needs to be directed to double-duty policies focusing both on nutritional deficiencies as well as overconsumption and nutrition-related NCDs. The Tanzanian National Multisectoral Nutrition Action Plan (NMNAP) makes a promising commitment (Box 10).

Box 10: The second Tanzanian National Multisectoral Nutrition Action Plan (NMNAP II)

The NMNAP II is a nationwide 5-year document that seeks to address malnutrition in all its forms and for all ages with the overall expected result by 2026 of a country where "Women, Men, Children, and Adolescents are better nourished and living healthier and more productive lives" with a particular focus on addressing the triple burden of malnutrition and on creating a conducive enabling environment to meet nutrition targets. The Action Plan includes other areas and actions, such as (i) increasing financial investment, especially in proven low-cost and high-impact nutrition interventions; (ii) research, development, and innovation; and (iii) further strengthening nutrition coordination. The NMNAP II emphasizes the scaling of multisectoral interventions and community-based initiatives that have been proven to yield cost-effective results and target areas and groups with the highest levels of malnutrition. It also includes objectives to diversify local food production; conduct training of agricultural extension workers on the production of nutritious food; and promote the use of appropriate technologies to support the availability of nutritious foods (urban agriculture, sack gardens, aquaponics, plastic fishponds, small animal keeping); as well as measures to strengthen the availability of nutrition services during emergencies and the delivery of nutrition-sensitive interventions at all levels (WASH, deworming, food system); improve food quality and safety standards; address micronutrient deficiencies with particular regard to iron, folate, zinc, iodine, and vitamin A; and address overweight and obesity involving health-care infrastructures, workplaces and communities, and public–private sector. To promote inclusive social and economic growth, the NMNAP II seeks to empower women, men, and adolescents to make necessary nutrition decisions; develop an improved market and trade system to ensure affordable, safe, and nutritious foods; and strengthen consumer education and information and private sector engagement in the implementation of undernutrition interventions. Specifically, the NMNAP II calls for strengthening multisectoral nutrition governance, considering efficient and effective multisectoral coordination at all levels through ensuring accountability, user-friendly policies, legal and regulatory frameworks, political leadership, and commitment to nutrition (Government of Tanzania, 2021).

5.2. Malawi: Urbanization, food environments, and diets in six districts in Malawi

Malawi is one of the least urbanized, yet one of the fastest urbanizing countries on the African continent (Van Capellen & de Weerdt 2023). Officially, Malawi designates urban areas as encompassing primary and secondary cities (UNDESA 2014). In practice, this means, that the four main cities (Blantyre, Lilongwe, Mzuzu, and Zomba) are considered as urban, as well as secondary towns such as district centers (*Bomas*) and major commercial centers (NSO 2018). In terms of population, the major cities range from 105,000 (Zomba) to 989,000 inhabitants (Lilongwe urban) (NSO 2018), remaining relatively small compared to other African mega-cities. Secondary towns are often much smaller at around 5,000-30,000 inhabitants. Malawi's geography, bordering in the East with Lake Malawi, and in the West with countries that have progressed further in the nutrition transition, such as Zambia, gives rise to fluctuations in the accessibility of diverse food items, including fish and (ultra) processed foods. As for ultra-processed foods, Malawi primarily relies on imports from neighboring nations such as Mozambique, Tanzania, and Zambia. This case study draws on a household and food environment survey conducted across Malawi's rural-urban continuum in six districts[12] in the Central Region between October and December 2022.

5.2.1. Market food environments

Malawi is at an early stage of the 'supermarket revolution'. In urban areas and along major roads, supermarkets and 'superettes' complement traditional markets that offer a range of products from animal-sourced foods to fruits and vegetables. Superettes are formal shops selling processed and ultra-processed foods. Other traditional shops such as neighborhood kiosks or tabletop vendors and other informal vendors sell eggs, flour, beans, and fruits and vegetables, but also increasingly ultra-processed foods, especially in urban areas. The rural and remote market food environment is still predominantly traditional and often informal, with short supply chains. Malawians rely extensively on markets for food consumption, as most households do not produce enough to last from one season to another (NSO and ICF, 2017). In urban areas, low- and middle-income households predominantly shop in larger traditional markets, while in rural areas, the predominant types of shops are tabletop vendors and neighborhood kiosks. Results from the survey show that especially for food items consumed

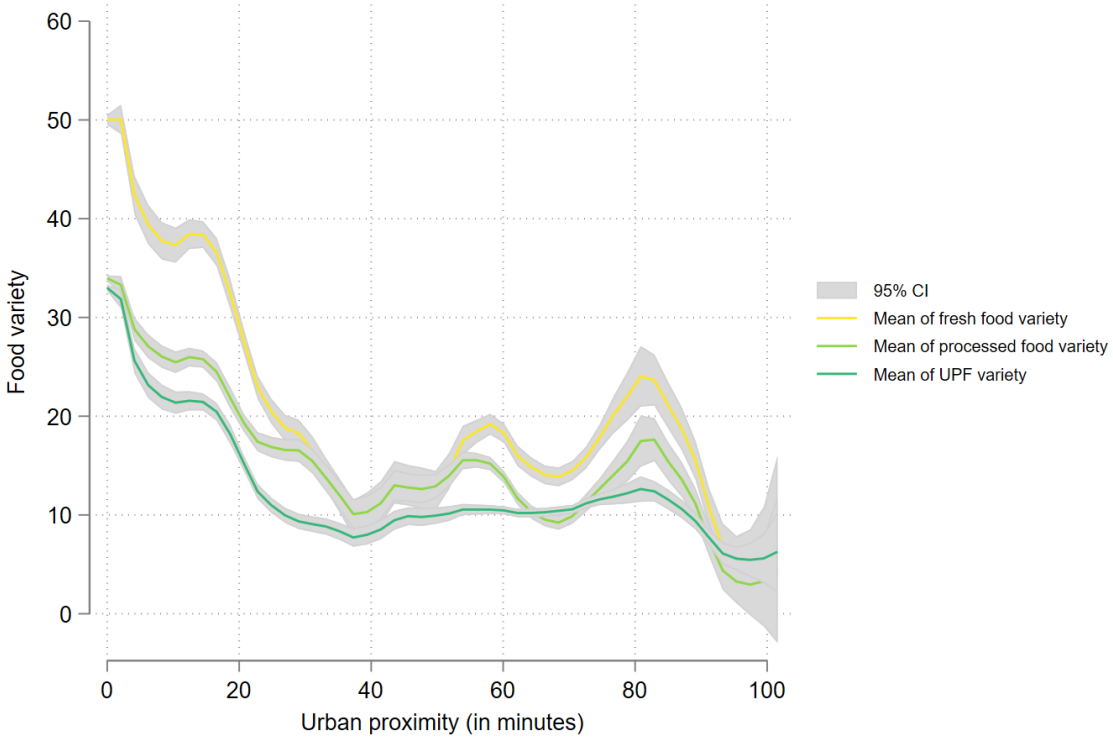
[12] The six districts are Lilongwe city, Lilongwe rural, Salima, Dowa, Mchinji and Dedza. We sampled 701 households from 44 clusters. We conducted village-level (rural) and neighborhood (urban) food environment surveys in these 44 clusters.

daily (e.g., tomatoes, cooking oil, salt, and green leafy vegetables), 80-90 percent are sourced from such small vendors.

5.2.2. Trade-offs in market access

Access to markets is important to access nutritious and varied diets, as markets provide more than households can produce on their own (Bellon et al., 2016). Better market access often coincides with urbanization, as functioning markets tend to be located along major roads, trading centers, or in urban centers. However, better food market access may come with the unintended consequence of easier and wider access to unhealthy foods. As discussed above, ultra-processed foods (UPFs) are typically income elastic, meaning, with more disposable income, also more UPFs are consumed. As the majority of the extreme poor are located in rural Malawi, with little disposable income, UPF consumption is still low in rural areas. However, Figure 5 shows that UPFs are consistently available, with around 10 varied types of UPF (e.g., chips, cookies, cakes, candy, sugar-sweetened beverages), even in remote areas. Moreover, there are fewer fluctuations in terms of availability when moving along the rural-urban continuum. An explanatory factor for this is the low perishability of UPFs, which renders selling them a low-risk business for vendors, even if disposable incomes are low. Higher availability in urban areas coincides with higher consumption levels, pointing towards the role of the food environment in changing eating habits.

Figure 5: Mean availability of fresh, processed, and ultra-processed foods in local market food environments across the rural-urban continuum



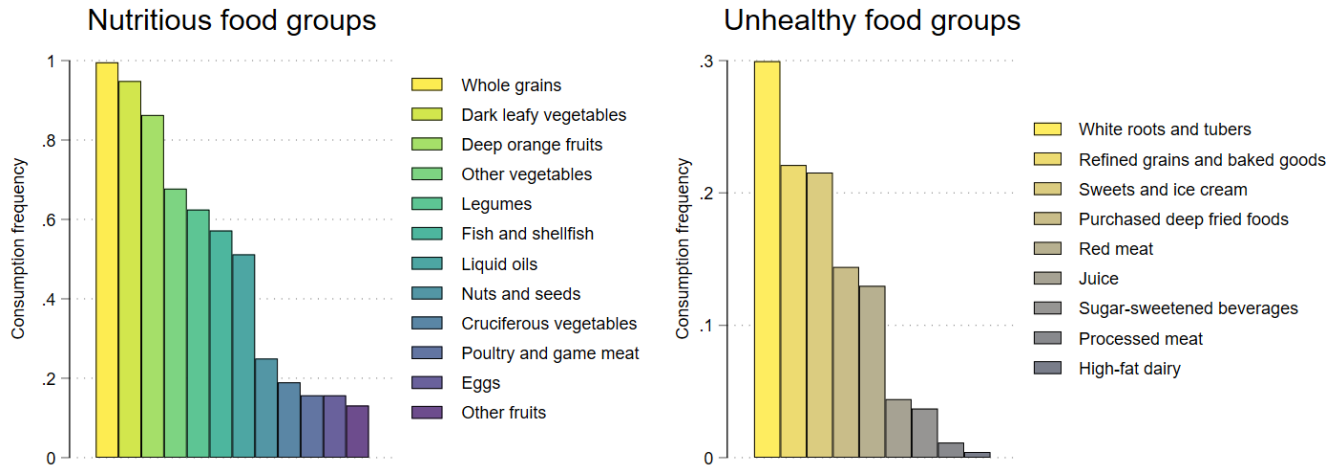
5.2.3. The role of lightly and moderately processed food consumption in addressing malnutrition

Processed foods tend to be framed negatively. However, in countries such as Malawi, food markets, especially in rural areas, suffer from extensive market failures in the provision of nutrient-dense, perishable foods. Food processing, to some degree, can hence be a tool to preserve foods that typically perish quickly and carry a high risk for food-borne diseases. In particular, drying and fermenting foods can be a relatively low-cost instrument to preserve otherwise perishable foods, while at the same time minimizing food loss and waste. In Malawi, it is common practice to dry green-leafy vegetables and fish. Other commonly found foods are powdered milk, yogurt, pasta, margarine, dried groundnuts, beans, or different types of milled flour. A recent study (Hülsen et al. 2024) estimates the effects of both fresh and processed food variety on child diet and nutrition outcomes, identifying positive and significant effects, which are larger in magnitude for processed foods as compared to fresh food variety. Particularly in rural areas, nutritious protein-rich foods such as animal-sourced foods and legumes are only accessible in lightly or moderately processed forms, due to a lack of infrastructure and storage possibilities. This points to the importance of healthy food processing options in addressing malnutrition in countries with multiple market failures.

5.2.4. *Diet quality*

Poor diet quality is widespread in Malawi, where the majority of consumers primarily depend on maize-based dishes, such as 'nsima', topped with vegetables and sometimes meat or fish *('relish')*. Due to limited economic opportunities, the majority of Malawians cannot afford or access a diverse range of nutritious foods, including animal-sourced items. While fish consumption remains at 30 percent, only one out of ten children have access to other animal-based foods, and these trends have not changed significantly over the last ten years (IPC 2022). In urban areas, traditional dishes are increasingly being replaced by ultra-processed foods and drinks, which have been linked to concerning health issues, such as an increase in female obesity rates. These doubled among adult women between 1992 and 2015-16 from 10 to 21 percent (NSO and ICF 2017), making it more prevalent than undernutrition in this demographic group and highlighting the broad dietary challenges faced by Malawians (Thakwalakwa et al. 2020). Changes in the food environment are likely a driver of this nutrition transition, yet, data on unhealthy food consumption and resulting overweight and obesity trends is generally lacking in Malawi as most research and government attention continue to focus on the high burden of undernutrition (Thakwalakwa et al. 2020), specifically in children. Child growth indicators show one of the highest stunting rates globally, at a staggering 37 percent nationally (NSO and ICF, 2017) but concentrated largely in rural areas with little progress achieved over time. Figure 6 breaks down the top nutritious and unhealthy food groups consumed in Malawi using the food groups of the Global Diet Quality Score (Bromage et al. 2021).

Figure 6: Household consumption frequency of nutritious and unhealthy food groups within the past seven days.



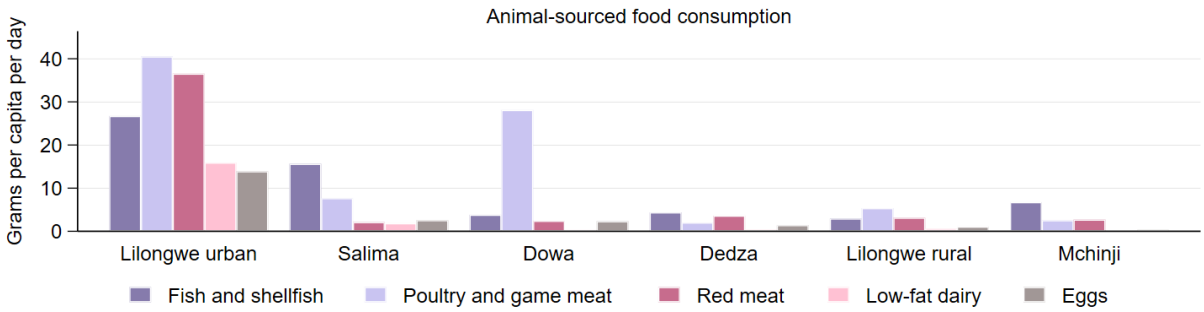
Note: The graph shows the consumption frequency per nutritious and unhealthy food group for the total sample.

5.2.5. Vegetable and animal-sourced consumption and affordability

After starchy staples, vegetables are the second most commonly consumed food group (see Fig. 9). In terms of specific items, more than 95 percent of the surveyed households consumed leafy-green vegetables, such as pumpkin leaves and rape leaves in the past week. These are typically combined with tomatoes, consumed by more than 80 percent, which are also found in almost all markets in the sample. Vegetables are the second most expensive food group relative to starchy staples when scaling the requirements to those of a healthy diet (ratio of 1.81) (FAO, IFAD, UNICEF, WFP and WHO 2023). Here, it is important to also consider consumption quantities, as only less than 10 percent of the sample eats the recommended amount of 300 grams of vegetables per day (Willet et al. 2019).

Lakes, and specifically Lake Malawi play an important role both economically and in diets. Fish consumption is culturally rooted and constitutes 70 percent of animal proteins consumed (Department of Economic Planning and Development, 2019). However, animal-sourced foods are also the most expensive foods. The ratio of the relative cost of animal-sourced foods to starchy staples in a healthy diet is 3.31 (FAO, IFAD, UNICEF, WFP and WHO 2023), making it unaffordable for many Malawians to consume or consume in sufficient quantities. In terms of consumption levels, the lake vicinity seems to be a driving factor of fish consumption. As expected, the richest districts in the sample, Lilongwe (urban), and Salima, have higher overall fish and other animal-sourced food consumption. Interestingly, however, poultry and game meat consumption are particularly high in Dowa (Figure 7).

Figure 7: Animal-sourced food consumption in grams, per capita per day



5.2.6. Conclusions

Nutrition and food insecurity is high in Malawi. To combat hunger, the country has historically focused on and invested in maize production, with limited overall production diversity. Local agro-processing, storage, and transportation infrastructure is limited, especially for nutrient-dense perishable fruits and vegetables (Matchaya & Guthiga 2023). This results in low availability in local rural markets and leads to high food loss and waste along the supply chain. Policies are needed to strengthen local trade and invest in processing and storage capacities. However, at the same, and despite the persistently high levels of food and nutrition insecurity, the nutrition transition in Malawi is at its onset. This calls for early interventions in the food environment and addressing behavioral patterns to avoid the rise of obesity and overweight and associated non-communicable diseases.

6. Conclusion and policy recommendations

The choices that families and farmers have regarding the food that they consume and the crops they produce and sell at markets have a direct bearing on nutrition and health outcomes. Despite current efforts and much progress over the past 20 years, reducing all forms of malnutrition—undernourishment, micronutrient deficiencies, and overweight and obesity—remains a challenge in many African countries. This nutrition transition is amplified by changing food environments driven by demographic changes, rapid levels of urbanization, a growing middle class demanding more varied and convenient foods, and increasingly a “westernization” of diets. As discussed in this paper, while urbanization provides better access to more varied and healthy foods, with less undernutrition as a result, the flipside of urbanization is the ready availability of highly processed foods, contributing to more overweight and obesity and related NCDs.

The food environment approach thus recognizes that the choices consumers make about food are shaped by the context in which the choices are made. Food environments bear a significant and effective opportunity to nudge consumers to adopt healthier food consumption behaviors, for example by lowering barriers to healthy choices, addressing structural factors impacting individual food choices, or disincentivizing unhealthy and unsustainable food choices. Moreover, a better understanding of the role of sociocultural factors that determine eating patterns in these dynamics can feed back into the food environment and inform targeted interventions, policies, and regulations.

More needs to be done to achieve Sustainable Development Goal 2 of Zero Hunger by 2030 and the Malabo Declaration targets of reducing the prevalence of stunting, wasting, and underweight while ensuring a minimum dietary diversity for women and meeting minimum standards for infant diets. At the same time, more attention must be paid to the overconsumption of unhealthy foods, the resulting increases in overweight and obesity, and associated NCDs. The ongoing discussions on the post-Malabo Agenda as well as the implementation of countries' UNFSS pathways present opportune moments to ensure that food environments deliver healthy and sustainable diets for all.

If African countries are to meet these goals, governments in collaboration with other stakeholders, including the private sector and research institutions, they will need to accelerate and scale their efforts to: 1) deepen understanding of the opportunities and the existing and emerging challenges impacting food environments along the rural-urban gradient; 2) gain a better understanding of context-specific and individual factors driving food choices; 3) take a multi-sectoral approach to addressing changing food environments, including nutrition, health, agriculture, energy, and infrastructure; and 4) harness the opportunities of an enabling food environment, including the opportunities presented by digital technologies and strengthening local agro-processing sectors as well as fresh food / open-air markets.

With changing food environments inherently linked to urbanization and demographic changes, effective urban agricultural policy requires new forms of governance, consultation, and coordination, and new actors — including mayors, city councils, district governments, urban planners, public health officers, private sector companies, and industry trade associations — must become central to the effective functioning of agricultural input and output markets, food processing, and food safety systems. Food environments can be directly reshaped by agile policies, incentive structures, and regulations that address 'food entry points', and the availability, affordability, accessibility, and desirability of foods.

Efforts that aim to improve food environments in Africa must, therefore, include a portfolio of carefully crafted individual- and community-based interventions and policies. These policies can inform and empower, guide and influence, and incentivize or discourage actions within food environments.

Policy recommendations

We recommend a set of levers that governments have to mitigate the challenges of changing food environments while harnessing the opportunities.

a. **The burden of adopting healthy diets and consuming nutritious foods must shift away from solely focusing on the consumer. As governments revise their strategies and policies toward healthy and sustainable food environments, nimble and agile regulatory environments are required coupled with double-duty actions.** This can include taxation of sugar-sweetened beverages and food products containing particularly high amounts of sugar, salt, or trans fats (HFSS) alongside regulation restricting the advertisement of unhealthy food marketing, especially to children. Fiscal measures alongside taxation should include subsidies on healthy, locally-produced foods and be coupled with information and awareness-raising campaigns. While primarily aimed at reducing the ready availability, accessibility, affordability, and desirability of UPFs, the introduction of fiscal measures can also support longer-term behavioral change initiatives and nudge consumers towards healthier and sustainable diets while contributing to price stability and addressing matters of seasonality. Governments must also implement measures in alignment with the International Code of Marketing of Breast-Milk Substitutes to regulate the aggressive marketing of breastfeeding substitutes. Instead, programs aimed at addressing the barriers to breastfeeding in the home, community, or workplace, can protect the health and well-being of women and their children and contribute to greater gender equality.

b. **Access to information and knowledge about what nutritious foods are and what constitutes a healthy diet is crucial, however, behavioral change is key and must be a focus.** To sustainably shift food purchase and consumption patterns, culturally appropriate and relevant health and nutrition education programming needs to be rolled out at scale by national and local governments and their partners to improve the provision of information and nutrition literacy, including consumer education campaigns and social marketing, such as community engagement and point-of-purchase awareness campaigns. This must go hand-in-hand with targeted training opportunities starting at kindergarten and primary school levels, and for those primarily responsible for purchasing food and preparing meals at the household level, in restaurants or canteens. Importantly, interventions must be designed in a way to address gender barriers and break down stereotypes by specifically addressing men. At the same time, governments and their partners can work with schools and workplace cafeterias, hospitals, and prisons, to ensure

the provision of healthy meals. By sourcing from local smallholder farmers, the nexus between nutrition and agriculture can be strengthened and farming households' incomes be improved.

c. **The contribution of UPFs to overweight and obesity and nutrition-related NCDs is widely recognized and must be urgently addressed. However, it is important not to demonize processed foods *per se* and instead recognize and leverage the inherent opportunities that lightly processed foods present to deliver healthy diets and support women's economic empowerment**. As such, governments must boost investments to strengthen the local agro-processing sector to increase the availability of healthy lightly processed foods and snacks, including using underutilized crops, traditional staples, and animal-sourced foods by offering them in convenient forms that are less perishable. This can contribute to making a greater variety of foods accessible to rural and urban households and can allow consumers to incorporate nutritious choices into their busier lifestyles. Lightly processed foods can also address women's time use and manage important trade-offs: in many countries, preparing meals at home continues to be the responsibility of women. At the same time, women are increasingly economically active pursuing employment outside of the home. By making healthy lightly processed foods available in convenient forms – instead of reverting to UPFs and SSBs - cooking times are significantly reduced, allowing women important time to spend on other activities while consuming nutritious meals.

d. **The role of gender norms in food environments is of particular importance and must be supported through carefully crafted interventions to seize opportunities and manage trade-offs.** As women become more economically active with employment outside the home, food environment interventions must be aimed at breaking down gendered barriers coupled with addressing women's time use and allocation, mobility, and control over their finances. In a context where women are increasingly economically active, yet continue to be predominantly responsible for preparing meals for their families, convenient access to fresh food markets and healthy snacks or ready-to-eat meals should be facilitated. For example, the location of fresh food markets near key major commuting hubs or the wider availability of healthy lightly processed foods in kiosks, grocery stores, and supermarkets must be promoted. Moreover, behavioral change interventions can specifically target boys and young men to eliminate structural gender inequalities and challenge the underlying causes often rooted in discriminatory gender norms and social and power relations.

e. **Civil society should organize itself and be actively supported to strengthen consumers' voices in demanding their right to food and healthy diets and that the food and beverage industry deliver nutritious food options in an affordable, accessible, and desirable manner.** In particular, CSOs can work with partners, such as UNICEF and WHO, to call for the implementation of a Child Rights-Based Approach to Food Marketing as well as call on their governments to fully implement the measures under the International Code of Marketing of Breast-Milk Substitutes. Civil society can also work with local authorities and municipalities to introduce ethical advertisement policies that ban the marketing of SSBs and junk food in public spaces.

f. **Governments and their partners must leverage the opportunities presented by digital technologies and social media to reach harder-to-reach communities and younger people with information about the benefits of healthy diets.** Using digital technologies and social media, such as trending social media hashtags and working with influencers, including sports people, actors, or musicians, and sharing information in local languages can play an important role in changing food consumption patterns with a shift towards healthier diets. This can include sharing video tutorials on easy-to-prepare nutritious meals, as well as raising awareness about the negative impacts of consumption of ultra-processed foods rich in salt, sugar, and fat.

g. **To develop policies and interventions that support consumers to adopt healthier and more sustainable diets, more research is required into several important areas. Food environments and the choices people make take place within a complex web of external and individual-based factors.** While not yet a top policy priority in most African countries, a better understanding of the different types of front-of-package labeling designs and information that is effective in different countries and contexts is needed, coupled with a better understanding of how consumers make their choices in the presence of multi-labeling, including nutrition, animal welfare, and eco-labeling. In addition, more context-specific research is needed on where consumers purchase their food and the underlying individual-based food choice patterns that go beyond access, availability, affordability, and convenience. This includes learning from the nutrition transition in other parts of the world to understand what has worked and what has not. For example, a move away from shame associated with being under or overweight and a better understanding of the underlying psychological factors driving food choices in a food environment context.

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Authors: Katrin Glatzel, Hannah Ameye, Vivien Hülsen, Matin Qaim

Contact: kglatzel@uni-bonn.de, hameye@uni-bonn.de, vivien.huelsen@uni-goettingen.de
mqaim@uni-bonn.de

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