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Urban Food Systems Profile

Ghana

RUAF

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Cover photo: Urban open-space farming in Accra, Ghana. Source: Authors

CGIAR Initiative on Resilient Cities

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Summary

Over the last thirty years, Ghana's population in towns and cities has more than tripled, from 4 million to nearly 14 million, exceeding growth in the rural areas. In fact, rural-urban migration is an important factor for urban growth. It is estimated that the urban population will reach over 70% by 2050, calling for fast and sustainable strategies for facilitating the main challenges deriving from rapid urbanization including urban food security and food system resilience against shocks. Several projects mapped urban foodsheds and the overall extent of specific city-region food systems. But not only food quantity, also food safety is at stake. A particular challenge for the farmers is widespread water pollution in urban area resulting in the contamination of irrigated vegetables. The largely informal nature of irrigated urban vegetable farming as well as the street food sector makes it difficult to regulate, promote or control compliance with food safety measures which are needed from farm to fork.

Contents

1.0 Purpose of the Profile

Sustainable food systems are a key element of the United Nations' Sustainable Development Goals (SDGs). Adopted in 2015, SDG 2 calls for major transformations to end hunger, achieve food security and improve nutrition by 2030. To achieve this SDG, the global food system needs to be reshaped to be more productive, more inclusive of poor and marginalized populations, and has to consider drivers of change, such as urbanization and climate change. With populations becoming increasingly urban and cities developing into consumption hubs, their dependance on their hinterland (urban 'food shed'), including urban and peri-urban agriculture (UPA), and the related rural-urban linkages require special attention (Prain et al. 2022). This complexity requires the combination of interconnected actions across administrative boundaries and sectors, at the local, national, regional and global levels. Box 1 explains some of the terms used in this report which differ in part from those common in rural farming systems.

This country profile has its focus on urban food security and the food systems contributing to it in the case of Ghana. It is highlighting issues that the CGIAR and partners can help addressing to improve rural-urban food flows and nutritional health, ensure food accessibility and sustainability and increase food resilience in urban communities.

Box 1: Key terms

Food system: Food systems are the sum of actors and interactions along the food value chain—from input supply and production of crops, livestock, fish, and other agricultural commodities to transportation, processing, retailing, wholesaling, and preparation of foods to consumption and food waste disposal. Food systems also include the enabling policy environments and cultural norms and preferences around food.

City-Region: A city region can be defined as a larger urban centre (or conglomeration of smaller urban centres or towns) and their surrounding and interspersed peri-urban and rural hinterland.

City-Region Food System (CRFS): A City Region Food System is applying the food system perspective to the territorial approach of the 'city-region' to analyse e.g. rural-urban food flows and dependencies to support more resilient and sustainable urban food systems.

Food shed: "Food sheds" describe the geographic area that supplies a population — whether in a city, town or community — with food, i.e. the flow of food from different geographical sources to a particular end point (in the case of an 'urban food shed' it is the urban area). Different commodities have usually different geographic food sheds. Closely related are the "**Food Miles**" which reflect the distance and environmental cost associated with a food's transport from farmer to consumer.

Home gardens: Traditionally, home gardening is a well-known small-scale food production system to support predominantly individual households with food. This can be in rural or urban areas. Home gardens (or backyard gardens) are also common in urban areas and a very common form of urban agriculture, to be distinguished from open-space farming in urban areas.

Open-space farming: The agricultural use of open areas, like along urban streams, under power lines, or on unbuilt land. The land use is often informal or even illegal, supports a number of farmers who might live in proximity or not, and usually grow crops for nearby markets.

Urban agriculture (UA), peri-urban agriculture (PUA) and rural farming: While urban and rural farming systems are very different (Annex 1), peri-urban systems are often in-between showing characteristics of both. All three are part of the CRFS and comprise all components from farm work to marketing, or human and environmental health.

2.0 Urbanization in Ghana

Ghana is a West African country located along the Gulf of Guinea and the Atlantic Ocean. Its largest cities are Accra, Kumasi, Sekondi-Takoradi, Sunyani, Tamale, Obuasi, and Cape Coast (Figure 1).

Over the last thirty years, Ghana's population in towns and cities has more than tripled, from 4 million to nearly 14 million, exceeding growth in its rural areas. Although Ghana's urbanization is credited as contributing to economic growth and poverty reduction, the process raises serious implications for the country's urban future (Owusu and Yankson 2017). Consistent with observed patterns across Africa, Ghanaian urbanization is caused by three factors: natural population increase, rural-urban migration, and urban reclassification. These factors are not mutually exclusive but can be intrinsically linked (Cobbinah et al. 2015). Especially rural youth perceive Accra to be the epicenter of economic opportunities and exciting modern lifestyles. Rural-urban migration means in Ghana mostly North-South migration: Hunger and malnutrition persist primarily in northern Ghana, where the large majority of capita are farmers who face challenges like climate change, low prices for their produce and poverty, poor road infrastructure, lack of access to finance and schooling, inadequate markets, etc. The Northern Region is among the three poorest in Ghana with a poverty rate of 50.4% in 2016 and a high rate of malnutrition (WFP 2016; GSS 2021).

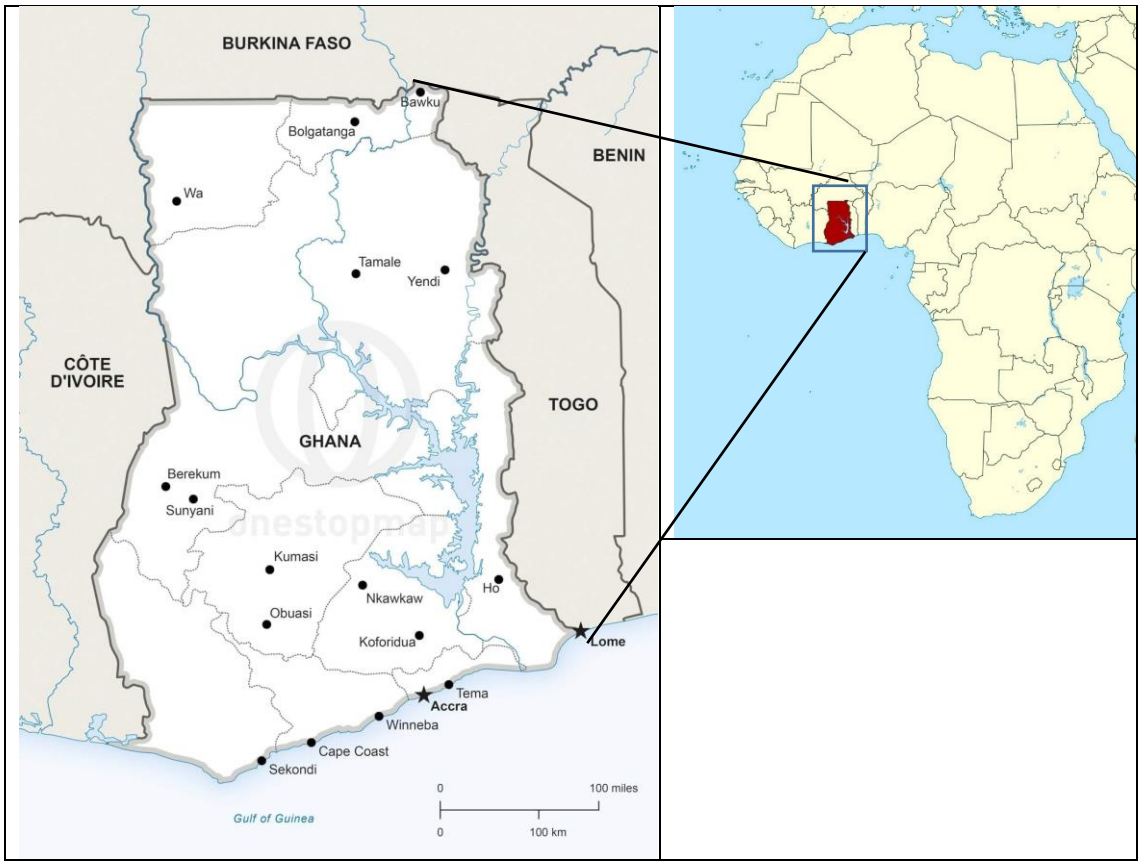

Figure 1. Map of Ghana showing the largest cities and country boundaries (*Source*: https://www.onestopmap.com/ghana/ghana-36/)

Ghana's total population currently stands at over 31 million (Figure 2). The country's population is estimated to almost double by 2050, to an estimated 54.5 million. The **urban** population for 2021 was

18,4m, a 3.25% increase from 2020 (GSS 2021). Urban population in Ghana[1] increased from 52% in 2012 to 58.6% in 2022 with almost half of the increase in Greater Accra and the Ashanti regions (GSS 2021; https://www.statista.com/). The urban population share is estimated to reach 72.3% by 2050, calling for fast and sustainable strategies for facilitating the main problems deriving from rapid urbanization.

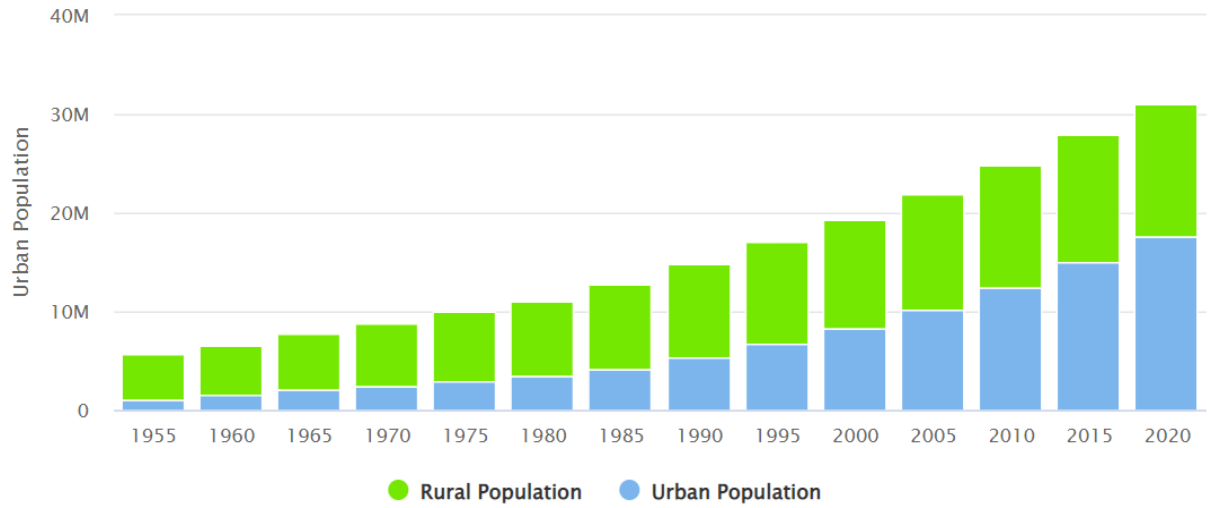

Figure 2. Urban population growth in Ghana (*Source*: GSS 2021*)*

The major cities in Ghana are Metropolitan in nature. A Metropolitan area combines an urban agglomeration (the contiguous, built-up area) with zones not necessarily urban in character, but closely bound to the center by employment or other commerce (see Plates 1a and b). These outlying zones are referred to as peri urban. The peri-urban zone is a transitional belt between the city and the countryside—a zone undergoing various kinds of transformations, where urban and rural features exist side by side (see Box 1). It involves various transformations on the edges of large cities, such as transformation of existing rural settlements into urban settlements without necessarily displacing the rural residents, and changes in the structure of the peri-urban local economy, changes in demography, social structure, land use, land use management and architecture.

Plates 1. a) urban and b) peri- urban Accra

[1] In Ghana, urban areas are defined as settlements with a threshold population of 5000 or more.

For example, Accra, the capital city of Ghana, is the nucleus of the Greater Accra Metropolitan Area , which 29 metropolitan, municipal and district assemblies including Tema Metropolis. The rapidly growing urban population in Accra as well as other cities in Ghana has resulted in massive population spillover into peri-urban settlements, especially as Ghanaian cities are growing more horizontally than vertically (Møller-Jensen et al. 2020). Rapid population growth on the fringes of Accra has led to a corresponding increase in demand (and prices) for land to build homes, shops and offices (Yankson et al. 2005). The peri-urban zones are functionally linked to the cities, and the settlements within them are at various stages of mostly unplanned transformation. Public infrastructure investments from sanitation to roads, markets and schools are hardly keeping pace with the rapid sprawl.

With increasing land prices, farming activities and farm-sizes in peri-urban areas are declining (Allen et al. 2014). On the other hand, many public institutions (also in the city center) allow farmers to use void land for agriculture. Land tenure arrangements involve mutual agreements or sharecropping. Urban migrants without job consider urban farming a temporary option, although many continue for years given the reasonable income which can be obtained from selling perishable vegetable which are in high market demand (Drechsel and Keraita 2014; Karg et al. 2020). Farmers seek in particular unused plots near urban streams, canals or other water ways as irrigation allows to farm even in the dry season. Irrigation is especially important for exotic leafy vegetables in need of water twice a day under the sunny weather and climate of Ghana, which is very different e.g. in the high-altitude Addis Ababa where similar crops are irrigated only a few times the week.

3.0 Climate change and food supply

Climate change impacts on food systems are multifaceted, encompassing both negative repercussions and positive outcomes, although global observations over the past 50 years predominantly highlight adverse effects. In animal production, Ghana faces challenges such as feed scarcity during droughts and high temperatures, leading to illnesses and mortality. Floods and storms pose risks of drowning and hinder movement for both animals and humans, often resulting in infestations of pests and diseases. Droughts and high temperatures significantly affect food processing by causing raw material shortages, escalating processing costs, and consequently, reducing sales.

In Ghana, flooding commonly disrupts food transportation and distribution within urban foodsheds, contributing to elevated food prices. The erratic nature of rainfall, characterized by intra-seasonal dry spells lasting two to three weeks, is a major constraint on agricultural production. Dry spells, becoming more frequent and prolonged, lead to significant crop losses and occasional total crop failure (FAO et al. 2021).

A positive aspect of climate change is the abundance of sunshine during certain periods, facilitating the drying of grains and nuts, as well as smoking and drying of fish. However, during floods and storms, the lack of sunshine results in poor-quality grains and nuts, affecting sales and profits. The dry season, expected to be a peak sales period, sees reduced supplies for petty traders. Conversely, the flood season brings an ample supply of river fish, allowing fishmongers to buy more and store for the lean season, showcasing a nuanced interplay of challenges and opportunities related to climate variations.

4.0 Urban Food Systems in Ghana

Common food produced within the boundaries of Ghanaian cities (e.g. Accra, Kumasi and Tamale) include crops (vegetables, cereals, tubers), livestock (cattle, poultry, goats, and sheep), fish, and non-traditional food (mushrooms, grasscutters, snails). Crop farming in urban areas (Plates 2a and b) can

be subdivided into three main systems as shown in Table 1 (Cofie et al. 2008, Drechsel and Keraita 2014):

TABLE 1. Major categories of urban crop farming systems in Ghana (*Source*: Drechsel and Keraita 2014, modified).

Farming System	Characteristics
1. Market-oriented (vegetable) production	Smallholder farming by several farmers usually on larger undeveloped open land, often near a water source. Exotic vegetables irrigated year-round or seasonal; flowers and ornamentals; in rainy season often also cereals, especially maize.
2. Mixed market and/or subsistence farming	Smallholder farming on (fenced) plots designated e.g. for construction, where one person who can be plot owner, caretaker or neighbour is cultivating in the rainy season e.g. maize or okra.
3. Subsistence production at home	Family operated home gardens or back yard farming at small scale; a few fruit trees, chicken, plantain, maize, cassava, local vegetables, seldom irrigated. Mostly for home consumption, with possible surplus sale.

In Accra, for example, market-oriented irrigated vegetable farming is the dominant crop farming activity either all year round or in the dry season while in the rainy season, corn (maize) is grown. These systems can be seen across the city. About 60% of irrigated vegetable farmers produce exotic vegetables (e.g. lettuce, cabbage, cauliflower etc.), while 40% produce local vegetables (e.g. Okra, Ayoyo [*Amaranthus]*, tomatoes). Backyard farming (Plates 2c and d) also produce fruits, millet, beans grain, legumes, soybean, and plantains, as well as poultry and small livestock.

In peri-urban areas of Accra, some farmers operate large-scale pineapple plantations, supporting the European market (Drechsel and Keraita 2014). Urban areas in Ghana (especially in Accra) also hosts nontraditional farming activities, including mushroom farming, snail farming, grasscutter farming, though at low scale. For a detailed description of some urban farming systems, see e.g. Bellwood-Howard et al. (2015).

Plates 2. a) and b) urban vegetable farms in Accra; c) Backyard farm in Gumbihini residential area and d) Livestock rearing in urban Tamale. (*Source*: UrbanFoodPlus project)

People involved in farming in urban areas often have other jobs. While men are usually more involved in high energy demanding activities (e.g. land preparation), women are usually engaged in watering, sowing, weeding, applying fertilizer and pesticides, harvesting and threshing, coupled with processing and cooking activities. Men outnumber women in irrigated vegetable production, while women dominate the vegetable retail sector, with gender variations between crops (Adeoti et al. 2011; Drechsel and Keraita 2014).

4.1 Urban foodsheds

In Ghana, food mainly flows from the rural and peri-urban areas to the urban centers and their wholesale or retail markets. In addition, some food items are imported from other countries. Depending on their geographical location, like the major north-south road, cities can be more trade hubs than consumption centers. What stays in the city depends on local diets. In Kumasi, for example, cassava and plantain are in high demand for the traditional main dish (fufu), while in Tamale cereals have a similar dominant role (Figure 3). The Northern Region is a major rice production area providing almost 40% of the domestic supply. However, many urban consumers prefer imported rice compared to local brands which have – as the perception goes - small stones mixed with the rice corns due to poor postharvest practices. Cereals, foremost maize, and also other staples such as yam, beans

(*Phaseolus vulgaris L.*) and groundnut (*Arachis hypogaea L.*) are among those crops mostly passing the city of Tamale towards the central and southern parts of the country.

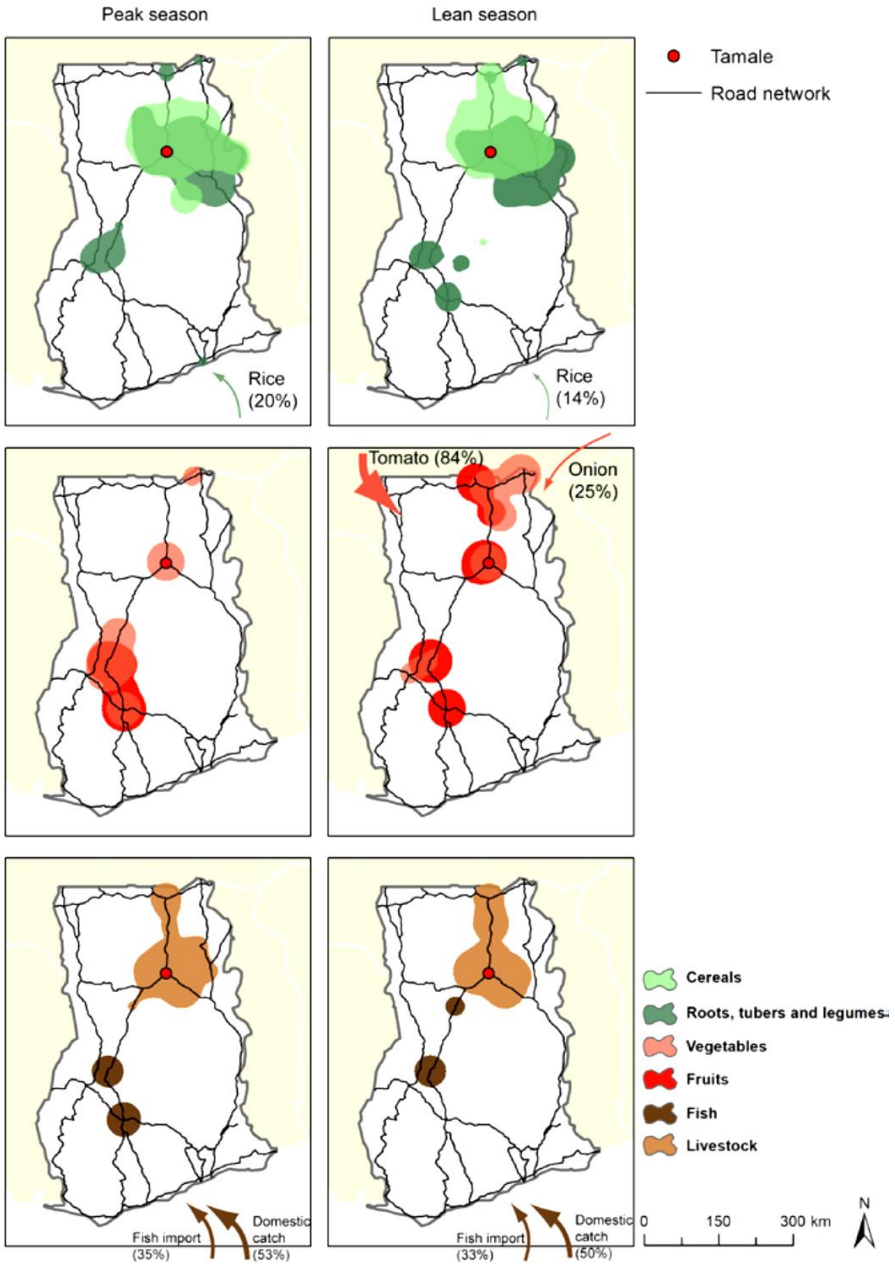

Figure 3. Season-specific sources (foodsheds) of various food groups for Tamale, Ghana. (*Source*: Karg and Drechsel 2018)

Fish plays an important role in Ghanaian diets and contributes to the necessary protein intake given the heavy reliance on staple crops (FAO 2014). Ghana is one of the few countries in the world where fish accounts for more than 50% of the population's animal protein intake as compared with the world average of 17% (FAO 2014). A quarter derives from inland fishery and one-third is met by imports.

Another popular urban protein source is poultry. The demand is to a large extend met by cheap poultry imports from Europe (Elbehri 2013). Other key imported goods are rice, palm oil, raw sugar, poultry meat, wheat, processed tomatoes, and non-fillet frozen which consume more than half of the total expenditure for imported food (Marras et al. 2018).

4.2 City region food systems

Considering source locations as well as relative quantities provided by those locations to the urban population in for example, Tamale, 30%–40% of all food and 26%–28% of the major food is sourced within 30 km while 50%–58% is sourced within 105 km. Again, 80%–90% of food items were sourced within 300 km (Figure 4).

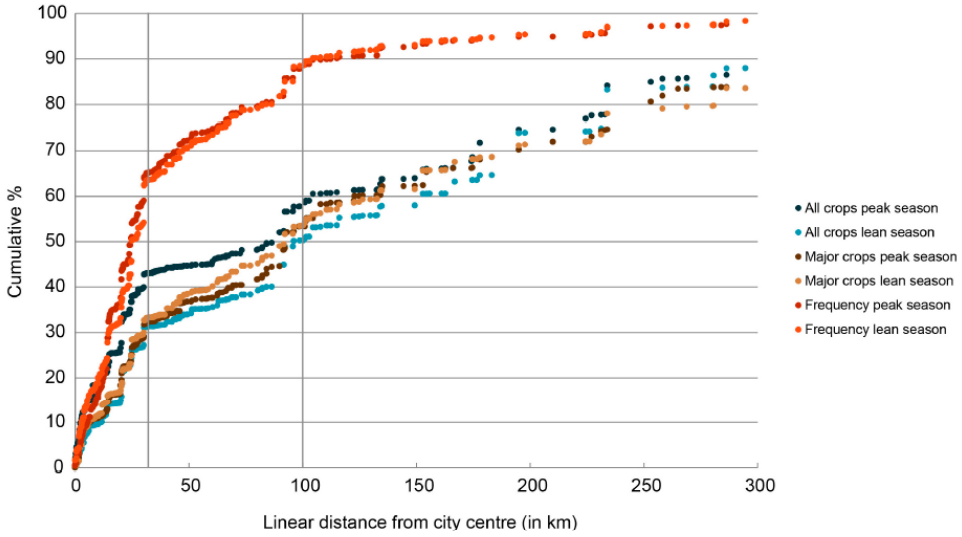

Figure 4. Cumulative food contribution along a distance gradient in Tamale in 2013–2015. The grey-vertical lines indicate the 30% and the 50% city region based on the lean season supply of all crops (*Source*: Karg et al. 2016).

In Tamale, in the peak season, even up to 60% of all records came from within the 30% city region, as compared with 40% of the food quantities. Within 100 km, the ratio rose to 88% of the records. In Tamale, for example, small vehicles accounted for 82% of the vehicles entering the city, carrying 62% of the overall food into the city. This is due to the large number of motorized tricycles in Tamale that carried almost half of the food from the 30% city region into the city, which is more than that carried by trucks and articulators.

Within the 30% city region, peri-urban villages with marketplaces contributed the most, while the 50% city region clearly goes beyond what can be considered peri-urban in the case of Tamale (Karg et al. 2016). The villages and small towns located northeast of Tamale in the 50% city region are part of the north-eastern periodic market system and have traditionally provided local produce, in particular cereals, to Tamale (McKim 1972). In terms of type of food, the 10%, 30% and 50% city regions show different crop-specific contributions (Figure 5).

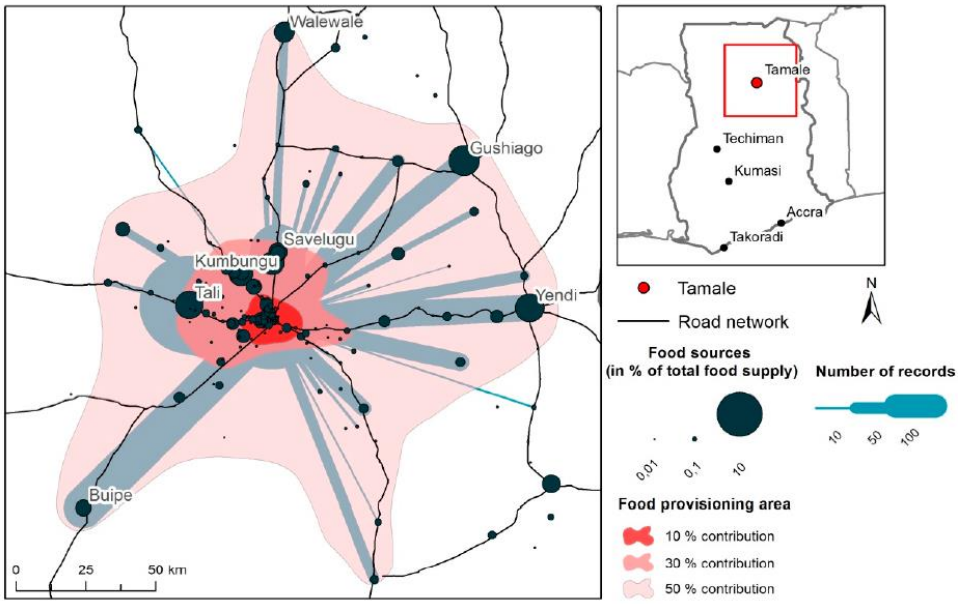

Figure 5. Extents of the city region of Tamale in the lean seasons 2014/2015 (*Source*: based on quantitative contributions and number of records; Karg et al. 2016)

Main sources for yam, maize and plantain are the rural areas of Brong-Ahafo, Upper East, and Ashanti Region. Leafy vegetables (e.g., lettuce) are brought to Accra from other cities (especially Kumasi) during the major dry season. About two thirds of the food brought to Accra is consumed within the city, whereas one third is redistributed to its outskirts or elsewhere in the Country.

For Kumasi a strong seasonality can be observed in the origin of the food supply. Rural-urban food flows are most important (88%) in the lean season. In the peak season, however, peri-urban agriculture reaches an aggregate contribution of 36 percent. It is mainly vegetables like eggplant and cabbage that are harvested during this time from peri-urban farms. Other vegetables, like tomato, are produced in specialized areas or irrigation schemes. Main sources for yam, maize and plantain are the rural areas of Ghana's Brong-Ahafo, Upper East and Ashanti Region. Up to 90 percent of the demand for fresh leafy vegetables, like spring onion and lettuce, is met by inner-city production. Moreover, the lettuce produced in Kumasi is also sold to Takoradi, Cape Coast and Accra (see above). Also, most of the fresh milk found in Kumasi is produced at the local university in the urban area. The peri-urban areas have large poultry farms that produce 80 percent of the eggs found on the urban market while frozen poultry meat is these days mostly imported from the EU (Drechsel et al. 2007).

4.3 Food distribution and marketing

The majority of urban and peri-urban farmers (except for backyard gardeners) are serving local markets. While seasonal crop produce (e.g. maize, cassava) is mostly sold through dealers dealers/middlemen or to market sellers in bulk, irrigated vegetables are generally sold to market sellers at farm gate (pre-ordered, pre-financed) or at the market (Cofie et al. 2008). Many cities have both, wholesale and retail markets (Plate 3).

Large cattle and pigs are usually sold through middlemen, whereas the trade of small ruminants (e.g. sheep, goats), poultry, and grasscutter seldom involves middlemen, as farmers sell directly to neighbors, butchers, chop bars, and consumers at markets. Mushrooms are mainly sold to supermarkets and hotels (Drechsel et al. 2007).

Farmers and marketers have their own system of governance in the areas where they operate. For example, in the typical Ghanaian market setting, there are “queen mothers” in charge of day-to-day operations of vendors, including allocation of selling places and sometimes who sells what and when in the various markets. There can be strong gender roles making it for example for men impossible to sell lettuce (Danso and Drechsel 2003).

As within Ghana and West Africa in general, many commodities are transported over long North-South (and vice versa) distances, usually on second- and third-hand trucks, the food supply system is vulnerable to road challenges, like flooding or robberies, but even more disturbed by the frequent road blocks by police, forestry, and customs who stop the trucks and only let them go after payment of a bribe (Akoto-Danso and Karg 2022).

Plate 3. A market scene in Tamale (*Photo credit*: Hanna Karg)

Out of the 72 imported food items listed by the FAO, four of them account alone for over 50% of the total imported quantity. These are rice, fish, wheat, and tomato products (FAOSTAT). Rice is the only staple crop imported at larger scale beyond African borders (Karg et al. 2016; Karg and Drechsel 2018).

4.4 Role of UPA production

Urban agriculture is a common feature in Ghanaian cities, in particular along any type of water way. In Kumasi, about 90% of the urban consumption of e.g. lettuce derives from lettuce grown within the city on open fields operated by groups of farmers. High percentages are also reported for spring onions, milk and in part cabbage, but not for any crops that can be transported over longer distances without risk of spoiling (Drechsel et al. 2007). Thus, urban (open-space) farming offers an important niche contribution but cannot support urban food demand in general beyond this. This also applies to backyard gardens which have an important role in supplying fruits, herbs, eggs, etc. The contribution of back yards to household food security has been estimated in terms of the saved cost on food expenditures and direct income from sales. Given the small size of the gardens, the annually saved cost reached max. 10% of the overall food expenditures (Drechsel and Keraita 2014).

In general, urban farming takes advantage of its proximity to markets and firsthand knowledge of what crops are in high demand. Except for backyard gardening, urban agriculture appears to flourish in a

grey area between Governmental support[2] and informality as open-space farming usually occupies land based at best on an informal agreement with the owner, caretaker or a local security officer, if any agreement at all.

4.5 Food safety

In Ghana, significant concerns and gaps exist in national food safety across various stages, including production, handling, packaging, processing, and transportation (National Food Safety Policy 2022). Especially the prevalent urban street food sector, a crucial source of job opportunities, faces serious food safety issues due to unsanitary conditions, limited access to safe water, and poor waste disposal facilities. The risk of food contamination is particularly high in urban farms and open markets due to widespread water pollution. Irrigated urban vegetables produced in urban areas are commonly highly contaminated with water-borne pathogens (Drechsel and Keraita 2014). A particular challenge is the largely informal nature of irrigated urban vegetable farming as well as the street food sector where raw salads are part of common dishes. The informality does not support regulations and prevented so far initiatives promoting food safety measures from any lasting success (Drechsel et al. 2022).

5.0 Food in urban planning and governance

The governance of urban food systems in Ghana is complex, with a range of governance actors, sometimes with competing agendas (safeguarding health vs. livelihoods), and more international than national interest in the urban farming topic.

In Ghana, at least seven ministries are responsible for the formulation of policies affecting the nexus of urban food systems, urban agriculture, food safety and food quality (Drechsel and Keraita 2014). The key responsibility is with the Ministry of Food and Agriculture and its various policies, plans, strategies and frameworks of which Ghana's Medium Term Agriculture Sector Investment Plan (METASIP) had a dedicated section on UPA (Box 2). A broader perspective related to urban food systems or rural-urban linkages as found in Sri Lanka's agricultural policy is (still) missing in the screened policies and investment plans, although it was recently promoted (FAO et al. 2021) to increase urban resilience against climate change and other shocks[3].

[2] The Ministry of Food and Agriculture is decentralized, and every district (incl. every urban one) has an office and extension officers.

[3] https://ruaf.org/resource/assessing-risk-in-times-of-climate-change-and-covid-19-city-region-food-system-of-tamale-ghana/

Box 2: Ghana's Medium Term Agriculture Sector Investment Plan (METASIP) and UPA

METASIP (2014-17) was among the various strategies, frameworks and plans developed for the agricultural sector, the one that nominally encouraged the development of UPA. METASIP even dedicated 0.9% of the agricultural budget to UPA and aimed to increase its output by 20% while addressing its related health risks. The plan says in detail:

Component 2.6: Support to Urban and Peri-Urban Agriculture

Urban agriculture using wastewater and water bodies in cities and towns is common in Ghana as in other countries of the world. Intensive urban farming in open spaces is taking place all-year round in Ghana's three main cities of Accra, Kumasi and Tamale and it is market oriented.

UPA makes a significant contribution to a variety of foods in urban markets. In Kumasi, 90% of all lettuce and spring onions consumed are produced from open-space vegetable farming in the city and in Tamale and Accra, about 80% and 10%, respectively of cabbage found on the markets are produced from the open-space farming in the cities. UPA also contributes to employment, livelihoods and poverty alleviation.

Plot sizes range between 0.01 ha and 0.2 ha in urban areas and 0.1 to 0.8 ha in peri-urban areas. The plot sizes in urban agriculture are, in general, diminishing as a result of the action of estate developers and dredging of main drains. Declining soil fertility due to lack of fallow periods is another problem. The main source of irrigation water is untreated wastewater from open drains or polluted water from streams and rivers and also shallow wells.

Although many benefits are derived from UPA, the production is often associated with health risks, and as a result, there are restrictions on farmers. Section 51, subsection 3 of the local government act 462 (1993) generally allows urban farming activities without prior permit from the District/Metropolitan) Planning Authority. However, city bye-laws, e.g., the Accra Metropolitan Assembly (AMA) bye-laws (growing and sale of crops) 1995, restrict urban agriculture on land outside one's premises (open-space farming) to a mandatory registration with the metropolitan officer of health with the intention to maintaining good sanitary conditions in the city.

Farmers face constraints of access to land and quality water for irrigation. Restrictive regulations from local government authorities and rapid urbanization pose significant challenges to UPA as a means of livelihood. Fresh vegetables produced from UPA are often contaminated with pesticides because of improper application.

Development issue: Potential for UPA as source of income is under-exploited and threatened.

Output 2.6.1: Output from peri-urban agriculture increased by 20%.

Activities earmarked to increase generation from UPA include the following:

a) Liaise with Metropolitan, Municipal and District authorities to zone areas within urban and peri-urban areas for agricultural activities.
b) Identify owners and potential users of such lands for agricultural purposes and discuss and agree on conditions of use.
c) Monitor and enforce the use of the lands as per agreements.
d) Train peri-urban producers in good agricultural practices.
e) Conduct Tuberculosis and Brucellosis screening in the peri-urban milk collection areas.
f) Organise mass vaccination, endo and ectoparasitic interventions against the endemic diseases in the peri-urban areas.

The INVESTING FOR FOOD AND JOBS (IFJ) 2018-2021 agenda for transforming Ghana's agriculture followed up on METASIP. In view of UPA it identified the **use of urban and peri-urban fertile lands for real estate** as a challenge. This development is however hard to change as traditional leaders play a key role in urban land allocations, not the Government.

6.0 Indicators for urban food system resilience

Urban food system resilience is a complex and multifaceted concept that involves the ability of a city or urban area to withstand, adapt to, and recover from various shocks and stresses while maintaining essential food functions. Monitoring and assessing urban food system resilience require a set of indicators that can capture the system's dynamics and response mechanisms. Based on consultations by and for RUAF[4], table 2 shows suggested indicators for evaluating urban food system resilience in the case of Tamale.

Table 2. Suggested indicators for resilience in food systems

Number	Indicators for resilience
Foresight	
1	Mechanism(s) for identifying and discussing potential food system impact scenarios (including long-range forecasts) and related contingency plans with diverse stakeholders.
2	Participatory mechanism for co-developing a collective vision and action plan.
3	Local government powers, capacity and resources to implement action plans (specify which actors have powers, capacity and resources).
4	Local government actors can take appropriate rapid action,
Knowledge acquisition and use	
5	Action-planning is informed by baseline assessments and /or robust analysis of the challenges, vulnerabilities, and lack of capacities, including the underlying causes.
6	Baseline assessment takes a systems approach to identify interlinked issues and feedback loops.
7	Scientific learning, from across relevant fields and disciplines, is made available and used to support analysis, learning and action planning.
8	Existing, known vulnerabilities in the urban food system (including those identified from past events) inform specific actions to reduce current and future risks.
9	Mechanism(s) or channels for obtaining community-based knowledge from diverse stakeholders in different social spheres (e.g. though 'social brokers'), to inform analysis and action planning.
10	Local government (and other actors) have the authority to take appropriate rapid action to address urgent issues, based on good knowledge.
Experimentation	
11	Culture of 'learning by doing', with space for experimentation with ideas, technologies and actions that challenge or disrupt established ways of working.
12	Will and resources to adopt and scale up promising new actions, beyond the first stage of adaptation.
Reviewing/measuring performance	
13	Clear outcomes for food-related actions, and ways of monitoring progress (periodic review)

[4] https://ruaf.org/tool/city-region-food-system-indicators/

14	Feedback systems and smart monitoring to measure performance of interventions and policies, detect early signs of failure, and enable adjustments were needed (continuous)
15	Mechanism for stakeholder reflexivity over the process of developing food system interventions, and implementing and monitoring them.
16	Institutional knowledge management to ensure lessons learned from food system interventions are retained between electoral cycles.
Collaboration and integration	
17	Collaboration and integrated working on food systems issues • within government (inter-departmental/ministerial, e.g. Environment, Disaster Risk, Forestry, Water, Planning, Transport, Energy, Climate Change etc); • across jurisdictional boundaries; • between state and non-state actors; • between stakeholders at different food supply chain nodes. (NB this may include involvement in a multistakeholder platform or other mechanism(s))
18	Development and implementation of cross-departmental policies and programmes related to the food system and climate.
19	Inclusion of food in relevant sectoral policies that aim to manage climate risks and build resilience.
20	City leadership is committed to action, and drives collaboration.
21	Diverse actors from private, non-profit, academic sectors (and others) develop and implement complementary actions to build food system resilience.
22	Actions and initiatives to build food system resilience involve stakeholders from across food chain nodes, in an integrated way.
Multi-level governance	
23	Clearly defined and mutually supportive institutional arrangements and division of authority and responsibilities related to the food system between national, regional, local levels.
24	Channels for engagement, capacity-building, and coherent action between local, regional and national levels.
25	Adequate funds are available for local governments to take action as needed, either through national funding mechanisms or the ability to raise funds at the local level.
Inclusivity	
26	Multistakeholder participatory platform for inclusive dialogue and decision-making, enabling engagement of diverse community voices throughout the process (especially marginalized and disempowered); with procedures upholding equity, fairness and accountability.
Empowering communities	
27	Enabling and empowerment of grassroots communities to design projects and manage resources to address local needs (with support from organizations at various levels, especially to promote long-term viability)
Access to services and resources	
28	Residents and food businesses have safe access to fuel and energy (electricity); clean water; sanitation

29	Actions are in place to ensure fuel & energy in contingency planning (by local governments, fuel and energy suppliers)
30	Safety/Sanitation: Actions to ensure adequate sanitation services in contingency planning (by local governments and sanitation suppliers)
31	Communication: Actions to ensure access to internet, radio and telecommunications in contingency planning (by local governments, radio and telecoms suppliers)
32	There are social programmes and/or government reserves exist, that can be activated or distributed to vulnerable stakeholders in times of crisis (including economic crisis).
Embedding and institutionalization	
33	An institutional culture that is open-mined to overcoming path dependencies and changing norms, values and power structures (ways of working), including: integrated approaches and operation across policy areas and jurisdictional lines; • development, adoption and implementation (with appropriate instruments) of policies, approaches and practices for food systems resilience, including on food waste and food safety. • Inclusion of food within the planning framework, and identification of appropriate policy instruments for implementation. • Existence of an integrated strategy for food system climate resilience • Inclusion of food within local government contingency/disaster risk recovery plans. • capacity-building and training provision to promote take up and use of new approaches by officials and other stakeholders
Instruments and agency levels	
34	A suite of actions that are based on a variety of instruments, including top-down regulations, market incentives, and enabling community-based initiatives.
35	Actions or activities that build capacities across various human agency levels (individual, household, social groups, organizations, networks, society).
Brokers and change agents	
36	Active change agents that enable engagement with different sectors, governance levels, and social spheres (social brokers, entrepreneurial agents; collaborative agents, visionary agents).

(Source : RUAF unpublished)

These indicators can provide a comprehensive overview of the urban food system's ability to adapt, recover, and ensure food security in the face of various challenges. The specific indicators chosen may vary based on the unique characteristics and challenges of each urban area.

7.0 Key issues and recommendations

In Ghana, urban areas are fast growing. The CRFS can cut across national and regional borders. Research done for Accra, Kumasi and Tamale showed the flows of various commodities within the city-region or between cities. Crop- and season-specific foodsheds revealed the level of spatial and temporal diversity and dependencies within one-dimensional and multi-dimensional foodsheds.

Increasing globalisation, contributing to a year-round availability of food and the supply of imported and processed food, will likely change and expand current foodsheds, and the relation of a city to its city region, and its function within it, may change as it develops. Complementing local food supply

sources with other national and continental sources may enhance systemic resilience, given that place-based risk factors, e.g., climate risks such as floods, could affect the entire production and urban food supply.

Sole reliance on international sources, however, is also risk prone. For example, cross-border trade among the ECOWAS (Economic Community of West African States) countries seems still far from smooth although economic integration should be a pillar of food security, including in the landlocked countries.

Urban farming is supporting urban food security. However, there is no universal level of self-sufficiency. Understanding urban food needs and current foodsheds can help to develop strategies for a better management of urban food supply including the role of local production in urban and peri-urban areas, with a keen objective of diversifying food sources (Karg et al. 2016).

While the future of (inner) urban farming systems remains uncertain (Allen et al. 2014; Karg et al. 2020) its role close to urban markets remains for now important for perishable commodities, like exotic vegetables. A particular challenge for the farmers and the city is, however, water pollution. As long as all urban water bodies show high pathogen loads, vegetable farmers and other actors along the vegetable value chain have to adopt safety practices as promoted by WHO. Due to the informal nature of irrigated urban vegetable farming and limited knowledge on how to facilitate behaviour change, this is still work in progress and requires more research (Drechsel et al. 2022).

References

Adeoti, A.; Oladele, O.; Cofie, O. 2011. Sustainability of livelihoods through urban agriculture: gender dimensions in Accra, Ghana. Life Science *Journal-Acta Zhengzhou* University Overseas Edition, 8(2), 840-848. Avialabe at: https://www.researchgate.net/publication/285754496_Sustainability_of_livelihoods_through_Urban_Agriculture_Gender_dimensions_in_Accra_Ghana. (accessed on 15.08.2024)

Akoto-Danso, E. K.; Karg, H. 2022. *Trading food across West African borders. Colombo, Sri Lanka*: IWMI Available at: https://cgspace.cgiar.org/items/c6211869-319f-4eaa-bcc7-70eb3c213887 (accessed on 15.08.2024)

Allen, A.; Frediani, A.; and Wood-Hill; M. 2014. *Land and Planning for Urban Agriculture in Accra: Sustained Urban Agriculture or Sustainable Urbanization? Irrigated Urban Vegetable Production in Ghana*, 161. Available at: https://www.iwmi.cgiar.org/Publications/Books/PDF/irrigated_urban_vegetable_production_in_ghana-chapter-13.pdf (accessed on 15.08.2024)

Bellwood-Howard, I.; Häring, V.; Karg, H.; Roessler, R.; Schlesinger, J.; Shakya, M. 2015. *Characteristics of urban and peri-urban agriculture in West Africa: Results of an exploratory survey conducted in Tamale (Ghana) and Ouagadougou (Burkina Faso)*. IWMI Working Paper 163.Colombo, Sri Lanka: International Water Management Institute. 30pp doi: http://dx.doi.org/10.5337/2015.214

Cobbinah, P. B.; Erdiaw-Kwasie, M. O.; Amoateng, P. 2015. Africa's urbanization: Implications for sustainable development. *Cities* (London, England), 47, 62–72. doi: 10.1016/j.cities.2015.03.013

Cofie, O.; Danso, G.; Larbi, T.; Kufogbe, S. K.; Obiri-opareh, N.; Abraham, E.; and Forkuor, G. 2008. *Livelihood Support Potentials and Policy Issues for Urban Agriculture in Accra, Ghana*. IWMI

Research Report. Retrieved from http://ruaf. iwmi. org/Data/Sites/4/PDFs/Accra% 20UPA% 20paper% 20-% 200309. Pdf (accessed on 15.08.2024)

Danso, G. and Drechsel, P., 2003. *The marketing manager in Ghana. Urban Agricultural Magazine 9*: 7. Available at: https://www.researchgate.net/publication/227450006_The_marketing_manager_in_Ghana (accessed on 15.08.2024)

Drechsel, P. and Keraita, B. (Eds.). 2014. *Irrigated urban vegetable production in Ghana: characteristics, benefits and risk mitigation.* 2nd ed. Colombo, Sri Lanka: International Water Management Institute (IWMI). 247 p. doi: 10.5337/2014.219

Drechsel, P.; Graefe, S.; Fink, M. 2007. *Rural-urban food, nutrient and virtual water flows in selected West African cities. Colombo, Sri Lanka*: International Water Management Institute. 35p (IWMI Research Report 115) Available at: https://www.iwmi.cgiar.org/Publications/IWMI_Research_Reports/PDF/PUB115/RR115.pdf (accessed on 15.08.2024)

Drechsel, P., Qadir, M., Galibourg, D. 2022. The WHO guidelines for safe wastewater use in agriculture: a review of implementation challenges and possible solutions in the global south. *Water* 14, 864 (2022). Doi: https://doi.org/10.3390/w14060864

Elbehri, A. 2013. Rebuilding West Africa's Food Potential: Policies and Market Incentives for Smallholder-Inclusive Food Value Chains; FAO: Rome, Italy, 2013. Available at: https://www.fao.org/4/i3222e/i3222e.pdf (accessed on 15.08.2024)

FAO (Food and Agriculture Organization of the United Nations).2014. *The State of World Fisheries and Aquaculture: Opportunities and Challenges;* FAO: Rome, Italy, 2014. Available at: https://www.fao.org/in-action/globefish/publications/details-publication/en/c/338355/ (accessed on 15.08.2024)

FAO, RUAF and IWMI. 2021. *Assessing risk in times of climate change and COVID-19: City region food system of Tamale, Ghana*. Rome, FAO. Doi: https://doi.org/10.4060/cb6621en

Ghana Statistical Service (GSS), *2021 Population census,* 2020, Ghana Available at: https://census2021.statsghana.gov.gh/ (accessed on 15.08.2024)

Karg, H.; Drechsel, P. (Eds.). 2018. *Atlas of West African urban food systems: examples from Ghana and Burkina Faso. Colombo, Sri Lanka*: International Water Management Institute (IWMI). CGIAR Research Program on Water, Land and Ecosystems (WLE). 83p. doi: 10.5337/2018.224

Karg, H.; Drechsel, P.; Akoto-Danso, E.K.; Glaser, R.; Nyarko, G.; Buerkert, A. 2016. Foodsheds and City Region Food Systems in Two West African Cities. *Sustainability* 2016, 8, 1175. doi: https://doi.org/10.3390/su8121175

Karg H, Drechsel P, Dittrich N, Cauchois A. 2020. Spatial and temporal dynamics of croplands in expanding West African cities. *Urban Agric Region Food Syst*. 2020; 5:e20005. doi: https://doi.org/10.1002/uar2.20005

Marras S., Salmivarra, M., M.A.G. Bendech, R. Seki. 2018. *Urban food systems, food security and nutrition in West Africa, Accra, Ghana*. Available at: https://www.academia.edu/37800733/Urban_food_systems_food_security_and_nutrition_in_Accra_Ghana (accessed on 15.08.2024)

McKim, W. 1972. *The periodic market system in Northeastern Ghana*. Econ. Geogre. 1972, 48, 333–344. Available at: https://www.tandfonline.com/doi/pdf/10.2307/142912 (accessed on 14.08.2024)

Møller-Jensen, L.; Allotey, A. N.; Kofie, R. Y.; Yankson, P. W. K. 2020. A comparison of satellite-based estimates of urban agglomeration size for the Accra area. *ISPRS International Journal of GeoInformation*, 9, 79 doi: https://doi.org/10.3390/ijgi9020079

National Food Safety Policy. 2022. Accra, Ghana. Available at: https://www.moh.gov.gh/wp-content/uploads/2022/07/NFSP-Document-signed-and-launched.pdf (accessed on 14.08.2024)

Owusu, G. and Yankson, P. W. K. 2017. *Urbanization in Ghana: Retrospect and Prospects*. In The Economy of Ghana Sixty Years after Independence, Ernest Ayeetey ed Ravi Kanbur ed Pages 207-222 doi: https://doi.org/10.1093/acprof:oso/9780198753438.003.0013

Prain, G.; Simon, D.; Halliday, J.; Drechsel, P. 2022. Investment priorities for research and innovation in urban agri-food systems: toward more resilient cities in the Global South. *Frontiers in Sustainable Food Systems*, 6:965011. doi: https://doi.org/10.3389/fsufs.2022.965011

WFP (World Food Programme). Ghana. 2016. Available at: http://www.wfp.org/node/34673726 (accessed on 2 July 2016).

Yankson, P.W.K.; Kofie, R.Y. and Moller-Jensen, L. 2005: *Urbanization of the fringe areas of Accra: Periodical:* Bulletin of the Ghana geographical Association. Issue 14 Available at: https://www.africabib.org/rec.php?RID=Q00043134&DB=p (accessed on 14.08.2024)

Annex 1: Selected differences between rural and urban crop farming systems

Criterion	Rural agriculture	Urban agriculture
Type of farming	Conventional, 'textbook' -type farming mostly by small holders with focus on staples like grains, tubers, …	Backyards, open space, low space, vertical, soil-less, roof-top, controlled environment agric. Mixed cropping, often perishable crops.
Policy attention	High as cornerstone for SDG 2	No, low, or negative attention
Focus of agricultural extension support	High, and subject of its training curriculum	Seldom; UA crops and farming challenges not part of extension training curriculum
Importance for urban food supply	Supplies most food of nearly all commodities (not counting imports, and easily perishable ones)	Can supply the majority of easily perishable commodities likes exotic vegetables or serves niche markets (e.g. herbs, baby tomatoes)
Livelihood importance	'Farming' is usually a primary (full-time) job	Farming is often a secondary, part-time job
Heritage	Usually 'born' farmers (family tradition)	Often 'beginners' (rural migrants, hobby farmers in backyards)
Land tenure security	Relatively high based on local customs	Often illegal/informal land occupation (open-space farming) with low/no tenure rights
Community integration	Farmers constitute the majority of community members	Open-space farmers are a minority; backyard gardening can be more mainstream where space allows

System complexity	More homogeneous system and external environment	Diverse stakeholders and physical environment, crop choices follow closely market demand
Common nutrient inputs	Fertilizer, cow manure	Urban waste compost, poultry manure, fertilizer
Common water sources	Surface and ground water	Polluted streams and shallow wells, raw or diluted wastewater
Main authority concern	High yields	Public health risks (unsafe irrigation water, contaminated soils, air)
Carbon balance	Long food miles and high carbon footprint	Short supply chain, low carbon footprint

Source: Authors