Foresight Capability for Food System Transformation in Ghana and Uganda

A project by the Foresight4Food Initiative

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Foresight4Food
International Collaborative Initiative

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Executive Summary

This report presents the outcomes of an OSF-funded project supporting the piloting of food system mapping and foresight work in Ghana and Uganda during 2021 in the lead up to the UN Food Systems Summit. As signalled by the Summit, a food systems transformation is needed to meet the Sustainable Development Goals, and to ensure that for the long-term food is consumed and produced in ways that are healthy, sustainable, and equitable. Working closely with country partners and national stakeholders, this project aligned with national level activities contributing to and resulting from the Summit Dialogues. It constituted part of activities of the Foresight4Food Initiative for enhancing foresight capacities and scenario analysis to support food systems transformation.

The project piloted a methodology on national-level foresight for food system transformation through a stakeholder-led and co-creative process. This involved a set of workshops designed in collaboration with country partners, focusing on the national food system in each country, building capacity on foresight and scenario literacy within the country, and developing scenarios for the future around critical uncertainties. The findings from these workshops contributed to the data collection and information gathering exercises conducted by the country partners and contributed to the national dialogues for the UN Food System Summit. The process represents a foresight toolkit for national level activities in food systems transformation processes driven by systems mapping and foresight and scenario analysis.

The scenario analyses for both countries were based on an exploration of drivers and future uncertainties for the country's food system, arrived at through a consensus-building process in stakeholder workshops. The scenario analyses were supported by the evidence from the country food system mapping reports which gathered information on the key food system activities, current drivers and the status of food system outcomes, such as food and nutrition security, economic, environmental and social outcomes. Four scenarios were developed, based on five key uncertainties identified by the stakeholders concerning different policy arenas such as trade, agri-food sector development, the environment and human development. The Foresight4Food team then analysed the scenarios in a light touch way to draw out the implications of these different plausible futures for a number for variables of interest to stakeholders, such as food and nutrition security outcomes, small holder farmers' opportunities, health or environmental implications. All the scenarios demonstrated a variety of trade-offs between food security, socio-economic well-being, sustainability, and resilience outcomes of potential future food system that require decisionmakers to re-think some of the policy choices in front of them today.

Contents

The Need for Food Systems and Foresight Thinking

Food systems around the world need to urgently transform to provide adequate nutrition, lower environmental impacts and better livelihood outcomes. The challenge is working out how to bring about the transformations that will enable better nutrition, sustainability, inclusiveness, and resilience. This requires a systemic approach to policy making and advisory work that integrates evidence from research and field experiences with forward thinking to assess the longer-term consequences of alternative scenarios. Creating political will for and societal understanding of change demands effective brokering of scientifically informed stakeholder engagement. Such processes need to integrate systems analysis with foresight and scenario analysis, supported by effective use of data and evidence from the field, and include, if possible, computer modelling and data visualization.

While multiple approaches and methodology for food systems analysis, and stakeholder driven foresight and scenario analysis have been developed, there has been limited integration of such approaches into comprehensive and ongoing national and local processes to support food systems dialogue and policy reform. There remains a critical need to enhance national and regional capacities for such foresight analysis and its role in designing implementation strategies to cope with uncertainties. This needs the establishment of a wider global supporting mechanism to broker the input of international expertise and enable learning across national level efforts. This will only be possible through greatly enhanced forward looking processes of engagement between policy makers, society and science informed using real-time and diverse type of data, implementation, and testing of research findings and of resulting evidence. Within the context of the Food Systems Summit, few countries have a synthesised and integrated perspective of critical food system trends, analysed in ways that can support policy makers and other stakeholders to understand the issues and their longer-term implications.

Systems and foresight analysis is key for stakeholders to understand the likely consequences for them of “business as usual”, and to engage in processes of exploring the trade-offs, opportunities and risks of alternative scenarios and pathways.

Foresight4Food and the Grand Challenge in Food Systems

The Foresight4Food Initiative aims to provide a mechanism for better analysis and synthesis of key trends and possible futures in global food systems and to support more informed and strategic dialogue between the private sector, government, science and civil society. The Initiative further aims to strengthen global and local commitment to and capacities for rigorous foresight processes that enable open, transparent, and forward-thinking dialogue between diverse stakeholders based on food systems approaches and effective use of scientific insight.

With support from the Open Society Foundation, Foresight4Food developed and piloted a comprehensive methodology for national level foresight for food systems transformation in Ghana and Uganda in collaboration with in-country teams. Foresight4Food focuses on:

1. Integrating systems thinking with the challenge of transforming food systems
2. Linking scientific research with systems modelling with stakeholder dialogue and policy to explore future scenarios
3. Assisting stakeholders to work with the complexity of food systems and the uncertainty of the future
4. Brokering an open and collaborative platform for the benefit of all actors working on food systems

5. Supporting, complementing and not duplicating the work of existing institutions and platforms
6. Coordinating efforts to provide foresight analysis and services that serve multiple purposes and groups

Given the Initiative's focus and areas of interest, it is well placed to address the grand challenges and uncertainties facing global food systems and to respond to the call to action by the UN Food Systems Summit.

Objectives

Effectively managing trade-offs that might arise in food system transformation requires better system-wide understanding and futures-oriented analysis. Foresight and scenario processes integrated with national and local dialogues can significantly help to develop robust, future-proofed strategies, and policies. The objectives of the project therefore were to:

1) Pilot a methodology for national level foresight for food systems transformation and develop an associated foresight toolkit.

2) Help catalyse and support foresight and scenario processes in Ghana and Uganda relevant to local needs and circumstances.

3) Enhance foresight and scenario literacy for food systems transformation of key actors in Ghana and Uganda.

4) Support the work of the African Foresight Academy and strengthen linkages on foresight work with key African academic and government institutions including AU and RUFORUM.

5) Foster the Foresight4Food Community of Practice.

Method and Toolkit

The project piloted an enhanced use of foresight for food system transformation that aligns with and supports food systems dialogues. The primary proposition is that dialogue, policy innovation and business innovation will need increased support from science-based foresight and scenario analysis to help assess the consequences of current trends and future risks and to identify pathways for desired change. This type of foresight work requires capacity development at national and local levels, where research institutions could be mobilized to provide synthesized analysis and methodological support, and to facilitate an integration of scientific analysis with interactive stakeholder processes.

This work benefits from the Foresight4Food approach for food system foresight (see Figure 1 below). A few basic definitions and premises are underlying the presented framework: foresight here is used in a general way to refer to developing insights about the future to improve responsiveness and decision-making to future risks and opportunities. Related terminology includes strategic foresight, future studies, and scenario analysis.

This framework has been developed to illustrate an integrated approach to foresight work that connects stakeholder processes of foresight analysis with the science of foresight research and studies. It represents a core "foresight process" of: clarifying actors; establishing the purpose of a foresight exercise based on actors needs and interests; understanding and mapping the boundaries and relationships of the systems to be analyzed; identifying key drivers, trends and uncertainties; which provide the basis for exploring possible future scenarios; understanding stakeholder visions

for the future; analysing possible scenarios of upcoming changes, and from this identifying what strategies for influencing or adapting to change may be desirable. This core process is then supported by stakeholder engagement, dialogue and scientific knowledge base (that itself is constantly evolving and influenced by foresight).

In practice, foresight processes exist on a continuum from highly stakeholder driven with limited scientific input to very scientific studies that have limited stakeholder engagement at the other extreme with full integration in the middle. This results in processes that are either fully determined by stakeholder interests (with researchers being facilitators of the process) to process in which stakeholders are merely consulted or not directly involved.

There is considerable overlap between the ideas of foresight and scenario analysis. Simply, scenario thinking means recognising that due to complexity and uncertainty, the future may unfold in different ways based on varying interactions of driving forces determining the future and human decisions shaping these. Scenarios are a way of trying to understand the implications of these different futures. The term 'scenario' is also used in a narrower sense in the computer modelling world to refer to the future outcomes of a particular set of parameters and assumptions. Approaches to scenario thinking incorporate many aspects of what has been referred to as foresight, and many foresight approaches incorporate aspects of scenario analysis.

The framework has three core premises:

1. Due to complexity and uncertainty the scope for accurately predicting exactly how the future will unfold is limited at best.
2. However, this does not mean that it is not possible to detect and respond to emerging trends that will significantly shape the future, for better or worse (e.g.the negative consequences of a trend of destroying much of the world's biodiversity is pretty clear, warranting some form of 'anticipatory action' to avoid the negative consequences).
3. Foresight is a social and political process, informed by scientific understanding and analysis that enables organisations and societies to better respond to emerging risks and opportunities.

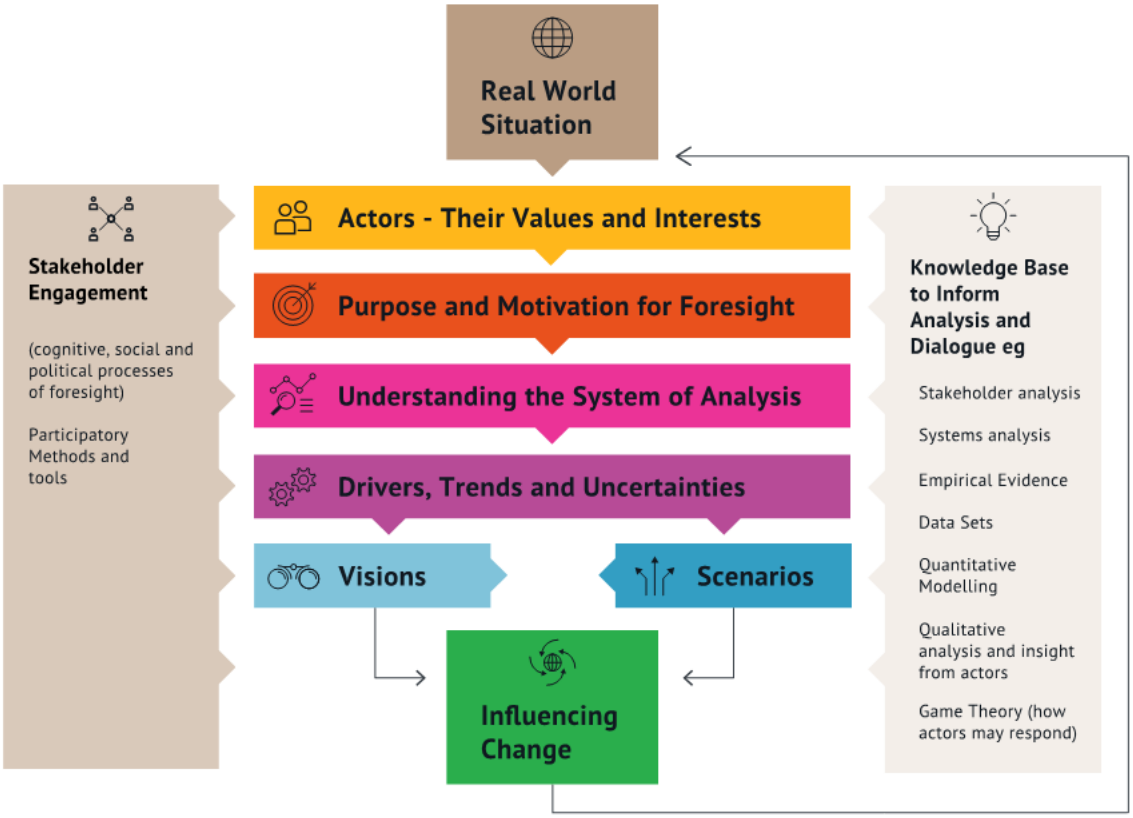


Figure 1 Foresight4Food Approach Food Systems Foresight

Figure 2 and Table 1 below illustrate a practical translation of the foresight approach into a series of steps to guide a stakeholder engagement process for undertaking food systems foresight analysis. In practice the steps will be more iterative than implied by the linear depiction.

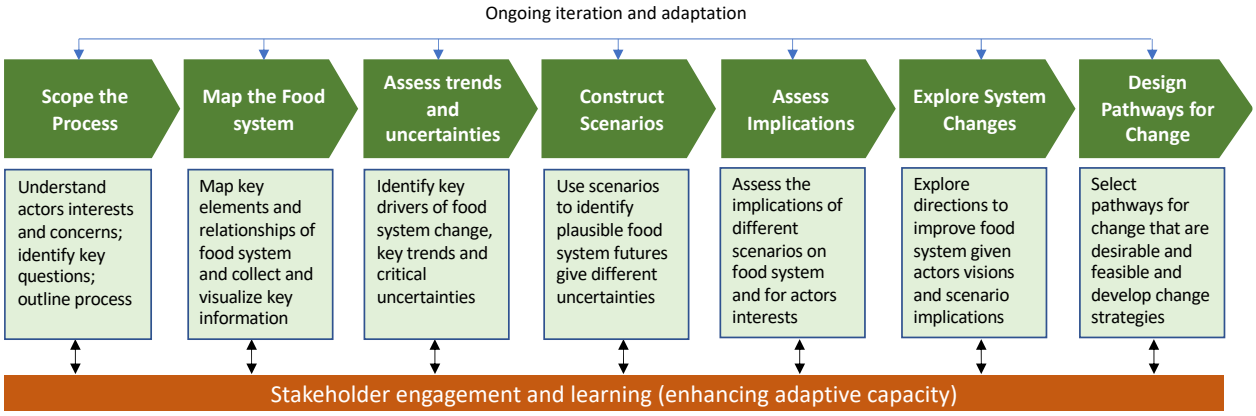
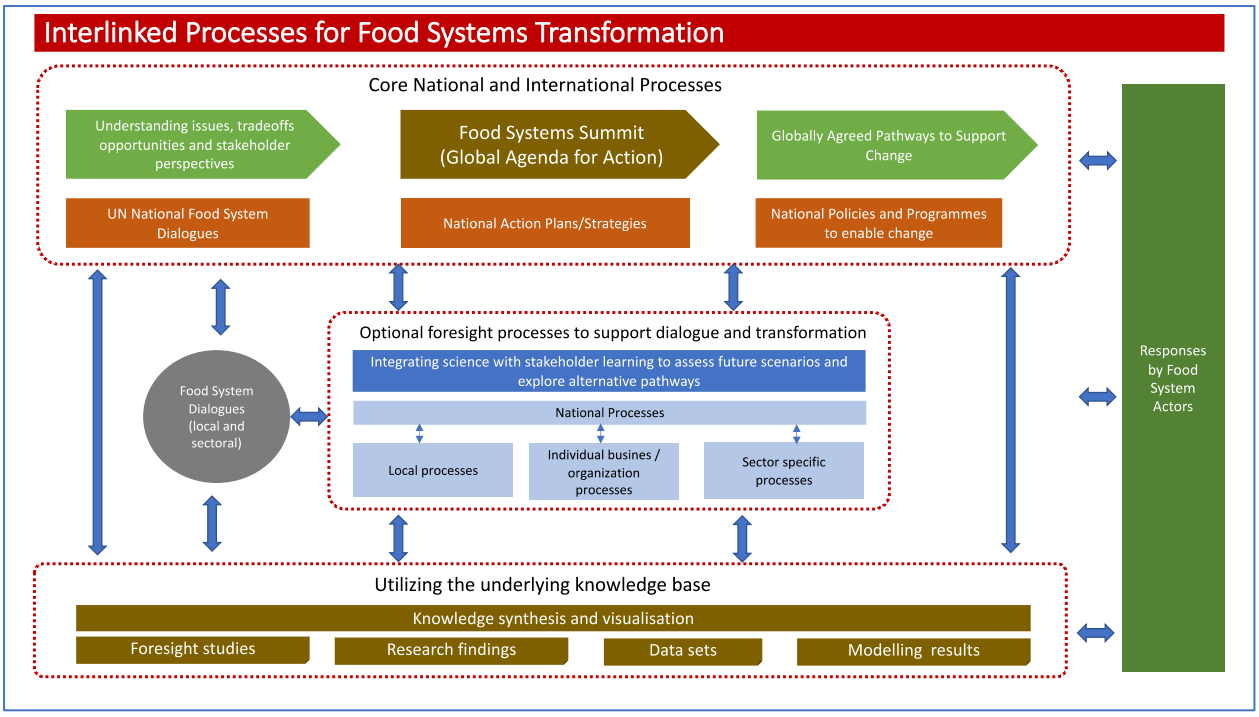


Figure 2 Foresight approach at a national level

Step	Key elements	Description
1) Scope the process	• Understand actors interests and concerns • Explore desired food system outcomes • Identify guiding questions • Establish agreed boundaries and focus • Outline process and stakeholder participation	The foresight process is actor / stakeholder driven. The aim of the scoping is to develop a process that is meaningful to key stakeholders. It needs to reflect their concerns and questions. The scoping exercise is essentially a quick, high level run through all the steps, particularly (2, 3 and 5). This enables the detailed design of the steps be framed and bounded by stakeholders' key questions and issues.
2) Map the food system	• Map key elements of the food system(s) • Map critical relationships • Map available data and information • Visualise data and relationships for easy stakeholder understanding	This step develops understanding of food system elements, how they interact and the information that is available for further analysis. It helps stakeholders to 'see' the food system as a set of relationships.
3) Assess trends and uncertainties	• Identify key drivers of current food systems change • Identify key trends in food systems status, dynamics and outcomes • Identify key uncertainties that may create alternative food system futures	Information identified in 2 is used to assess how external factors are shaping the direction of the food systems and how the internal dynamics are changing. Key is thinking out of the box to identify uncertainties they may have a big influence.
4) Construct scenarios	• Review existing scenario exercises • Use uncertainties and trends to identify plausible future scenarios • Identify key features of each scenario • Develop narratives and story lines for each scenario • Back up scenarios with data	Scenarios are constructed to explore how food systems might evolve given different uncertainties and trends. This help actors engage with the implications of uncertain and unpredictable futures, and to assess if business as usual trajectories will be desirable. Scenarios are not about predicting the future bout about help decision makers prepare for plausible alternative futures.
5) Assess implications	• Assess implications of scenarios for food system activities • Assess implications of changed activities for food system outcomes • Assess the implications of different scenarios for actors' interests	The scenarios provide a basis to explore with stakeholders how different plausible futures will affect food system dynamics and outcomes and the degree to which different scenarios are or are not in actors and/or overall societies interests.
6) Explore system changes	• Clarify actors' visions and goals for an improved or "ideal" food system • Assess degree of alignment or misalignment between visions/goals and the outcomes of different plausible scenarios	The scenarios and implications provide a basis for actors to explore what sort of changes to food systems would be desirable and feasible for different scenarios. All the preceding analysis help actors be clearer on their desirable visions for the future of the food systems and the

	• Explore options for change that could bring food systems into better alignment with visions and goals • Test options for change against each scenario	degree to which these visions can be realised in different scenarios. This provides the basis for exploring options and pathways for change and testing against different scenarios.
7) Design change pathways	• Select pathways for change that are desirable and feasible • Develop theories of change for selected pathways • Mobilise action for change	The final step is to select pathways for change and to establish what will be needed for such change to be acted upon and realized.

Foresight work is intended to support and align with any national level dialogue and food system transformation processes. In doing so the intention is to create an interface between science, stakeholder engagement and policy dialogue. National processes need to be country owned and driven, and build on and integrate with existing initiatives.



Applying the Foresight Methodology in Ghana and Uganda

The foresight process was undertaken in Ghana and Uganda between May and November 2021. This involved:

1. Consultation with in-country partners about the project process and activities
2. An orientation workshop on food systems analysis and foresight (Annexes 2.2 and 3.2)

3. Data collection and expert consultation conducted by in-country teams (Annexes 2.1 and 3.1)
4. Stakeholder workshops, convened by in-country partners, to develop the outlines of country food system scenarios
5. Further population of scenario tables by in-country teams based on uncertainties identified during the workshops and supported by evidence from the country reports (Annex 1)
6. Overall analysis of the scenario implications support by the University of Oxford team.

The initial intention had been for a series of face to face events each involving several days. Due to the COVID-19 situation this proved not possible and all engagement became virtual. While it proved possible to work through the entire foresight process in a virtual way, this did have significant limitations in terms of the length of time people could be engaged, and the depth of collective analysis possible. Poor internet access also made it more difficult for some participants to fully engage.

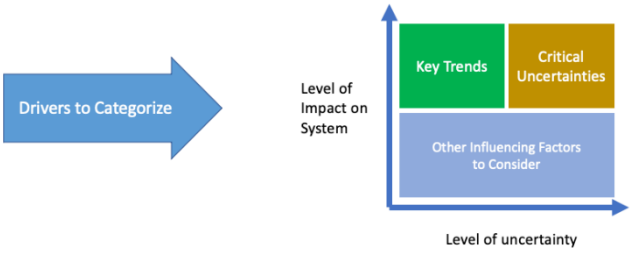
In all over 60 people participated in the process in Ghana and 70 people in Uganda representing interests from across government, academia, civil society, and food businesses.

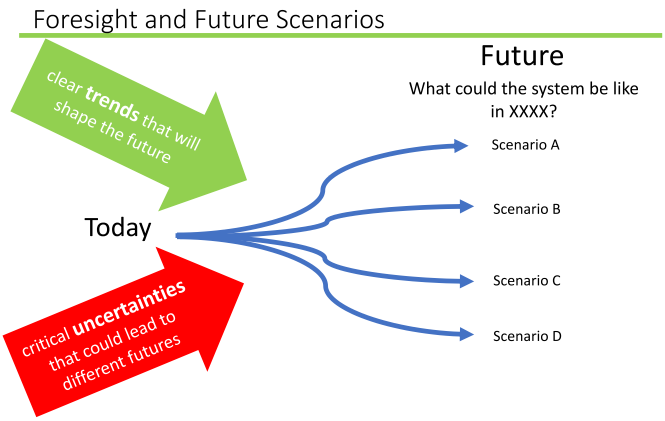
The framework for analysing food systems through a foresight process was much appreciated by those who engaged in the process. In particular the value of taking a longer term perspective and exploring the impact of future uncertainties for policy making was highlighted. The process also highlighted how fragmented data and information on food systems remains. It took the in-country teams considerable time and effort to assemble the data sets (Annexes 2.1 and 3.1) with it being clear that no such compilation of food system information had previously been collated by national or international agencies. In collecting the information significant information gaps were also apparent as well a lack of future projections for key indicators.

In the context of these constraints, these exercises in food systems foresight analysis are presented as pilot studies and a learning process for those who engaged. They provide a methodological basis and overview analysis, which could be built on and deepened as part of taking forward national food system transformation pathways. However, even this limited scope of work has produced important insights for policy.

Outcomes of the Foresight Analysis

The development of future scenarios, in this case taking a 2050 time horizon, is at the core of the foresight process. This analysis requires identifying key trends and critical uncertainties which may shape the future. Future scenarios are not what stakeholder may "like to see happen" but rather possible or plausible situations which could occur given critical uncertainties. Identifying and discussing the implications of critical uncertainties is one of the most important and insightful aspects of the foresight work.





Ghana Analyses

Scenario Implications for Ghana

When looking across the different scenarios, there is no scenario that can achieve positive outcomes for all food system outcomes and result in an overall more resilient Ghanaian food system. But there are two of the plausible futures that can come close, though in different ways and with different 'costs' associated with these outcomes. This shows that policy and decision makers have quite a few policy choices in front of them concerning how they design the policies around agricultural and food sector development, trade, or environmental policies. The scenarios nevertheless also portray how intertwined these choices are in Ghana's complex food system and close attention needs to be paid to coherent policy making that takes the implications of each decision not just on one part of the system into account but also assesses potential trade-offs with respect to other parts or system outcomes. All scenarios show various ways in how feedback loops exist between different sectors, such as in Scenario 2 where the 'environment bites back in the future' to stifle agricultural sector development if not addressed properly. Thus none of the policies provide a way forward alone, in combination and with careful consideration of potential trade-offs between policy goals the scenarios show that there could be brighter futures ahead, such as in Scenarios 3 and 4. How the potential trade-offs between differing goals of policy makers and varying opinions of food system actors can be best addressed requires to create a joint understanding of where the food system currently stands and what food system actors value today and in the future. And some way for negotiating across the various opinions is needed, if Ghana wants to avoid some of the inefficiencies of more uncoordinated policy making. As the food system is complex and many different forces impact on its size and shape designing monitoring systems to manage potential unintended effects are needed to ensure socially and environmentally sound food system outcomes.

There are different opportunities and threats to **smallholder farmers** in the scenarios, depending a lot on how much development options for the sector include them (e.g. Scenario 2) or how the domestic agricultural market is organized in the future (e.g. Scenario 4). While no future provides a clear pathway for small holders to thrive, different pros and cons exist for some of the potential policy choices. For **smaller food processors and local traders**, the attention to domestic production, such as in Scenario 3, could help establish a solid domestic market and economy. This is more difficult in a more competitive trade environment (unless protections for them are in place) though this pathway might limit potential food choices for consumers compared to more open trade regimes. For **consumers**, the scenarios show a mixed picture for enabling more food choices but also for bringing better and healthier food onto their plates. Here a lot depends on the type of inclusive policies and incentives for more healthy eating, as well as how trade openness is set up.

Uganda Analysis

Scenario Implications for Uganda

Looking across the different scenarios and analysing them for their implications with respect to the key food system outcomes, none of the scenarios result in an ideal food system. This is to be expected as in each pathway decision makers put different priorities into food system development. Thus, food system development is resulting in a set of different trade-offs between achieving food and nutrition security, livelihood/poverty reduction, environmental and other societal goals. Scenario 2 for example shows that if not enough attention is paid to addressing environmental issues as part of the agriculture and food sector development strategies, that is the 'how' of intensification efforts, degradation is likely to 'bite back' in the long run, undermining the sector's development options. Scenario 4 demonstrates the need to not just focus on the agriculture sector development alone, but policies need to be combined with clear attention to nutrition and health, and trade regulations need to address potential unhealthy foods being imported in order to not exacerbate the current malnutrition and obesity trends. Furthermore, trade policy has to be very carefully managed as these policies affect all food system actors and outcomes in various ways and not just purely the agricultural sector. These examples demonstrate that there is a need to develop coherent policies that address the various aspects of the Ugandan food system in a coordinated manner to avoid many of the potential trade-offs of more singular focus policies. As there will always be trade-offs due to the complexity of feedbacks within the food system, devising policies that help to monitor and manage potential unintended effects are needed to ensure socially and environmentally sound food system outcomes.

Small farmers do not seem to thrive under any scenario. All of them lack particular attention and instruments such as safety nets, insurances or knowledge transfer mechanisms that could enable a better participation in agricultural development process. This calls for very careful consideration of how a push for development of the agricultural sector can better enable them to participate and earn a living income. For **smaller food processors and local traders**, the attention to domestic production, such as in Scenario 3, could help establish a solid domestic market and economy. This is more difficult in a more competitive trade environment (unless protections for them are in place) though this pathway might limit potential food choices for consumers compared to more open trade regimes. For **consumers**, the scenarios show a mixed picture for enabling more food choices but also for bringing better and healthier food onto their plates. Here a lot depends on the type of inclusive policies and incentives for more healthy eating, as well as how trade openness is set up.

For Ugandan policymakers, it is essential that decisions around agricultural sector development, trade regimes, environmental policies and public health concerns related to the food sector balance the trade-offs for key food system outcomes, the resilience of the country's population in the long-term, and the interests of vulnerable stakeholder groups, particularly smallholders, women, and the youth.

Overall Policy Implications for Food Systems

It is evident from these exercises that there are critical areas of concern in both countries that warrant policy attention. Of particular concern are the trade-offs between economic and agricultural development and environmental and health outcomes, particularly for vulnerable population groups, and the continuing impacts of climate change and resource degradation across multiple sectors.

For both countries, agri-food sector development, and the degree and type of trade integration need to be considered in the context of national aims for protecting environmental resources and implementing inclusive and health-oriented policy. This then needs to be seen in relation to the critical uncertainties discussed above and the ability to cope with the consequences of environmental change. all of which will determine of which the nature of outcomes for health and nutrition security, environmental sustainability, livelihoods and well-being, and food system resilience.

The Ghanaian and Ugandan food system reports and scenario analyses determine that both countries need to orient policy and strategic planning towards achieving sustainable and healthy food systems without compromising on agricultural production, trade relationships, and economic development. While current policies around agriculture, livelihood development, and ensuring good health and nutrition have led to significant gains, better enforcement and coordination between policies and institutions within the country are needed. Vulnerable population groups such as smallholder farmers, women, and youth necessitate specific attention particularly in terms of economic transformations and livelihood protection. Finally, the resilience of the food system needs to be considered, not just in terms of robustness to short-term shocks, but also towards long-term stresses, such as environmental and demographic changes.

The scenario analyses for both countries demonstrate that trade-offs need to be made between achieving food and nutrition security, livelihood and poverty reduction, environmental protection, and other societal goals. A focus on developing the agro-food sector needs to be combined with policies with clear attention to nutrition and health and a careful management of trade regulations to ensure that food system actors, particularly smaller players, do not lose out. Vulnerable groups such as smallholder farmers, women, and the youth will be particularly at risk of such trade-offs, with consumers often facing a mixed picture in terms of food affordability and the nutritional attributes of food. For policy makers in Ghana and Uganda, it is essential that decisions around agricultural sector development, trade regimes, environmental policies and public health concerns related to the food sector balance the trade-offs for key food system outcomes, the resilience of the country's population in the long-term, and the interests of vulnerable stakeholder groups.

The status of the national food systems and the outcomes of the scenario analysis are synthesised using the following key outcome variables:

Food and Nutritional Security

Concerns about food and nutrition security are present in all scenarios to some degree in both countries up to 2040, but for different reasons. The scenarios that demonstrate potential pathways for achieving high food and nutrition security involve a synergistic application of policies favouring agricultural development, trade integration, and health-oriented policies. While a focus on agricultural development and trade integration only may result in affordable and readily available food, it may be highly calorific and have a low nutritional profile, potentially resulting in negative health outcomes. Commercialization, intensification, and food innovation can enable improvements in food availability, but they nevertheless need to be accompanied by strong attention to health and environmental feedbacks to reduce unhealthy food availability or environmental damage.

Food System Actor Livelihoods

The food system in Ghana is estimated to have the highest development multiplier of all economic sectors, with it contributing to nearly 50% of the national economy, employing nearly half of the total work force, and 85% of the rural population. Similarly, Uganda has experienced a reduction of the proportion of households' dependent on the subsistence economy (down from 69% in 2016/17

to 38% in 2019/20), with agriculture, forestry, and fishing. Therefore, concerns for livelihoods in the agricultural sector remain in all scenarios, with two scenarios in each country showing some positive outcomes for certain food system actors. Smallholder farmers face uncertain outcomes across the scenarios, with many benefits of development often going towards medium and large-scale farmers, traders, and processors. Outlooks for food system actors in the middle of the food chain depend on trade policy and the type of investment in the agricultural sector. Food prices and food choices are likely to be better with trade integration and or a particular focus on consumer needs in the food sector development process. The vulnerability of women and the youth, particularly in terms of employment is emphasised in both countries.

Environment and Ecosystem Services

Environmental problems and the ability to cope with the consequences of environmental change are not fully addressed in any of the scenarios, although various options exist across each country, particularly in relation to food production. Consumer interest in safeguarding the environment is a common theme, if supported by policy. The design and enforcement of environmental regulations and food production practices is key, although questions remain on how positive environmental outcomes could translate into improved health outcomes for national populations.

Food System Resilience

Overall food system resilience (in terms of desirable food system outcomes in the face of shocks and stresses) is mixed across the scenarios in both countries and depends on the intensity and scale of agricultural production, trade integration, and the effectiveness of enforcement of health and environmental policies. Resilience building can be accomplished through a combination of different measures such as trade for buffering domestic shocks, strategies for addressing environmental degradation, and innovations in agricultural production. However, none of this address the system outcomes equally, resulting in different trade-offs between health, environment, and livelihoods.

While we see a lot of similarities between the Ghanaian and Ugandan food futures there are nevertheless a set of important differences shaping policy choices and food system outcomes in the near- and long-term future. These of course also depend on different starting points for food system development in each country. One difference are potential ways of how smallholders might fare in the different futures: In Ghana the options developing in some scenarios could potentially result in better outcomes as the scenarios portray some viable options for them to thrive, especially with careful attention to their development options and domestic market development versus trade openness. In Uganda the smallholder development seemed a bit more constraint by the types of agriculture development or trade policies favoured in the future. In addition, as there are some important policy differences already today between the two countries that impact the starting position for smallholders. In Ghana policies such as ‘Planting for food and jobs’ makes opportunities at the local level more accessible while in Uganda specific attention is paid in national policies to rural populations, youth, and women more general. In addition, Ghanaian stakeholders could conceive a few more options for positive scenario outcomes for the environment but these depend largely on effective policy enforcement. In Uganda environmental food system outcomes are more mixed as stakeholders saw the long- and short-term impacts of current resource use as jeopardizing food systems.

Reflections on the Utility and future use of Foresight for Food Systems Transformation

The food systems foresight methodology employed for the project demonstrates the value of taking a food systems perspective on a national scale, a stakeholder-driven scenario analysis organized around critical uncertainties, and examining trade-offs between economic development, health and nutrition security, livelihoods, and systemic resilience.

Annex 1: Scenario Analyses

Scenarios for Ghana

The columns capture the way the main drivers may play out (Low or High) and the rows the consider the consequences of each of the four scenarios for the food system outcomes related to food and nutrition security, livelihoods, and environmental conditions. The most righthand column summarises common features from all four scenarios.

	Scenario 1: Survival for a while (El Niño)/ Business as usual Regional Trade Integration: Low Agro-food sector development: Low Inclusive and health-oriented policy: Low Aim to protect the environment: Low Ability to cope with env change: Low	**Scenario 2: Wealth above all else** Regional Trade Integration: High Agro-food sector development: High Inclusive and health-oriented policy: Low Environmental protection: Low Ability to cope with env change: Low	**Scenario 3: Elephant in the Room** Regional Trade Integration: Low Agro-food sector development: High Inclusive and health-oriented policy: High Aim to protect the environment: High Ability to cope with env change: High	**Scenario 4: The Flying Geese with crippled legs** Regional Trade Integration: High Agro-food sector development: High Inclusive and health-oriented policy: Low Aim to protect the environment: High Ability to cope with env change: High	**Results from Looking Across the Scenarios**
Consequence for food and nutrition security (enough calories, adequate nutrition, food safety, equity issues) At national level	***High negative impact on food and nutrition security*** Low regional integration reduces incentives for increasing food production and leads to import dependence on distant markets, thereby leading to high prices, less food access especially for the poor	***Mixed results, with potential for unhealthy diets, and a question on whether the poor can take advantage of the opportunities*** Integrated regional markets in the context of a sophisticated agro-food sector (high levels of processing and movements of food) will likely result in the	***High food and nutrition security levels due to attention to health, social and environmental policies while domestic agriculture markets relatively protected*** Highly developed agro-food sector with limited regional trade integration suggests substantial increase in domestic production	***High food and nutrition security, high food availability, but with concerns about food safety and proper nutrition*** High regional integration will undoubtedly improve both food availability, food diversity and stability of seasonal food markets for both	Two of the four scenarios demonstrated avenues towards achieving high food and nutrition security, though they differ in how this is achieved. If attention is not paid to all four food systems outcomes food and nutrition security will show a mixed picture. Scenario 1 and 2 show the dangers for food

	and higher risks of child malnourishment. With limited regional trade opportunities, the local food markets may be less diversified - more grains and less fruits and vegetables negatively impacting on nutrition. However less mass production may also mean less chemical use and therefore safer and healthier food. High dependency on imports from distant markets may lead to high carbon-content consumed locally. Poorly developed local agro-food sector, especially limited local processing may lead to dependence on imported processed food especially into urban markets contributing to obesity.	expansion of medium to large scale farming. Whilst this can increase the overall supply of food in the market and drive down prices for urban consumers it may also lead to land grabs and drive inequalities in the food growing sector upwards. Regional market opportunities may lead to the food sector's export-orientation, which, as in the case of the West African market, are attractive for non-staples. Export orientation may also create local shortages and vertical-integration of regional prices, making food access insecure for the poor. A relatively advanced agro-processing sector operating under conditions where there is little attention to	and or imports from outside the region. If domestic production is led by medium-large scale farms, agricultural sector income inequalities could increase without necessarily improving food security. Either way, consumers, urban consumers, will be major gainers with increased production of a wide variety of agricultural commodities, processed and primary. With high participation by small farmers, both food security and relative equity will be enhanced. However, prices for commodities supplied by regional markets will rise and depending on the crops that might have been imported	consumers and processors. The low health orientation however could lead to sacrificing food safety for profits and low consumer prices by attracting substandard food imports.	and nutrition security if health and environmental policies are not well considered in a consistent manner. If the poor can take advantage of better food availability and nutrition strongly depends on wider inclusive policies.

	Limited processing opportunities may also deny possibilities to fortify foods with micronutrients especially for children. Poor environmental protection policies in a poorly developed agro-food sector context may lead to primitive unregulated land clearance practices and bush-burning that lead to increased CO2 emissions and deforestation. Failure to cope with environmental change can in turn impact negatively on food production, food storage (due to pests and other factors affecting post-harvest losses) and transport (washed-out roads). These could lead to increased hunger especially in	food safety risks supplying processed food that may be harmful to health such as food high in salt and sugar and influence a shift in diets to these unhealthy options. A relatively developed agro-food sector with poor environmental regulatory policies will likely lead to large scale land degradation, heavy use of water as well as agro-chemicals leading, in the long run, to soil degradation, high GHG emissions and deforestation. With limited attention to adaptation to environmental change the food system itself could come under stress with say increased extreme weather events affecting food production and	for regional markets may affect nutrition Strong health and nutrition-conscious policies will encourage processors to fortify processed food with micro-nutrients. These policies will also encourage shifts in consumption habits towards balanced diets, in turn encouraging local production of fruits and vegetables. Strong health policies in a relatively closed food system will likely translate into strong health standards for both fresh and processed food whilst strong environmental consciousness should translate into policies that encourage ecological agriculture that is in turn positive for nutrition.		

	environmentally fragile ecosystems.	storage; floods affecting food distribution etc. On the other hand, a diversified and competitive food system may also provide incentives (niche markets) for green, ecologically sustainable farming as well as processed food.			
Consequence for Livelihoods (jobs, econ outcomes, markets) Farmer, traders, consumers, processor	***Mixed picture but mostly negative for livelihoods*** With low levels of production, farmers' incomes are low even with higher prices. With limited processing and diversification, non-farm incomes are low and so are employment opportunities. Traders may thrive as they benefit from high prices in urban markets whilst traders in border	***Mixed picture, but positive for medium-large scale farmers*** Depending on situation of actor and type of agriculture sector push (intensification vs agro-ecology), there will be more opportunities for larger, more tech-savvy farmers, but not so much for smallholders. Integrated regional markets incentivising high production – raw and processed commodities – will likely increase jobs.	***Good outcomes but question about how to sustain them in the long run (size of domestic market without regional trade opportunities)*** A highly developed agro-food sector is good for jobs and consumers. Low integration with regional markets can have mixed impacts on the incomes of both small holder farmers and processors. If the relatively closed regional markets are	***Largely positive for jobs, economic growth and incomes for farmers, traders, transporters and processors*** However, the impact on the health food sector is uncertain. The industry can be constrained by the lack of active policy interest but it also can be unleashed purely by competition and changing diets.	Two of the scenarios show overall positive outcomes of their development pathways though these might vary between food system actor groups. Sustaining progress made will not be easy, especially under changing outside conditions (e.g. in scenario 3, trade integration). Two scenarios show overall mixed or rather negative outcomes for livelihoods, with trade and the type of agriculture sector

	communities lose out. Importers of non-staples and processed food will thrive but at the cost of lost jobs, balance of payment problems and inequitable access to food. Increased imports may benefit urban, middle-class, young consumers but at the cost of changing consumption patterns that may contribute to obesity. Local processors may be stifled by low supplies and other underdeveloped components of the food system, e.g., poor transport infrastructure, thereby affecting job creation, government tax revenues	Incomes for medium-large scale farmers and famers of high-yielding crops will rise. Incomes of transport owners and owners of storage facilities will increase whilst those of small holder farmers, may or may not increase depending on the nature of integration of small holder farmers and larger scale farmers. With low preparedness for climate change adaptation (e.g. crop insurance), farmers stand to lose big in case of weather extremes – extensive droughts or floods. Heavy rains could also raise the cost of transport, squeezing the incomes of traders.	accompanied by public investment in small holder farmers, their incomes will increase limited competition. However, constrained markets for processors can lead to a feedback, with fall in demand for local produce. The strong health and environmental policies could help to stimulate growth in ecological agriculture and a healthy food industry, contributing positively to economic growth and economic diversification. But sustaining such a market without regional integration will require expanding trade far afield and rapidly expanding per capita consumption financed by growth in non-agricultural sectors.		development having a big impact on livelihood futures, especially for small holders.

Consequences for environmental conditions (GHG emission levels, biodiversity, water, soils)	***High and negative consequences*** Mainly because no legislation or effective measures to protect the environment. GHG emissions may increase from extensive clearing of virgin lands, bush burning and deforestation. These will also lead to biodiversity loss, water loss, pollution, and soil degradation. However, limited agricultural intensification may also reduce GHG emissions, extract less ground water and less use of agro-chemicals resulting in safer food and better soil restoration. If low local production and processing are compensated for by	***High and negative consequences*** If development of high input/industrial agriculture then reducing agricultural biodiversity, increasing land use change, issues with water and pesticides, soil degradation but trade integration might ease some of the pressure of domestic agricultural intensification. On the other hand, if imports increase not only from regional markets but distant ones as well, contribution to GHG emissions would increase.	***Positive consequences but only with effective enforcement*** Without effective enforcement, GHG emissions will likely increase from increased consumption of energy in intensive farming and expanded external trade outside of the region. Environmentally resilient agricultural production system will suggest significant public and private investment in ground water infrastructure to mitigate droughts and control floods, and forest ecology production systems favouring mixed cropping rather than mono-crop plantation farming and other ecological farming approaches that minimise tree extraction.	***Positive consequences but only with effective enforcement*** The low commitment to health may translate into limited interest in food safety including poor regulation of agro-chemical use.	Again, two scenarios (1 and 2) show more negative outcomes for the environment and the ability to deal with change while scenarios 3 and 4 describe more positive outcomes for environmental change. Key here though are the proper design and enforcement of regulatory policies. Questions remain about how positive environmental impacts translate into better human health outcomes.

	increased imports from markets afield, the carbon intensity of food will rise.				
Overall resilience of the food system: Can desirable food system outcomes (food and nutrition security, good env and livelihoods) be achieved at needed level in face of shocks?	***Low resilience*** There is no ability to cope with a crisis. But food systems will be less energy and chemical intensive, more smallholder-led and with less polluted food.	***Moderate resilience*** Better trade, better local production and processing but issues with environmental degradation and possibly rising income inequalities.	***High resilience*** Diversified food system, good environmental policy and good health and social protection in place. But low regional trade integration may result in expanded trade outside the region, increasing GHG emission and risking heavy imports of processed foods that are damaging to health. The elephant in the room is the potential cost to the food system of closed trade policy.	***High resilience*** While co-existing with high malnutrition and food insecurity for the poor.	Results for achieving resilient food system are mixed across scenarios and depend on trade, intensity of agricultural production and enforcement of environmental and health policies.

When looking across the different scenarios, there is no scenario that can achieve positive outcomes for all food system outcomes and also result in an overall more resilient Ghanaian food system. But there are two of the plausible futures that can come close, though in different ways and with different 'costs' associated with these outcomes. This shows that policy and decision makers have quite a few policy choices in front of them concerning how they design the policies around agricultural and food sector development, trade or environmental policies. The scenarios nevertheless also portray how intertwined these choices are in Ghana's complex food system and close attention needs to be paid to coherent policy making that takes the implications of each decision not just on one part of the system into account but also assesses potential trade-offs with respect to other parts or system outcomes. All scenarios show various ways in how feedback loops exist between different sectors, such as in Scenario 2 where the 'environment bites back in the future' to stifle agricultural sector development if not addressed properly. Thus none of the policies provide a way forward alone, in combination and with careful consideration of potential trade-offs between policy goals the scenarios show that there could be brighter futures ahead, such as in Scenarios 3 and 4. How the potential trade-offs between differing goals of policy makers and varying opinions of food system actors can be best addressed requires to create a joint understanding of where the food system currently stands and what food system actors value today and in the future. And some way for negotiating across the various opinions is needed, if Ghana wants to avoid some of the inefficiencies of more uncoordinated policy making. As the food system is complex and many different forces impact on its size and shape designing monitoring systems to manage potential unintended effects are needed to ensure socially and environmentally sound food system outcomes.

There are different opportunities and threats to **smallholder farmers** in the scenarios, depending a lot on how much development options for the sector include them (e.g. Scenario 2) or how the domestic agricultural market is organized in the future (e.g. Scenario 4). While no future provides a clear pathway for small holders to thrive, different pros and cons exist for some of the potential policy choices. For **smaller food processors and local traders**, the attention to domestic production, such as in Scenario 3, could help establish a solid domestic market and economy. This is more difficult in a more competitive trade environment (unless protections for them are in place) though this pathway might limit potential food choices for consumers compared to more open trade regimes. For **consumers**, the scenarios show a mixed picture for enabling more food choices but also for bringing better and healthier food onto their plates. Here a lot depends on the type of inclusive policies and incentives for more healthy eating, as well as how trade openness is set up.

Uganda: Scenario Analysis

The columns capture the way the main drivers may play out (Low or High) and the rows the consider the consequences of each of the four scenarios for the food system outcomes related to food and nutrition security, livelihoods, and environmental conditions. The most righthand column summarises common features from all four scenarios.

	Scenario 1: Calamity Trade Integration: Low Agro-food sector development: Low Inclusive and health-oriented policy: Low Environmental protection: Low Ability to cope with env change: Low	**Scenario 2: Trade over health** Trade Integration: High Agro-food sector development: High Inclusive and health-oriented policy: Low Environmental protection: Low Ability to cope with env change: Low	**Scenario 3: Good ambitions, struggling economy** Trade Integration: Low Agro-food sector development: High Inclusive and health-oriented policy: High Environmental protection: High Ability to cope with env change: High	**Scenario 4: High production, good food security** Trade Integration: High Agro-food sector development: High Inclusive and health-oriented policy: Low Environmental protection: High Ability to cope with env change: High	**Results from looking across the scenarios**
Consequence for food and nutrition security (enough calories, adequate nutrition, food safety, equity issues) at national level	***Low to moderate negative impact on food and nutrition security*** **Low** agricultural development, food production, food innovations, and technology adoption. **Low** food sector development.	***Moderately to high negative impact on food and nutrition security*** **Moderate** because of agricultural commercialization. **High** cross border trade through a revitalization of the East African community.	***High levels of food and nutrition security with increased production and improved access*** **High** because of agricultural development, rapid innovations in food, and health-oriented policy. **High** food safety and quality standards,	***Mixed picture with improved food availability but consumption of calorific foods*** **Moderate** because of high (but unhealthy and less nutritious) food availability due to cross-border trade and high domestic production. Improved demand for ecological food production.	Concerns about food and nutrition security remaining in all scenarios up to 2040 but for different reasons and at least two scenarios show potential in improving outcomes. But, food and nutrition security cannot be improved just by favourable agricultural or trade policies. Additional attention is needed for healthy diets, and

	Medium to **high** food prices. **Low** food diversity and caloric intake. **Medium** attention to food safety issues, and poor handling and storage practices because of now health-oriented policy. **High** malnutrition and hunger. **Low** consumption and diversity of traditional foods.	**High** chronic food insecurity, poverty, greater consumption of processed and unhealthy foods, and loss of food diversity.	improved consumer protection. **High** nutritional and food security outcomes because of increased food access and availability, less unhealthy foods, and fewer food-related diseases. **High** value addition, food fortification, advanced food packaging and labelling, improved shelf life. **Low** economic revenue because of limited trade in EAC region, poor storage capacities, and high food loss along the supply chains, and low cost of production because of mass production of goods.	**High** consumption of calorific and processed foods, and fortified foods. **High** incidence of non-communicable diseases, malnutrition, low focus on consumer health.	environmental implications of the chosen agricultural development pathway in the long run. Commercialization, intensification and food innovation can enable improvements in food availability, but they nevertheless need to be accompanied by strong attention to health and environmental feedbacks to reduce unhealthy food availability or environmental damage.
Consequence for Livelihoods (jobs, econ outcomes, markets)	***Mixed picture but with negative consequences***	***Mixed picture with consequences depending on***	***Good consequences for livelihoods, but***	***Good consequences for farmers, but poor for women and youth***	Concerns for livelihoods in the agricultural sector remain in all scenarios.

Farmer, traders, consumers, processor	***for most food system actors*** **Poor** for farmers because of no push for sector development, low farm employment, low labour productivity, low farmer incomes, poor information and financial services, high prevalence of poor and/or low-quality inputs, and high informality of markets. **Good** for traders with supportive trade environment, no stiff competition from external trade, and high food prices. **Poor** for processors with low incomes because of reduced processing and sector underdevelopment. **Poor** for consumers because of limited food choices and lower standards.	***opportunity and unemployment*** **Mixed** for farmers, with some farmers shifting from subsistence to commercial farming, and others having low farm income. Low farm employment rates due to mechanisation. **Poor** for women and youth with high rates of unemployment, and social insecurity (because of agricultural mechanisation and industrial automation). **Good** for processors with improved variety of products from domestic production and trade.	***poor outcomes for smallholder farmers*** **Good** for medium and large-scale farmers because of increased agricultural mechanization and investment, and increased sensitivity to ecological production given environmental degradation. **Poor** for smallholder farmers who may be pushed out because of fewer opportunities. **High** potential for migration to urban areas because of displacement form agriculture. **Good** for domestic traders and processors with higher incomes because of increased processing focused on the domestic market, increased availability of	**Good** for some farmers because of improved incomes, improved farm practices, digitalization, high labour productivity, low on-farm labour rate. **Poor** for women and youth because of higher unemployment. **Good** for food system jobs because of well-developed logistics, supply chains, digitalization, high investment in agriculture, increased involvement of the private sector in agriculture. **Good** for traders and processors because increased value addition and more products available. **Moderate** for consumers with low	Particularly small holder farmers face quite uncertain conditions across all scenarios. Domestic processors and traders highly depend on trade policy and the type of investment in the agricultural sector. Food prices and food choices are likely to be better with trade integration and/or a particular focus on consumer needs in the food sector development process.

			produce for value addition, **Good** for consumers because of improved food choice, higher demand for organic products. **High** job creation because of agricultural and industrial sector development.	food prices, high food choice and food diversity, but in unhealthy and highly processed foods.	
Consequences for environmental conditions (GHG emission levels, biodiversity, water, soils)	***Moderate but negative consequences, balanced by scale of development*** **High** environmental and soil degradation problems, GHG emissions, water over-extraction and pollution, and poor pest and disease management practices due to lack of policies in environmental protection but at low scale due to low agricultural production	***High and negative environmental consequences*** **High** environmental consequences, poor pest and disease management, and biodiversity loss because of development of high input agricultural systems and industries. **High** land-use change, soil degradation, and water extraction because of more land being opened up for	***Mixed picture because of efforts towards environmental protection*** **High** because of efforts toward biodiversity conservation, and increased sensitivity and policies for environmental protection. **Low** land and soil degradation, low water pollution, and an increase in large scale ecological farming	***Mixed picture due to environmental protection, but high domestic production*** **Moderate** due to environmental protection regulations, but increased domestic production with a push towards sustainable intensification. High biodiversity loss, and some water extraction and soil degradation issues with high agricultural production.	Environmental problems are not fully addressed in any of the scenarios, though various options exist in three scenarios for impacts coming from food production. Specific outcomes depend on the environmental policy focus, food production practices and trade integration.

	and lack of sector development.	farming and a lack of policies in environmental protection. Trade integration may relieve some pressure on domestic production. **High** vulnerability to climate change and extreme weather events and a lack of supportive environmental policies.	systems (e.g. agroforestry based).		
Overall resilience of the food system: Can desirable food system outcomes (food and nutrition security, good env and livelihoods) be achieved at needed level in face of shocks?	**Poor Resilience:** **Low** coping abilities to cope in crises because of poor sector development and a lack of policies for environmental protection.	**Moderate Resilience:** **Moderate** coping ability because of better trade links, but persistent issues with environmental degradation and climate change. The 'environment could bite back later on'.	**Moderate Resilience:** **Moderate** because of promotion of environmentally sound practices, environmental policies, and social protections with agricultural sector development in mind. **Low** coping abilities for short-term disruptions because of low trade integration. A domestic focus on medium and large-scale farmers may further undermine	**Good Resilience:** **High** abilities because of good trade arrangements, enabling environmental policies, farmer awareness to climate change, more food availability and accessibility, good agricultural practices, circular economy ideas, improved support for building shorter supply chains and guarantee decent livelihoods for farmers.	The scenarios show that resilience building in the food system can be done through combining different measures, e.g. trade to buffer shocks, addressing env degradation, new options for agricultural development. But none of the scenarios address all food system outcomes equally, resulting in different trade-offs between social and economic

			resilience by excluding SMEs and smallholders.	**High** environmental resource management, reduction of food waste. **High** potential for obesity and NCDs.	outcomes for examples.

Looking across the different scenarios and analysing them for their implications with respect to the key food system outcomes, none of the scenarios result in an ideal food system. This is to be expected as in each pathway decision makers put different priorities into food system development. Thus, food system development is resulting in a set of different trade-offs between achieving food and nutrition security, livelihood/poverty reduction, environmental and other societal goals. Scenario 2 for example shows that if not enough attention is paid to addressing environmental issues as part of the agriculture and food sector development strategies, that is the 'how' of intensification efforts, degradation is likely to 'bite back' in the long run, undermining the sector's development options. Scenario 4 demonstrates the need to not just focus on the agriculture sector development alone, but policies need to be combined with clear attention to nutrition and health, and trade regulations need to address potential unhealthy foods being imported in order to not exacerbate the current malnutrition and obesity trends. Furthermore, trade policy has to be very carefully managed as these policies affect all food system actors and outcomes in various ways and not just purely the agricultural sector. These examples demonstrate that there is a need to develop coherent policies that address the various aspects of the Ugandan food system in a coordinated manner to avoid many of the potential trade-offs of more singular focus policies. As there will always be trade-offs due to the complexity of feedbacks within the food system, devising policies that help to monitor and manage potential unintended effects are needed to ensure socially and environmentally sound food system outcomes.

Small farmers do not seem to thrive under any scenario. All of them lack particular attention and instruments such as safety nets, insurances or knowledge transfer mechanisms that could enable a better participation in agricultural development process. This calls for very careful consideration of how a push for development of the agricultural sector can better enable them to participate and earn a living income. For **smaller food processors and local traders**, the attention to domestic production, such as in Scenario 3, could help establish a solid domestic market and economy. This is more difficult in a more competitive trade environment (unless protections for them are in place) though this pathway might limit potential food choices for consumers compared to more open trade regimes. For **consumers**, the scenarios show a mixed picture for enabling more food choices but also for bringing better and healthier food onto their plates. Here a lot depends on the type of inclusive policies and incentives for more healthy eating, as well as how trade openness is set up.

For Ugandan policymakers, it is essential that decisions around agricultural sector development, trade regimes, environmental policies and public health concerns related to the food sector balance the trade-offs for key food system outcomes, the resilience of the country's population in the long-term, and the interests of vulnerable stakeholder groups, particularly smallholders, women, and the youth.

Annex 2.1: Ghana Country Report

OSF Project Report

Ghanaian Food System

Charles Abugre and Atieno Ndomo

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Elements of the Ghana Food System

1. Context and highlights

Ghana's food system, defined as encompassing all activities involving the production, storage, trade, processing, transportation, and distribution of food is by far the most important sector of its economy. Estimating the size of the food system in Ghana, as is the case for most of the African continent, is a big task because of the absence of consistent data on most aspects of the system outside the commodity production sub-sector.

Nevertheless, according to one estimate, the food system in 2010 was nearly 50% of Ghana's economy in that year, far larger than agricultural GDP (OECD, July 2016). The food system in 2016 employed nearly half of the total workforce, 85% of people living in rural areas and a large part of the 300,000-350,000 new workers who enter the Ghanaian labour force each year, including many unskilled workers. According to the 2021 Housing and Population Census (HPC), 45% of all households in Ghana (or 2.5 million households) are agricultural households.

The IFC (2017) estimated that the food sector in Ghana has the highest development multiplier (1.8) of all sectors. It created 750 jobs for every additional US$1 million of output. Two-thirds of non-oil manufacturing depends on agriculture for raw materials. As an open economy with mechanised trade constituting nearly 50% of GDP (GSS)[1], Ghana's food system is highly integrated into the global food system although it is far less integrated into the West African regional economy with trade making up less than eight percent of total merchandise trade.

Overall, there is no coherent food system strategy to support the transformation from agriculture to a sustainable food system, with large gaps in irrigation, aggregation and transmission systems and in uptake of ecological farming approaches, as well as on the processing and retail side of the system. Instead, the focus of public policy is overwhelmingly on food commodity production and to a lesser extent, nutrition.

Nevertheless, the potential in Ghana's food economy to grow nutritious food and create jobs sustainably for Ghanaians and the West African economy is large and untapped, whilst facing serious constraints. The potential in Ghana's food economy to grow to provide nutritious food and jobs for Ghanaians, and grow the economy generally is huge and largely untapped. Favorable factors include:

- **Geographic positioning**. It is situated in the middle of an ECOWAS of rising population, urbanization, food consumption and per-capita incomes opening regional market potentials.
- **Fairly supportive weather:** Annual average rainfall has increased by 1.5% over the 20-year average ending 2018. But there are wide regional variations.

[1] Ghana's Merchandize Trade Indicators 2014-2018. Available at: https://statsghana.gov.gh/gssmain/fileUpload/Trade/Ghana%20Trade%20@%20A%20Glance_Annual_2018_1.pdf

- **Image**: Internationally, the country is considered as geopolitically moderate, tolerant, peaceful, and politically stable with a reasonably functioning democratic process. It is not a threat to anyone and although there are incidents of violent extremism in some of its neighbors, threats of spillage are rated low.
- **Rising per capita incomes** and reasonably good infrastructure including transport and logistics projects - an image of "it's not a bad place to live and risk one's money", therefore a candidate for inward investments.
- **Rising population and rapid urbanization** providing a demand boost. Ghana's population has grown five-fold in six decades, adding over six million people over the past 10 years only. Moreover, the rural/urban population divide is expected to flip in favor of the urban in a few years.
- **Revival of political interest in agriculture and agribusiness** linked to industrialization aspirations. Current government policies of Planting for Food and Jobs (PFJ) that prioritize government subsidies for small farmers and tree-crop plantations as well as the One District One Factory (1D1F) which channels support to largely agro-industrial projects have provided a boost for agriculture and agro-processing. This feeds into a willingness to take risks in investing in irrigation infrastructure including plans for large scale irrigation in the north of Ghana.
- **An emerging middle-class**: There is an emerging investing middle class with a firm belief that wealth can be made in the food system. The consumption habits of this middle class however tilt the incentives towards salt and sugar intensive processed food as well as fruit consumption which have implications for health and nutrition. This is partly reflected in a proliferation of small-scale processing initiatives from eat-in/out food joints milling, packaging, bottling operations of various sizes spread across the country.
- **Other supportive conditions for production:** These factors include abundant arable land yet to be put into cultivation, the presence of a well-endowed drainage basin with networks of water bodies that can be tapped for irrigation; a well-established agricultural research system which has been successful in the improvement of crop production such as cassava, maize and cowpea; relative proximity to the European market for exports facilitation, and a reasonably good transport network for produce and input distribution (GIPC 2013).

However:

- **Agricultural productivity is low** resulting in more arable and forest lands put into food cultivation leading to rapid deforestation and land-use change.
- **Deforestation and land degradation** are accelerating exerting pressure both on the environment and food security especially in the drier ecological zones.
- **Land degradation** is accelerating, driving rural poverty upwards. Land tenure conflicts are also on the rise in urban as well as rural communities.
- **Domestic production** does not meet demand – net food deficit - resulting in sustained increase in food imports especially rice, meat, dairy and fish.

- Although with urbanisation the consumption of fruits and vegetables has increased, Ghana depends heavily on its West African neighbours and the international market for much of its onions, shallots and fresh tomatoes.
- **Fresh vegetables and fruits produced in Ghana are** almost entirely distributed through small retailers for the local market who face sever logistical difficulties, although a few super markets and entering into the market distributing largely imported vegetables.
- **Dairy products** consumed in Ghana are almost entirely imported**.**
- **Food safety** concerns are low and policy enforcements are poor, creating risks for health and safety.
- Although good progress has been made in **reducing hunger and child malnutrition** progress is geographically uneven.
- Although good progress has been made regarding access to water, much of the water consumed is contaminated with E.coli. Only a small proportion of household members have access to safe E.coli free water. There is a sanitation crisis including plastic pollution and free-range defecation.
- Whilst urbanization and population growth have injected a demand boost for agricultural production and food in general, these dynamics have also driven obesity upwards with serious consequences for public health.
- Greenhouse Gas (GHG) emissions are rising, with agriculture contributing 15% to total.

2. Ghana's food system profile

Ghana is a Lower Middle-Income Country, so classified by the World Bank in 2010 following the rebasing of its GDP. GDP in 2019 was a little over US$ 356.5 billion and GDP per capita a little over US$2200[2]. One quarter of this value is produced by the informal economy. The size of the informal economy is even larger in some sectors and its impact is in excess of its contribution to GDP. For example, 90% of the currently employed population 15 years and older are in the informal sector (GSS, LFS 2015). The rural economy is even more informalized with 96.2% of the currently employed located in the informal sector compared to 84.1% in the urban areas.
This dualistic economy impacts, and is in turn reflected in, all components of the food system – the supply chain, the food environment and consumer behaviour.

The data in this report suggest that Ghana's food system is mixed, which although is still dominated by traditional practices, is fast modernising. The food system is characterised by the following:

i. The Supply Chain:

Production: Food production is dominated by small-holder farmers. 90% or more of food grown for local consumption is grown by farmers with average holdings of less than two hectares but average size of farm holdings is growing. The growth of middle-sized farms is led

[2] Ghana Statistical Service. Available at: www.statsghana.gov.gh

by small farmers “stepping up” towards 5ha and urban dwellers, retirees and new farmers (stranger farmers, local and foreign). Farms of 100ha+ are mostly stranger farmers (foreign and local, that step in from outside the farm sector and/or region). Whilst these represent a small percentage of farmers, they capture a large proportion of the value (IFPRI, 2016). Farming is largely seasonal and rainfed with total irrigated land covering less than 1% of cultivated land.

Storage: Food storage infrastructure is dominated by traditional storage facilities although modern warehousing capacities are growing both at farm level and in urban areas. With access to rural electrification growing (60% or more) small scale refrigeration capacities are also expanding. Refrigeration and warehousing are most developed at the sea ports. Access to these advanced facilities are inequitable and dominated by international and a handful of local companies.

Agro-processing: Ghana’s agro-processing industry is in its nascent stage. According to the Ministry of Food and Agriculture (2012), only 5% of food products harvested in Ghana are processed. The agro-processing sector is constituted by 97% micro- and small-scale and 3% medium-scale processing firms. This industry largely produces commodities for the local Ghanaian economy rather than for global export and heavily relies on the informal economy (Nkechi Owoo et al, 2018). The agro-processing sector is classified into two groups: domestic processing and factory processing (Quartey and Darkwah 2015). Domestic processing activities are dominated by female workers who are predominantly illiterate and have no formal training.

Post-harvest losses: Post-harvest losses in maize, cassava, rice, and yam amounted to about 35%, 34.6%, 6.9% and 24.4% in 2007 (MoFA 2007, Owoo and Lambon-Quayefio 2018) as a result of, among others, ineffective food-processing technologies. Losses may be less dramatic today but are still significant.

This notwithstanding, modern food processing is on the rise. According to the Ghana Export Promotion Authority, the industry grew at an average rate of 14.93% in 2008–13 (GEPA 2014). Medium-large scale processing using more sophisticated technology is growing, especially in the processing of grain into children’s food and beverages (mainly by multinational companies), the processing and packaging of fruits (cut fruits and fruit juices) and the processing of oils (shea and palm) into edible oil and secondary products.

Packaging: Food packaging ranges from the most basic (wrappings with paper and plastics) when traditional staples such as grain, flour, meat and fish are sold in open air markets and small shops to increasingly sophisticated packaging materials, including various types of plastic, fibre bags, cardboard and other paper materials, tin cans, and glass bottles and jars.

Market infrastructure: Market infrastructure is diverse comprising open aid markets, container shops, kiosks, local supermarkets and international supermarkets. Most food -fresh and processes, local and imported are sold in open markets, followed by container shops and kiosks. Open air markets sell 100% of locally produced starchy staples but also imported

products. Nearly 60% of goods sold in open markets are imported (Nkechi et al, 2018). In contrast, about 85% or more of goods sold in local and international supermarkets are imported. Local super markets sell starchy staples and spices than international super-markets.

International Trade: With regards to international trade, Ghana is a net importer of food. She is almost totally dependent on international markets for dairy products and wheat and significantly dependent on imports of meat, rice, processed vegetables and fats and oils. In 2019, the value of rice imports alone exceeded the combined value of cocoa and petroleum exports according to the Ghana Statistical Service (2021). However, imports are declining relative to domestic production of most food products year on year. There is intense competition with imports especially in processed products. Ghanaian firms dominate in the production of starchy staple products, using cassava and plantain to turn out products such as fufu flours, plantain chips, and gari. About a third of processed cereals, dairy, and cocoa products were made in Ghana. In relation to primary production, paddy rice production for example increased by 34% in 2019 compared to 2016. Trade with regional neighbours is however limited, falling below 10% of all external trade.

ii. The food environment and consumer behaviour:

Food consumption and affordability: As a result of a combination of 30 years of uninterrupted economic growth, rapid population growth and rapid urbanisation, demand for has increased tremendously. With about 60% of the urban population earning between $2 and $5 a day, there is a large emerging lower middle-income group, fuelling a rising tide of food demand. Moreover, both the poor and the non-poor groups spend 50% or more of their income on food (World Bank, 2017), implying that even as the population gets wealthier, the demand for food relative to income will remain high for a while. This is a potential demand boost to producers. The changing demographics and levels of income also drive changes in demand for food categories, with the demand for processed food increasing faster than starchy staples.

However, demand for food is inequitable, as determined by per capita incomes, seasonality and accessibility. About 20% of the population is extremely poor by international standards. Road networks and quality are poorer further from the cities and in some cases totally inaccessible during raining seasons. In spite of urbanization, about half of the population still lives in rural areas. Prices are generally higher and more volatile in rural than in urban areas especially for non-starchy staples and processed food. However, road networks are improving and packaged street food is a growing phenomenon even in small towns and rural areas

Food branding and promotion*:* Food branding is a growing phenomenon. One study (Nkechi et al, 2018) indicated that Ghanaian brands in processed food currently sold in all outlets in Ghana constitute up to 27% of all food brands in the market. Ghanaian brands dominate in processed cassava and plantain (51%) and is 30% or more with rice, maize and cocoa products.

Food adverts are increasingly common place in traditional media (bill boards, radio and tv) and social media mainly aimed at urban consumers. Food adverts, do penetrate the rural market through traditional electronic media and marketing networks but less so through billboards. The latter are largely an urban phenomenon. But there is an increasing use of social media for food marketing.

Food hygiene and safety: Attention to hygiene and basic food safety procedures is found, at times, to be limited among informal enterprises, including agro-processors (FAO 2014). Knowledge of specific regulations and legislation governing food safety and hygiene issues is only evident among those processors who market their product through formal outlets. Other reasons are the irregular supply of energy, low youth interest in farming, agro-processing, and agribusiness, in general, due to low profitability. Additionally, the greater perceived gains in the mining sector also attracts youth away from the agricultural sector.

iii. The Food System typology

Guided by the typology developed by the High-Level Panel of Experts of the Committee on World Food Security on Food and Nutrition (September 2017), Ghana's Food system is best classified as "mixed" or "hybrid". It is a system in transition, with a smaller but fast-growing modern element. The future balance between the two parts of the system will depend on several factors among which how much traditional norms, tastes and consumption habits will be retained in the future.

3. A Note about Data

In the African context, Ghana is a leading country in terms of the breadth and quality of published data. She conducts regularly: population and housing censuses; demographic and health surveys; censuses of agriculture; household expenditure surveys for living standards. The country also encourages the compilation of administrative data and the statistical authority, The Ghana Statistical Service s(GSS) operates and Open Data Platform.

Ghana's macroeconomic data, including national income statistics are regularly updated and are of international standards. However, national data systems have deficiencies in the production side of the economy (not all produce is reported consistently), as well as other parts of the food system notably transport (the size of food transport and employment) and consumption behavior (e.g. the size of the street food sector and employment). Consequently, the report relies heavily on international databases such as Faostats for time series related to food production, consumption, demographics and prices among others with the result that these sources data which are generated mainly through projections may often differ in from existing official data. Similarly, government data generated through different surveys may not always be consistent.

To supplement official data, the report also relies on publications and academic journals for information that cannot be found from official data sources. Even then, there remain large

data gaps of the food system such as volumes and disposal of food waste, the catering sector (how large it is and how many people it employs) and the transport sector.

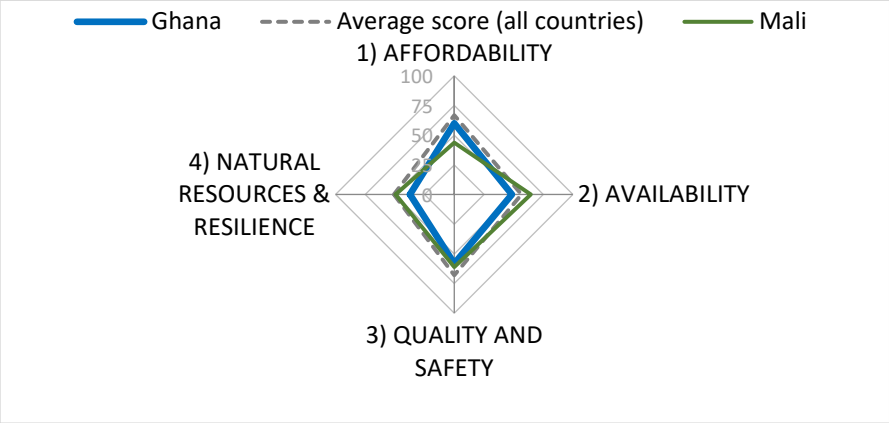
4. Food and Nutrition Security Outcomes

4.1 Food security.

Ghana is ranked as a moderate food security performing country (ranked 82 out of 113 countries) by the Global Food Security Index (2021). Where it has made the most progress is in the supply of micronutrients such as zinc and Vitamin A supplements. Compared to countries in the sub-region, Ghana's agricultural production and food prices are relatively stable. According to the index, Ghana performs poorly on food losses, food safety, policy commitment to food security and access, dietary diversity, land degradation and natural resource resilience.

In West Africa, Ghana is outperformed in the overall ranking only by Mali, especially in policy commitment to food security and access, the management of food losses and food safety. It falls behind Ghana largely due the higher proportion of the population living below the international poverty line as well as limited dietary diversity.

Figure 1: Food Security Index Score

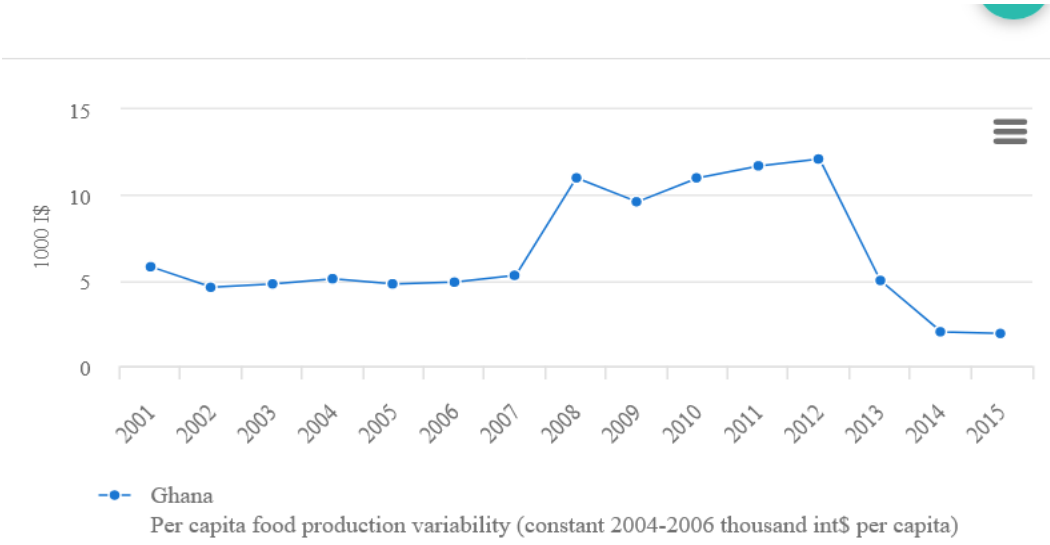


Source: Global Food Security Index, 2021

4.2 Food access

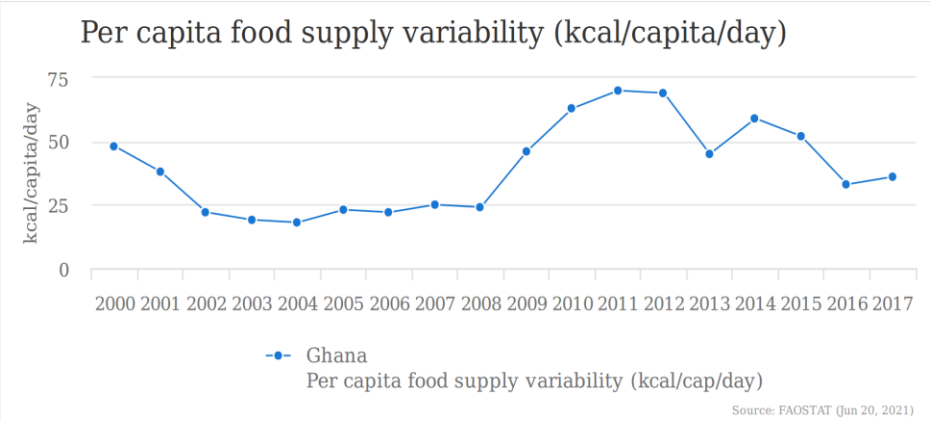
It should be noted that the available data on food access is dated – a decade old or more. From this data, both the production of, and access to, food increased rapidly from 2007 to 2012 and declined thereafter. Per capita food production declined from $12000 in 2012 to less than $3000 per head per annum in 2015. Per capita consumption similarly fell by more than half over the same period. In 2015, food production per capita was equivalent to about 30 kilo calories a day from a peak of about 70 k/cal per capita in 2012.

Figure 2: Food Production variability



Source: FAO stats, June 2021

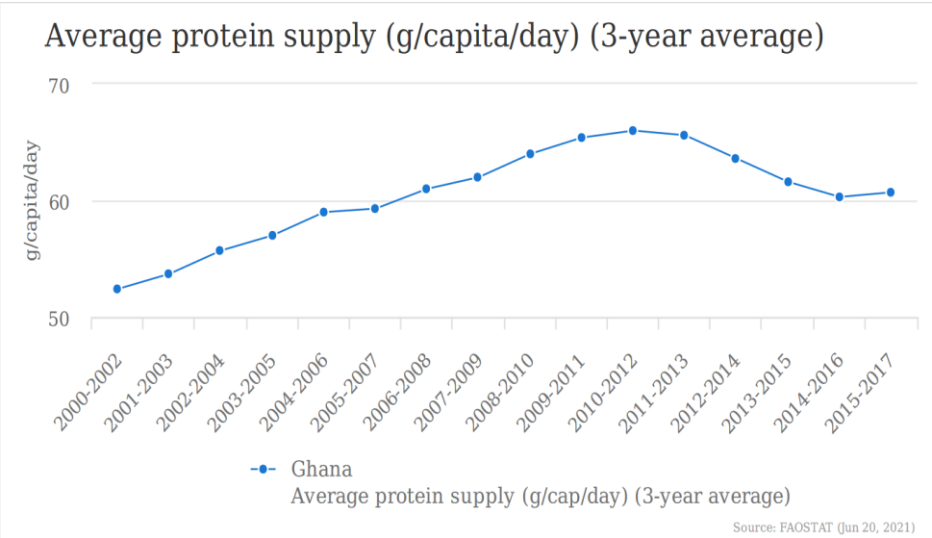
Figure 3: Food Supply Variability



Source: FAOstats, June 2021

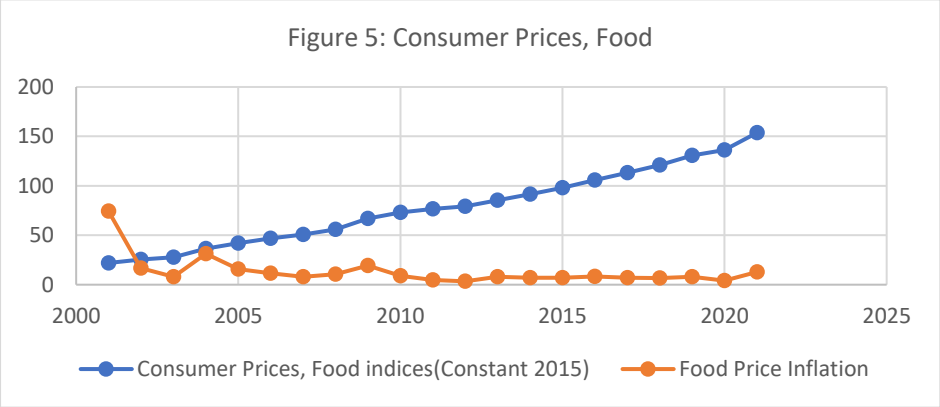
The availability of protein food which increased steadily since 2000 declined perceptibly between 2010 and 2016 as Figure 4 below indicates.

Figure 4: Protein supply variability



Source: FAOstats, June 2021

Food access is affected by both the supply factors – the availability of nutritious food – as well as demand factors – the ability to buy (incomes and prices). As Figure 5 below shows, food prices have been relatively stable since 2000 and falling behind general consumer prices.

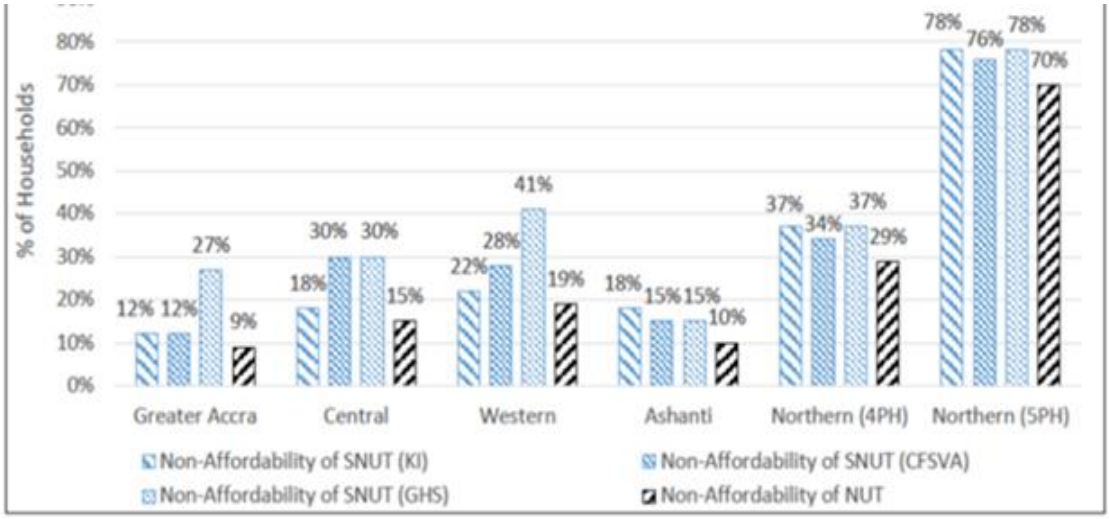


Source: FAOstats. November 2921

Nevertheless, due to rising income inequalities, and spatial inequalities in particular, a third of households nationally and more than 70% in the Northern region of Ghana reported inability to afford nutritious food in a World Food Programme Survey in 2016 as Figure 6 below shows.

Figure 6: Affordability of nutritious Food

Percentage of households unable to afford minimum cost of a nutritious diet



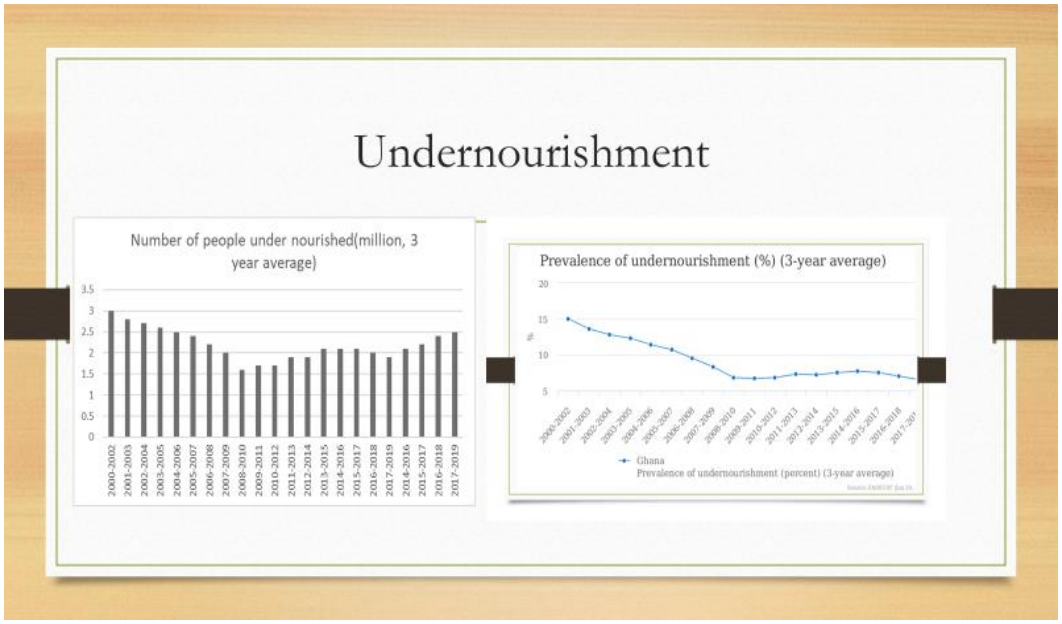
Source: WFP/GHS (2016)

The number of severely food insecure people has been going up since 2014, topping 2.5 million people on average between 2017-2019 according to the FAO.

4.3 Malnutrition Outcomes:

Both the absolute number of malnourished people and the prevalence of undernourishment have been rising steadily since 2010. Prevalence declined sharply from 15% in 2000 to less than 7% of the population in 2010 but has since creeped up. In terms of absolute numbers, although there were one million fewer undernourished people in 2018 compared to 2000, the prevalence of undernourishment has been inching up year after year since 2010.

Figure 7: Undernourishment

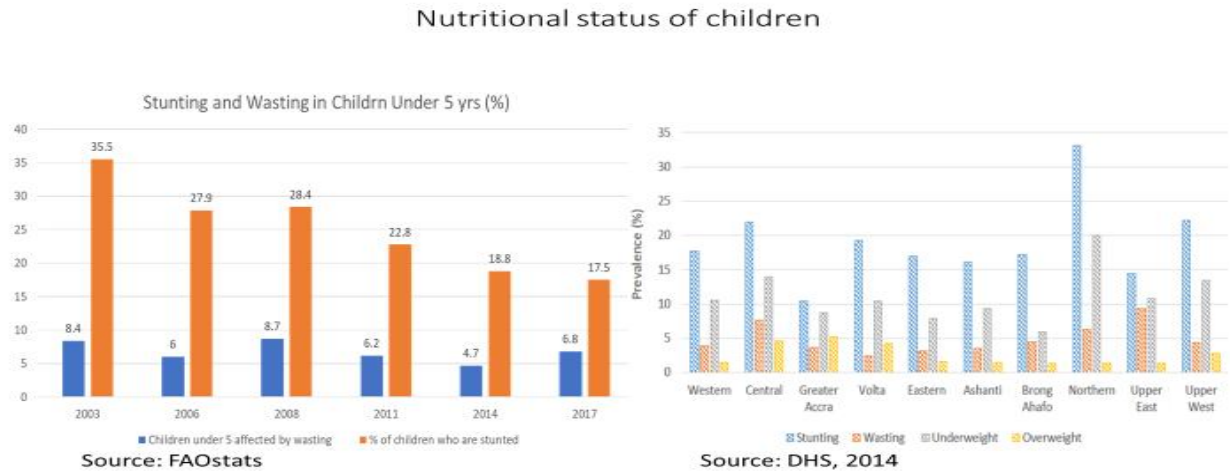


Source: FAO Stats, June 2021

Child malnutrition has seen significant improvement since 2000. To date, the percentage of stunted children has fallen by half compared to year 2000 Although children affected by wasting has also declined since 2008, the rate of progress has been less consistent. First, progress has been more rapid in urban areas compared to rural. For example, whereas 11% of children in urban areas were moderately stunted in 2016, the rural equivalent exceeded 13%. Moreover, progress has also been spatially uneven with the drier poorer parts of the country making far less progress.

In 2014, stunting among children in the Northern Region of Ghana was 60% higher than the national average. Other regions where stunting exceeded 20% were Central and Upper-West Regions with the Volta region following closely. These regions are also the most income-poor regions in the country and as well as the most dependent on food, rather than cash-crop production, for livelihoods. Production is predominantly rainfed and rainfall is seasonal. The Northern and Upper West regions fall in the dry-land ecology where rainfall is more variable than the national average.

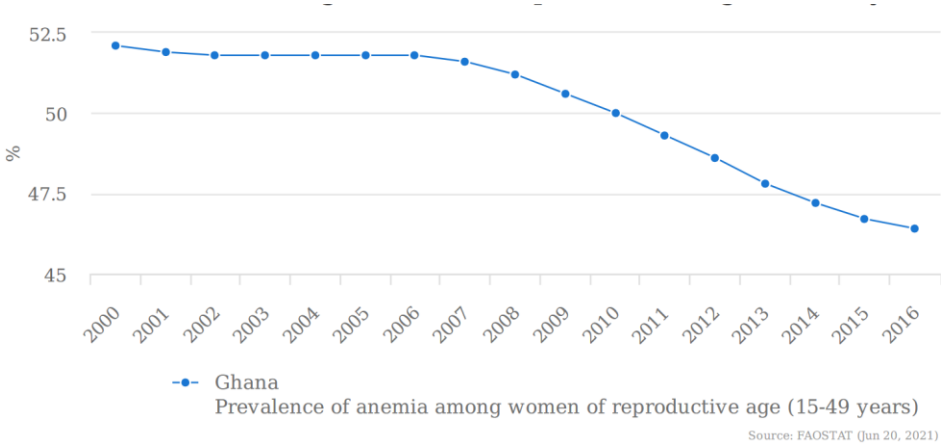
Figure 8: Nutrition Status of Children



The improvement in the prevalence of stunting (low height for age) owes much to the aggressive introduction by health authorities of micronutrient supplements in children's diet and the general decline in income poverty. A recent survey recorded the use of iodised salt by nearly 70% of households interviewed with the highest use being in the poorest regions, especially the Upper-East and Upper West regions (GSS 2017). It also reported a high level of access to zinc especially by children of poor households provided in health facilities through food supplements.

Although the prevalence of anaemia in women of reproductive age (15-49 years) has been declining since 2006 according to FAO data it still remains high, 46% in 2016. See Figure 9 below.

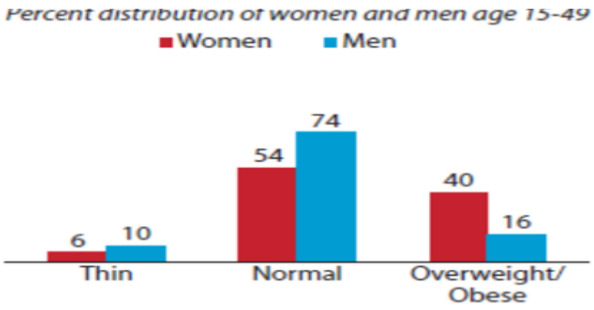
Figure 9: Prevalence if anemia of women of reproductive age



Source: FAO Stat, June 2021

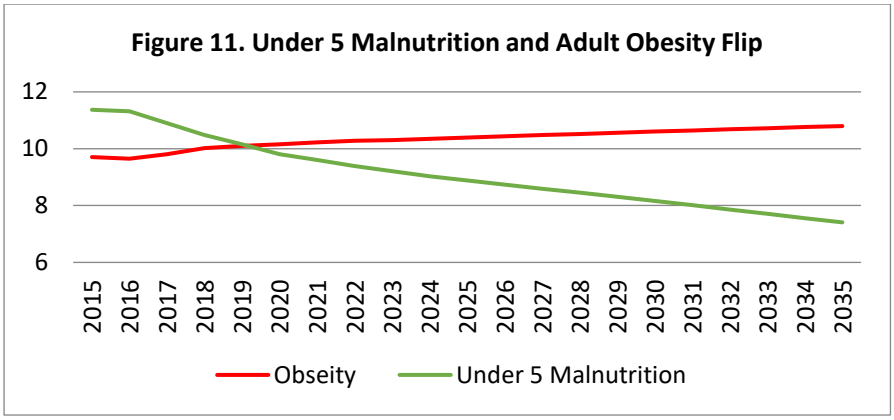
While child malnutrition is expected to continue falling with underweight children projected to be 2.2% in 2030, albeit with spatial disparities, obesity among adults, especially women, is rising rapidly and projected to be a number one public health issue, outstripping underweight. (Anim-Soumiah et al, 2018)

Figure 10: Obesity among men and women



Source*: Anim-Soumiah H & Asravor, R (2018), University of Ghana) In Abugre 2019 paper.*

It is projected that in 2030 more than 10.5 million Ghanaians could be overweight or obese if current trends continue. This newly emerging public health challenge and the diseases associated with it is related to urbanization, urban life, and changing diets and changes in the food system in general that make salty, sugar-laden and fat-filled food more available and cheaper than healthier alternatives. In cities in particular, obesity and overweight rates as well as chronic non-communicable diseases like diabetes and cardio-vascular disease are on the rise (FAO et al., 2013). Obesity among women has increased by over 400% from 3.4% in 1993 to 15.3% in 2014. By 2030, nearly 23% of Ghanaian women are projected to be obese.



Source: FAOstats June 2021

4.4 Nutrition and processed food.

Markets are increasingly the main source of food for households not only in the urban but also increasingly in rural communities. With the income elasticity of demand highest for processed foods (the richer you are, the greater your preference for processed food) - outside dining, processed dairy, tomatos, meat and wheat products - the demand for these products will likely grow faster than average incomes. New actors and activities have entered the food system to cater for these changes. The global fast-food chains such as Burger King, Pizza Hut, Kentucky Fried Chicken have already penetrated the Ghanaian food market alongside South African chains and Ghanaian fried rice and jollof stalls proliferating every street. Yet food standard enforcement is weak with serious risks to food safety and public health.

A growing agri-processing sector offers numerous opportunities for improving the nutritional content of food assuming government policy commitment to nutrition. Food fortification (nutrient enrichment) programmes have already been successfully tested and implemented in West Africa. Vitamin A-enriched oils, and iron- and folic acid-fortified wheat flour already exist in the Ghanaian market. Nearby Benin, gari – a popular roasted cassava grit - is enriched with protein-rich soy flour or vitamin A-rich palm oil.

4.5 Food safety

Food safety is affected by how food is handled – processed, stored, packaged, treated, transported, retailed, cooked and sold. Attention to hygiene and basic food safety procedures is generally limited when it comes to the management of primary produce (at the farm level and sales points) processed food including street food and fast food. According to an FAP report, food safety is particular poor among informal enterprises, including agro-processors (FAO 2014). Knowledge of specific regulations and legislation governing food safety and hygiene issues is only evident among those processors who market their products through formal outlets. Other reasons are the irregular supply of energy affecting refrigeration and general lack of awareness about food safety. Aflatoxin is a wide spread food poison affecting groundnuts, maize and other cereals produced in Ghana, and results from how the moisture content of cereals are treated especially during the drying and storage stages.

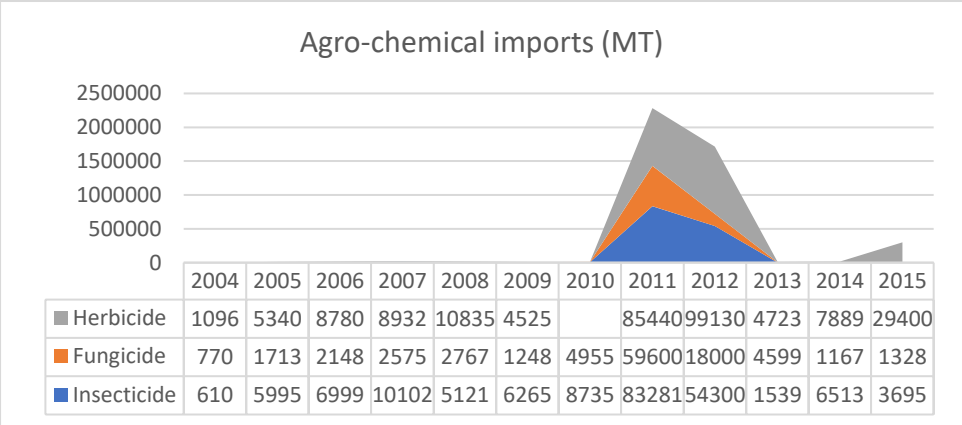
Table 1: Use of agro-chemicals and improved seeds by emerging farmers

Input	Percent farmers
Weedicides	87.3
Pesticides	19.2
Improved Maize seeds (Obatampa)	29
Improved Rice seeds (jasmine)	12.2
Rice (other improved)	39.8

Source: IFRI/SARI Survey (2017)

The quality of food is also impacted by the chemicals that are applied at the farm and storage levels. As indicated in Table 1 above agrochemicals are heavily used in Ghana with very little monitoring. Weedicide application is growing among emerging (medium-large scale) farmers. According to an IFPRI survey (2017) 87% of emerging farmers use them largely as a replacement for labor, given rising labor cost caused largely by out-migration from rural areas to the cities. Nearly 40% of rice farmers apply weedicides. The risk of chemical pollution of food, is therefore quite high.

Figure 12: Agro-chemical imports



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Herbicide	1096	5340	8780	8932	10835	4525		85440	99130	4723	7889	29400
Fungicide	770	1713	2148	2575	2767	1248	4955	59600	18000	4599	1167	1328
Insecticide	610	5995	6999	10102	5121	6265	8735	83281	54300	1539	6513	3695

Source: MOFA 2016

The report of the Census on agriculture referred to earlier reveals that generally, the use of pesticides is more common than that of fertilizer among all arable crop holders. About two-thirds (66.2%) of holders use pesticides with eight in ten holders who cultivate non-leafy vegetables (82.9%), horticulture (81.8%) and herbs/spices/condiments (80.5%) use pesticides.

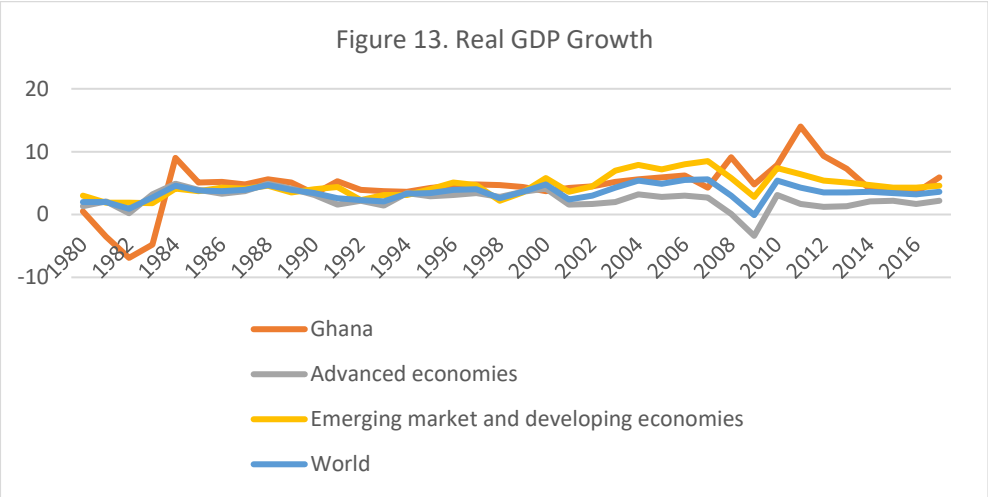
About two-thirds of starchy staple holders use pesticides and the specific crops for which more than two-thirds of holders use pesticides are maize (75.3%), rice (74.3%) and yam (73.9%). Starchy staple crops for which at least two-thirds of male holders use pesticides are rice (78.1%), taro (77.0%) and cassava (68.0%). Female holders who cultivate maize use pesticides, constituting more than two-thirds (69.5%) of the proportion using pesticides.

Agro-chemicals were used most heavily between 2010 to 2014. Data from the Plant Protection and Regulatory Services of the Ministry of Food and Agriculture (MOFA, 2019) indicates that the value of pesticide imports increased from 12,038 metric tons in 2010 to over 1.7 million mts in 2012, declining to 299000 mts in 2015. Owing to new government policies promoting heavy subsidization of agro-chemicals since 2017, their use is on the rebound. Their regulation for health and safety reasons is poor. To address the public health risks associated with agro-chemical poisoning of staples, coordinated monitoring and stringent application of both chemical application standards and food standards in general will need to be stepped up. Food safety concerns are however low in government policy priorities.

5. Food and Agriculture in Ghana's Economy

5.1 GDP Growth:

Ghana is one of a hand of handful of African countries where real GDP growth has been sustained for over three decades. Since 1983, GDP growth rate has matched that of emerging markets and higher than the world average. A combination of sustained economic growth and the rebasing of GDP lifted Ghana into a Lower Middle-Income Country status from 2010. Figure 13 below indicates that Ghana's GDP performance over the years has compared favorably with the average for emerging market economies and developing countries as well as average global growth.



Source: IMF, 2017

Growth in the period before 2011 was driven largely by commodity boom, mostly gold, and to some extent cocoa. Ghana's LMIC classification also coincided with the discovery and export of petroleum. Petroleum exports lifted GDP growth sharply in 2011 to 14%, the highest in the country's history. In that year, oil accounted for 40% of the growth. Oil has overtaken gold as the second largest export commodity to cocoa.

Sustained GDP growth contributed to reducing poverty significantly. Extreme poverty fell dramatically from 52.7% to 13% in two decades (GSS, 2017). However, this reduction has been spatially uneven with more than 1 million more people sinking into extreme poverty, mostly in the Savannah ecological regions of the country in the 5 years to 2016/2017. There is also a

gender dimension. The income divide between men and women has also deepened over the period. For example, only an estimated 6% of the richest people in Ghana are women (Oxfam, 2018).

5.2 Growth, inequalities and poverty reduction:

In recent times, economic growth has become increasingly ineffective as a means of reducing poverty. The rate of poverty reduction slowed from an average of 2% in the 1991-1998 period to 0.2% on average in the 2012-2016 period. Indeed, the number of people living in poverty went up from 6.4 million in 2012/13 to 6.8 million in 2016/17 in spite of the reduction in the percentage of people living in poverty. The decline in the ability of economic growth to reduce poverty is partly a reflection of growing income inequalities. Ghana's income inequality levels are surpassed only by Guinea-Bissau (a war-torn country) and Sierra Leone (a country badly affected by civil war and the Ebola outbreak) in the ECOWAS region.

Table 2: Income inequality

Year	Gini	Change in Gini	Palma ratio
2005/06	41.9		
2012/13	42.3	0.4	
2016/17	43	0.7	2.09
ECOWAS (mean)	39		
EAC (mean)	43.3		

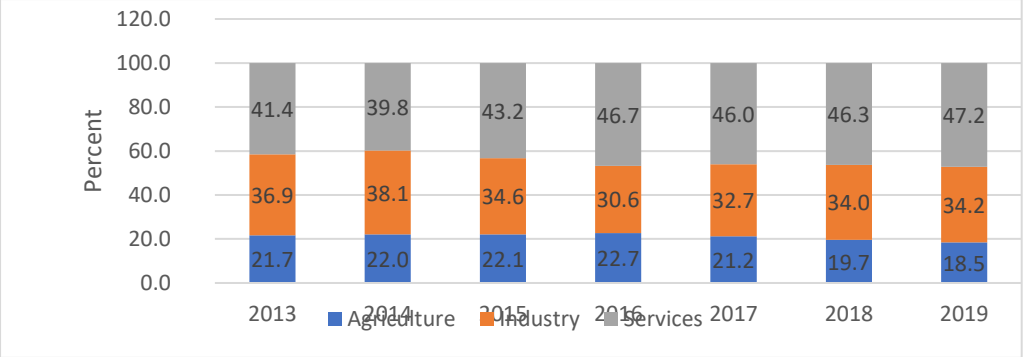
Source: Ghana Statistical Service (2018), CIIR database (2018) for ECOWAS and EAC

Inequalities measured by the Gini index grew by 3.3 percentage points between 1992 and 2013 and by a further 1.1 percentage points between 2012/13 and 2016/17. Measured as the share of consumption among different income groups, the bottom 60% of Ghanaians had a 35% share of total national income in 1988, but this declined to 30% in 2012.

5.3 The Structure of the Ghanaian Economy

Ghana's economy is experiencing structural change with the share of agriculture in GDP declining progressively with services being the net gainer. The largest contributor to GDP is the services sector and within that sector the fastest growing components are transport, storage and communications followed by retail and wholesale trade. These sectors are known to create limited or poor-quality jobs.

Figure 13: Economic structure

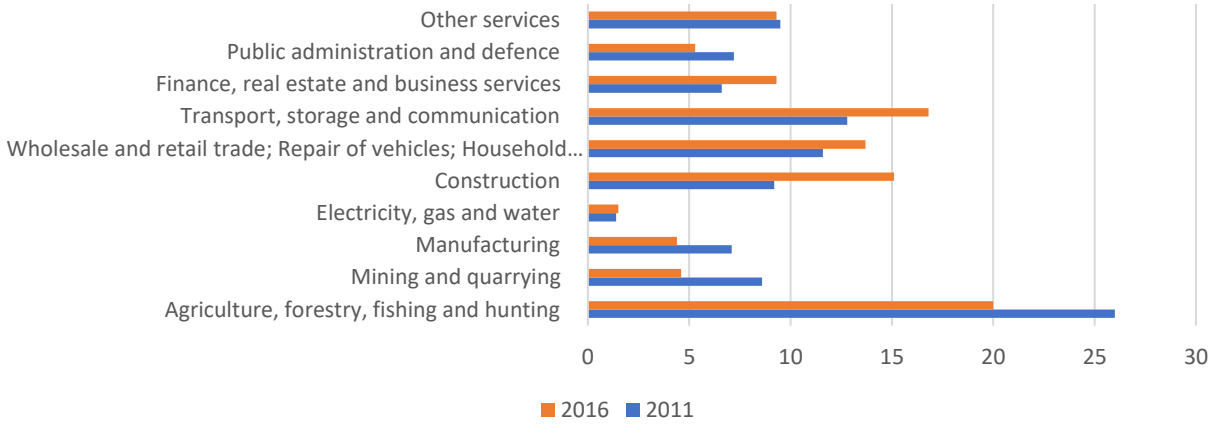


Source: Ghana Statistical Service, 2020

Agriculture currently contributes less than 20% to GDP, both as a result of structural change as well as the rebasing of GDP which brought additional contributors to GDP. The share of agriculture in GDP has however been declining long before the GDP rebasing in 2010 and continues to do so. In 6 years alone (between 2013 and 2019) agriculture's share of GDP declined by 300 basis point (GSS, 2020). This is to be expected as an economy matures. However, Ghana's structural transformation is atypical in that agriculture does not lose labour and resources to industry leading to a higher share of industry in GDP. Instead, industry's share has been declining also and remains the smallest of the 3 sectors.

However, although the industrial sector's share of GDP is modest, its contribution to annual GDP growth is disproportionately large, driven in recent times by the oil economy. The sub-sectors that experienced the sharpest reduction in the share of GDP have been mining and quarrying, and manufacturing whilst construction has grown strongly. The share of manufacturing in GDP (including agro-processing), often seen as an important indicator of structural transformation, declined sharply from 7.1% to 4.4% of GDP between 2013 and 2019.

Figure 14. Composition of GDP (Constant Prices)



Source: Ghana Statistical Services, 2012, 2017

5.4 Agricultural Output.

Although agricultural production in the country is generally rainfall-dependent, there are a number of factors that make this sector a viable area to focus more attention and investment

on. These factors include the presence of a well-endowed drainage basin with networks of water bodies that can be tapped for irrigation; a well-established agricultural research system which has been successful in the improvement of crop production such as cassava, maize and cowpea; a large youth population which can provide a ready supply of labour for increased crop production; relative proximity to the European market for exports facilitation, compared to other countries in southern Africa, (GIPC 2013). A major strength of the agricultural sector is the diversity of commodities being produced in each of the three major agriculture zones within the country.

i. Structure of production

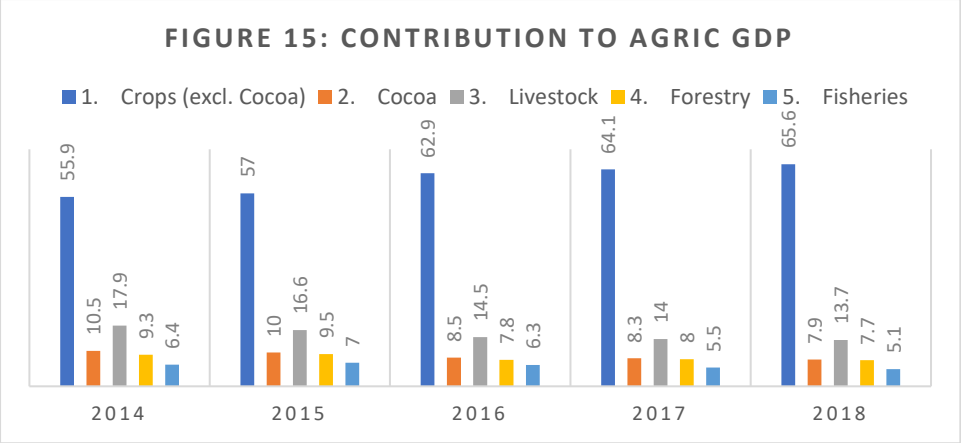
Less than 15% of farms are considered to be large scale, yet they produce approximately 50% of cash crops, exports and livestock (Oxford Business Report, 2018). Both large and small farms have different labour market and skill needs and required different TVET support.

Cocoa products continue to dominate exports, accounting for over 73% of total exports in 2018. There are approximately 800,000 cocoa farmers, of which the majority are small businesses (Oxford Business Report 2018).

ii. Agricultural Activities

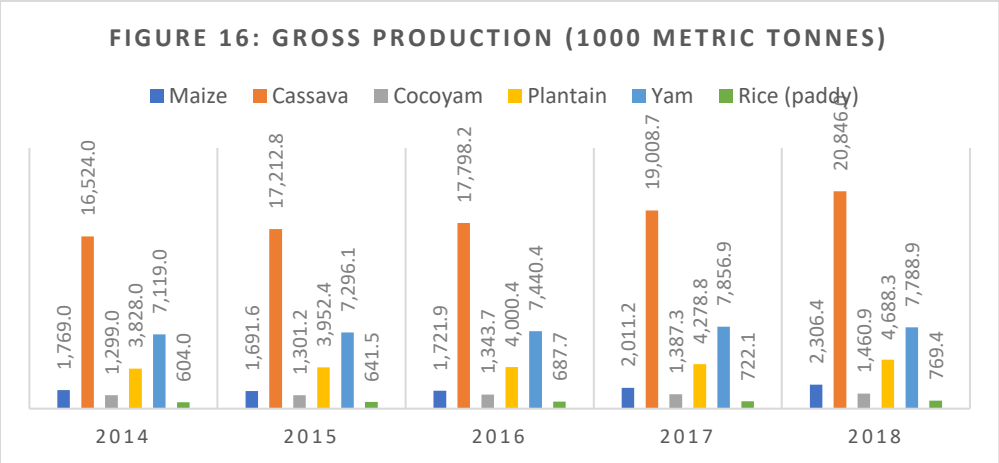
According to the Ghana Census of Agriculture (GSS, 2020), a total of 2,203,965 households (representing 25.8% of all Ghanaian households) are engaged in agricultural activities, of which 1,690,026 are headed by males (76.7%) and 513,939 or 23.3 percent by females. Among the urban households, 428,065 (9.0%) are engaged in agricultural activities out of which 318,409 and 109,656 households are headed by males and females respectively

Ghana's agricultural sector is dominated by crops. The main crops are cassava, plantain, yam, maize, millet/sorghum, cocoa, palm oil and rice. In 2018 crops, excluding cocoa, constituted over 60% of agricultural GDP. The share of cocoa, a major source of foreign exchange, has been declining in importance. In 2018 it represented less than 8% of agriculture sector GDP, exceeded by livestock.



Source: GSS, Agricultural Statistics, 2020

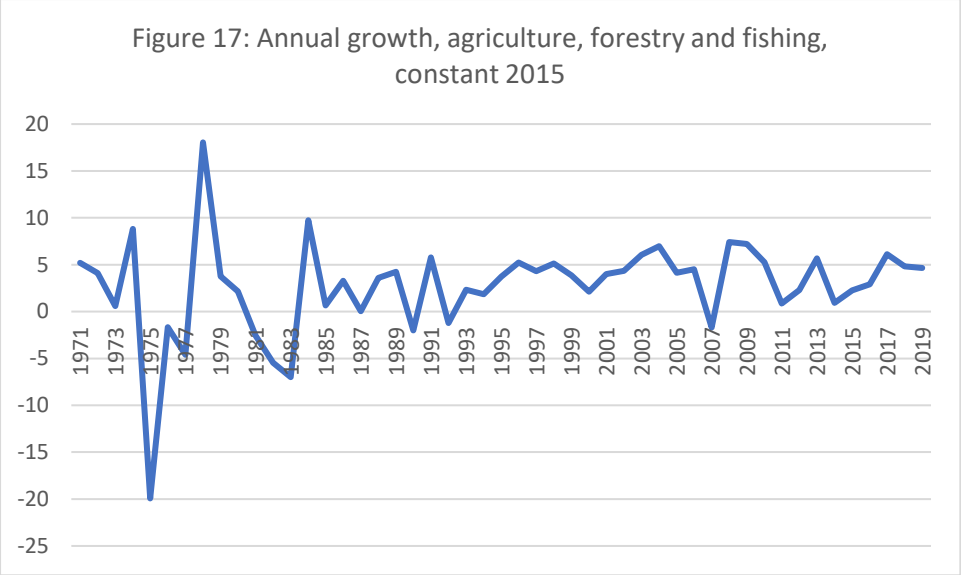
Within the crop sector, cassava is by far the biggest produced in Ghana by volume whilst by value it is yam. Both are worth a lot more than cocoa by far except in foreign exchange earnings where cocoa is the dominant crop. Plantain's estimated market value is only a little less than cocoa. Plantain, cassava, yams, cocoyam, maize, millet and sorghum are popular local staples. Rice output is small compared to the other staples but it is the fastest growing cereal by demand and output growth.



Source: Agricultural Statistics, GSS (2020)

5.5 Agricultural Growth Rate

According to the Ministry of Food and Agriculture in their Investing for Food and Jobs document (2018), the decline in Ghana's GDP growth rate from its peak of 14.0% in 2011 owes in part to low total factor productivity (low skill levels and a lack of capital investment) generally and especially in agriculture. The contribution of agriculture to GDP also continues to decline despite rising agricultural output, Moreover, the sector's growth performance has been highly erratic.



Source: World Bank (2020): World Development Indicators.

1978/79 stands out as a landmark of exceptional performance of the agricultural sector in Ghana. This is attributed to dedicated government policy of the military regime dubbed "Operation Feed Yourself" and "Operation Feed Industry" – a policy driven by self-sufficiency and food security objectives. It entailed massive mechanization and input subsidies as well as the use of minimum pricing mechanisms for produce and state marketing support, among others. Since then, agricultural sector growth has been volatile averaging 5% over the past three decades, barely above population growth.

5.6 Agricultural employment

According to MOFA's Investing for Food and Jobs report (2018), over 44.7% of the Ghanaian workforce are employed in the agriculture sector. The sector is still predominately made up of subsistence farming and as such whilst a large number of people are classified as working in the sector, only a small percentage do so in the sense of a formally employed workforce.

The Integrated Business Establishment Survey, 2015, (GSS 2016) indicates that about six out of every ten persons engaged (59.9%) in work in an establishment in Ghana (i.e. non-household unit) is considered as informal while the remaining two-fifths (40.1%) are engaged in formal establishments. Formal establishments accounted for higher share of persons engaged than informal establishments in agriculture while the reverse was the case in the industry and services sectors. Formal establishments engaged over three-quarters (76.0%) of persons in the agriculture sector as against 24% engaged by informal establishments. Informal establishments account for a lower share of persons engaged in agriculture (24%) while the reverse is the case in the industry and services sectors.

Skilled agricultural, forestry and fishery workers constitute the largest occupational group, engaging 2,949,805 of the currently employed persons according to the Ghana Labour Force Survey (LFS) (GSS, 2016).

The LFS showed found that 2,138,355 people work in crops, 2,943,696 in livestock and 2,988,896 in game. The LFS (2015) also identified that 29.7% of migrants are working in the

agriculture sector. Agriculture has the highest percentage of migrant workers of any sector in Ghana.

There are 2.5 million agricultural households in Ghana, representing 45% of total households. 44% of all households in Ghana own or operate a farm according to a recent survey (GLSS 7, 2019). In 2018, the government estimated that about 750,000 jobs were created in that year alone through its flagship Programme, Planting for Food and Jobs (PFJ) (MOFA, 2020).

6. Primary Production

i. Production by volume

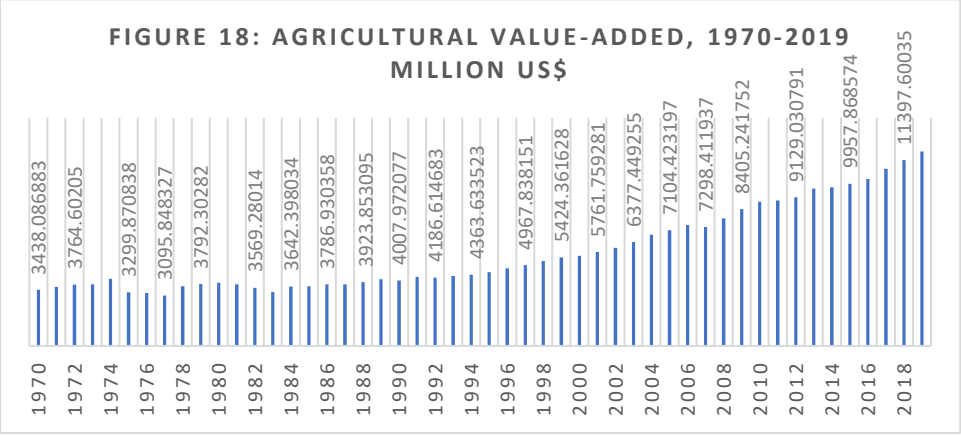
According to the Ghana Census of Agriculture (GSS 2020) starchy staples are the main crops produced (27,404,827.0 mts) by arable crop holders, constituting 94.4%. Pulses/legumes (673,875.3 mts) and non-leafy vegetables (320,492.6 mts), constituting 2.3% and 1.1% respectively, were the other major crop types produced by farmers in Ghana.

About half (49.9%) of the total production of arable crops is on a small-scale level while medium and large-scale production each form about a quarter of the total production. Majority of the production of all arable crops except starchy staples and horticultural crops is on a small-scale. For horticultural crops, the majority of the quantity produced is on a large-scale while medium-scale production forms a third or less of the quantity produced.

Cocoa is the most dominant tree crop, engaging 619,866 (80.9%) of the 765,885 holders followed distantly by cashew (11.7%) and oil-palm (11.3%).

ii. Value addition:

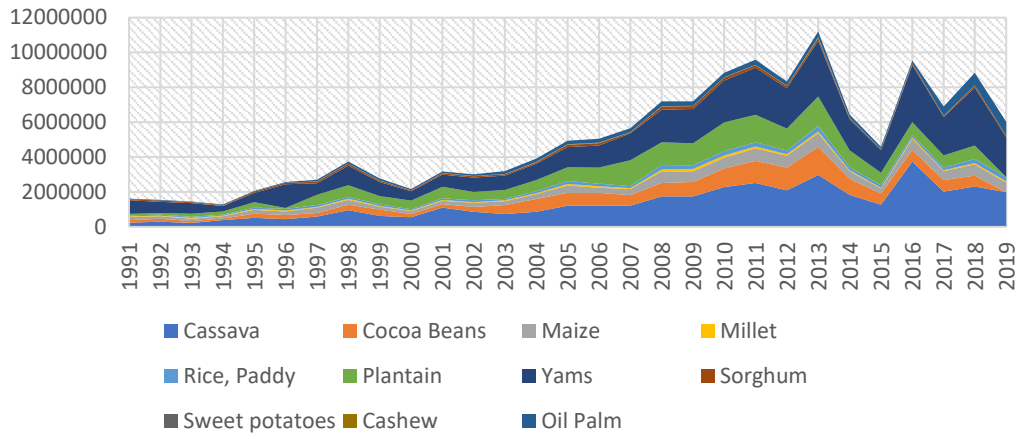
Agricultural value-added has been growing year on year over the past 50 years. In 2018 it approximated $1.1billion, more than double its value in 2000. Similarly, food production has also been increasing by value over the years, exceeding $300 million in 2016.



Source: FAOstats, November 2021

Gross production by value, of almost all crops grew rapidly from 2001, peaking in 2012/2013 or there about and falling to date. Yams, the largest crop by value declined from an output of $1.7bn in 2013 to $763 million in 2018. The exception is cocoa beans whose value expanded four-fold over the same time, making the crop the second most valuable.

Figure 19: Gross Production by value, crops (US 1000)



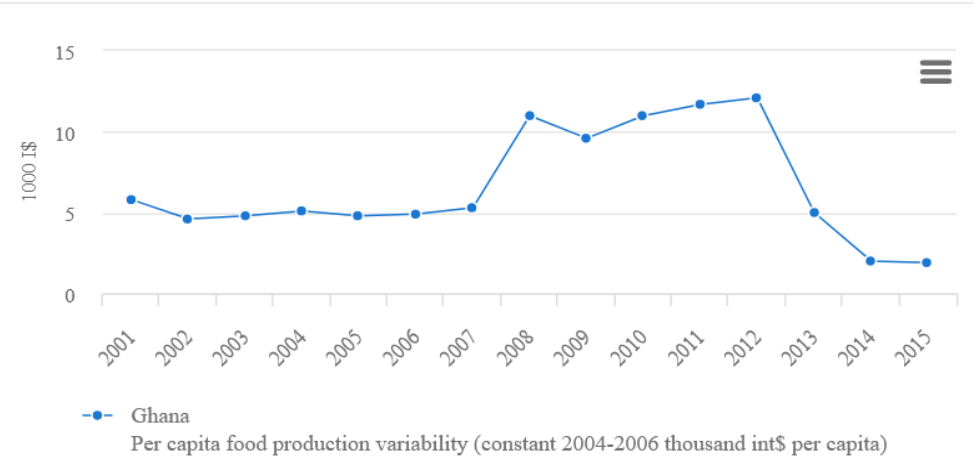
Source: FAOstats, June 2021

In recent times recent times (2014-2018) the livestock sub-sector has seen modest positive continuous growth whilst growth in the cocoa and fisheries areas has ebbed and flowed.

iii. Per Capita Food Production

Per capita food production has broadly followed the overall gross production trend. Per capita food production in 2015 was about a third of its peak value.

Figure 20: Per capita Food production



Source: FAOstats, November 20201

6.1 Agricultural Produce by commodity

i. Grains.

The implementation of national and regional Comprehensive Africa Agriculture Development Programmes (CAADP), which have put heavy emphasis on the production of basic staples (particularly rice) has further entrenched the dominant focus on a handful of cereal staples, particularly rice, maize and soya beans. The production of soybeans – not a traditional staple - has been added to the priority mix and heavily promoted by international organizations

including USAID, AGRA and the Africa Development Bank largely as a raw material for animal and fish feed. Government's recent policy, Planting for Food and jobs, first prioritized these grains and later added to the mix, legumes, millet and tree crops.

Table 3: Growth in agricultural output

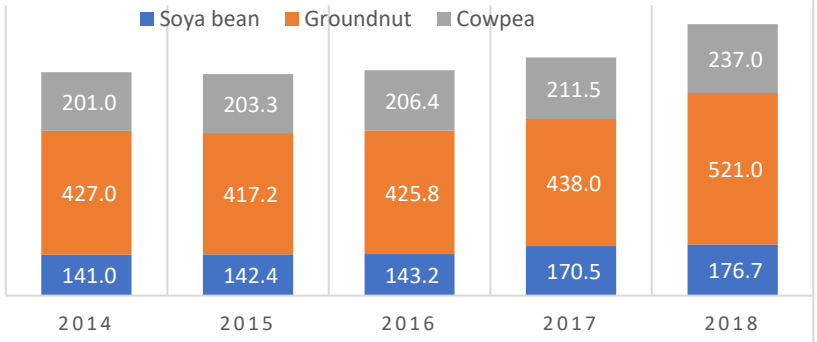
	2004/06 - 2007/09	2010/12-2013/15
Maize	4.52	-1.41
Rice (paddy)	3.47	6.92
Cassava	2.79	0.6
Cocoyam	-2.17	-0.64
Sorghum	-6.56	-2.14
Yam	3.87	1.72
Millet	-12	-2.76
Groundnuts	-8.84	-1.17
Cowpea	-5.45	-1.78
Soybean	11.24	1.36

Source: MOFA (2016)

While production of rice, maize and cassava has increased rapidly over the past 30 years, the production of perishables and vegetable oils, for which demand has been growing rapidly, has increased much more slowly (or in some cases declined). The production of maize, soy bean, yam and cassava, grew fastest in the period 2006 and 2009. Rice production grew faster than any other crop in the period between 2012 and 2015 reflecting the priority accorded the crop by the government of Ghana and major international development partners. Production of yam and cassava slowed down significantly, and for all other crops except for soybean, output actually declined on average between 2012-2015 compared with 2009/10.

Protein crops such as cow pean, groundnuts and soy beans are produced in far less quantities. Although production of soy bean, groundnuts and cow pean has been increasing in recent years, groundnuts more than double the other two by volume produced.

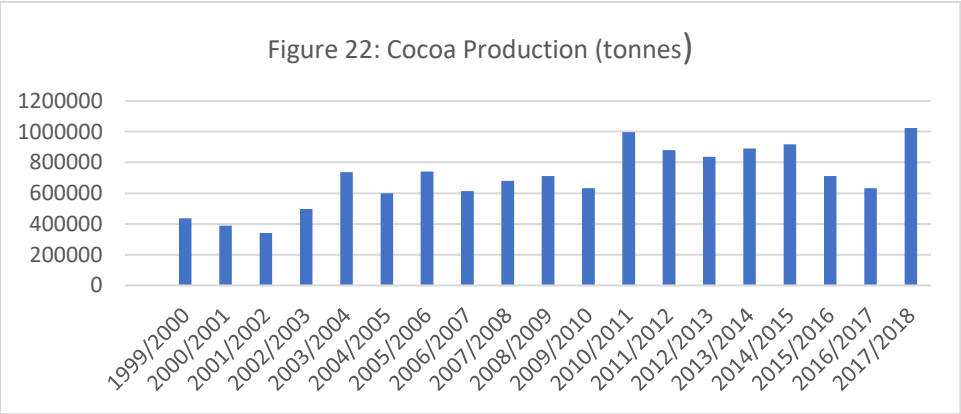
FIGURE 21: PRODUCTION 1000 METRIC TONNES



Source: GSS (Agric Statistics, 2020)

ii. Cocoa

Cocoa receives far more political and policy attention than any other crop in Ghana. The cocoa subsector accounts for about 12% of total agricultural value added, 7% GDP, and 20-25% of export earnings. Cocoa is a key source of foreign exchange and the country's largest non-resource export. However, after peaking at 1 million tons in 2011-12, cocoa production seems to have plateaued at an average of around 800,000 tons per year, recovering recently to about 1 million tonnes (2018).



Source: FAOstats, November 2021

In 2017, cocoa exports amounted to $2.6bn and imports, $378,000. Cocoa is produced predominantly by small-holders. The Government of Ghana invests heavily in the sector, often providing free seedlings and agro-chemicals for disease control and strict standards with private companies leading on the production side through small holders and purchasing and processing through large international firms such as Olam, Mars and Mondelez. Cocoa is the only crop with a guaranteed minimum price.

Cocoa exports are fully government controlled through the COCOBOD although licensed buyers also directly purchase beans from farmers and supply to COCOBOD. Farmers receive 6.6% of total value added to 1 ton of cocoa beans that are sold.

The International Labour Rights Forum (ILRF, 2014) estimate that the net earnings of typical cocoa farmers with 2 hectares (ha) of land in Ghana are about $2.69 per day. These values are just above the global poverty line of $1.90 per day. Considering that a typical rural household in these may have 5+ people the daily net income per person would therefore be much lower than the global poverty line. However, the largest reduction in rural poverty in Ghana over the years has taken place among cocoa farmers.

According to IFPRI (2016) cocoa production is becoming less profitable, the value of public support outstrips returns and productivity falls behind Ghana's neighbours, Ivory Coast. That notwithstanding, Ghana's cocoa commands a premium price in the international market and the proportion of beans processed into powder and paste is increasing.

According to a stakeholder interviewed, the future of cocoa farming remains bright. The strong financial support by the Government of Ghana (GoG) and market players is inducing a new breed of cocoa farmers who are mostly retired or retiring urban elite buying up existing farmers and retrofitting them. The future of cocoa will remain small-holder driven. That said, climate change, rapid urbanisation combined with competing land use exert severe pressure on available land for cocoa production.

iii. Fisheries production and consumption:

Most Ghanaians depend on fish and fish products for their animal protein. Per capital consumption of fish in 2010 was estimated at about 24.2kg. According to MOFA fish production contributes about 6% of Ghana's agricultural GDP. About 70% of fish is caught by artisanal fisherfolk involving over 250 000 people, employing 60% of the women who are mainly involved in the processing and retailing part of the value chain.

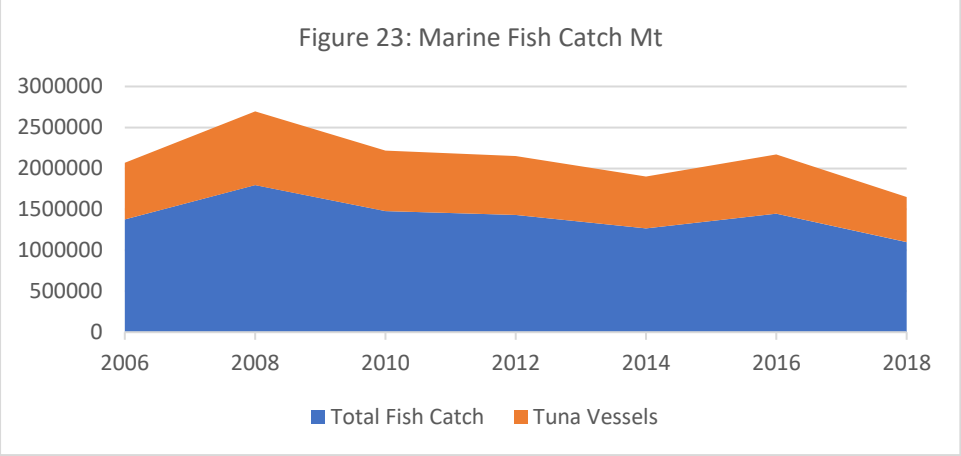
Fish is produced from 2 sources: fishing from marine and inland waters and aquaculture farms.

Table 4: Fish Catch (Metric tonnes)

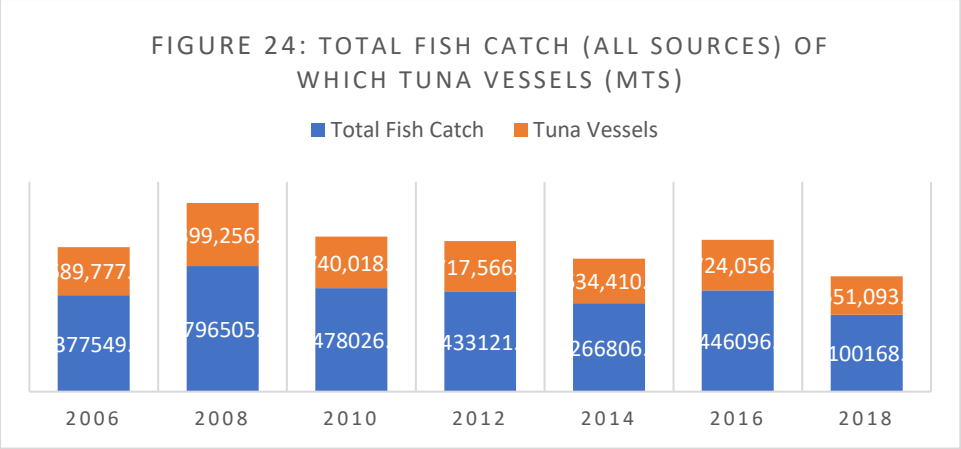
Source	2014	2015	2016	2017	2018
Marine	289,147.0	320,221.0	328,541.0	342,427.0	294,240.0
Inland	85,383.0	86,268.0	84,345.0	76,753.0	73,628.0
Total	**374,530.0**	**398,803.0**	**412,886.0**	**419,181.0**	**367,868.0**

Source: Fisheries Commission, Ministries of Fisheries and Aquaculture Development (MoFAD)

Marine fish makes up 80% or more of all fish caught. Of the marine fish, about 5% is tuna fish which is caught mostly with trawlers. Most other fishes are caught with canoes. Marine fish catch has been declining since 1999, from almost 420 000 tonnes to 202 000 tonnes in 2014. In 2018 fish catch fell even more steeply to about 100,000 metric tonnes.



Source: MOFA (2020) Ministry of Fisheries and Aquaculture Development



Source: MOFA. 2020, Ministry of Fisheries

Aquaculture: Fish farming (aquaculture), predominantly tilapia (80%) and catfish (20%), has grown significantly from 1200 tonnes in 2005 to about 50,000 tonnes in 2017 and takes place mostly on the Volta Lake in the form of cage farming. Pond farms are far less successful. Fish farming is dominated by about 23 medium to large scale farms. Fish feed is largely imported and although local feed producers are growing in importance, they depend on imports for raw materials, although soybean, a key ingredient is a priority crop of CAADP and the GoG. The aquaculture sector was recently devastated by diseases apparently brought about by the illegal importation and cross-breeding of an exotic variety that spread previously unknown diseases.

Table 5: Fish production by volume (mt) and value (Million GHS)

	Tilapia		Catfish		Farmed Shrimp		Total	
	Qty (mt)	Value (GH₵ million)	Qty (mt)	Value (GH₵ million)	Qty (mt)	Value (GH₵ million)	Qty (mt)	Value (GH₵ million)
2013	29,911.0	215.4	2,601.0	15.6	-	-	32,512.0	231.0
2014	35,837.6	394.2	2,697.5	29.7	12.0	0.4	38,535.1	424.2
2015	40,905.11	474.3	3,704.89	47	-	-	44,610.0	521.3
2016	48,638.3	583.4	3,832.1	42.8	-	-	52,470.4	626.2
2017	70,594.9	862.0	12,680.4	143.3	-	-	83,275.3	1,005.3
2018	69,859.9	947.0	6,760.2	91.3	-	-	76,620.1	1,038.3

Source: Ministry of Fisheries and Aquaculture Development

Aquaculture institutions: According to the Survey of Agriculture, (GSS, 2020), there are 149 institutions engaged in aquaculture of which 80 are in rural areas. A total of 118 use the monoculture system of production. The common types of holding facilities used are pond (75.2%) and cage (16.1%) which together constitute 91.3% of all institutions. A similar pattern is observed among agricultural institutions using the monoculture system in both urban and rural areas. For institutions using the poly-culture system, the main facility is

pond (93.5%), which is distantly followed by tank (6.5%). No institution uses the integrated system which is used by households in aquaculture.

A total of 85 out of the 149 agricultural institutions engaged in aquaculture produce grow-out while an additional 30 produce both grow-out and hatchery. Among institutions producing grow-out, 75.3 percent use pond and 17.6% use cage. A similar pattern is observed for the other types of production except for hatchery, where the proportion using tank is relatively high (11.8%).

About 95% of the total quantity of fish was produced in ponds and the others were produced in cages (3.4%), tanks (1.3%) and dams/dugout (0.6%). Hundred percent of all the various types of fish were produced in ponds, except for tilapia where 92.2% were produced in ponds, 5.0% produced in cage, 1.9% produced in tank and 0.9% produced in dam/dug-out.

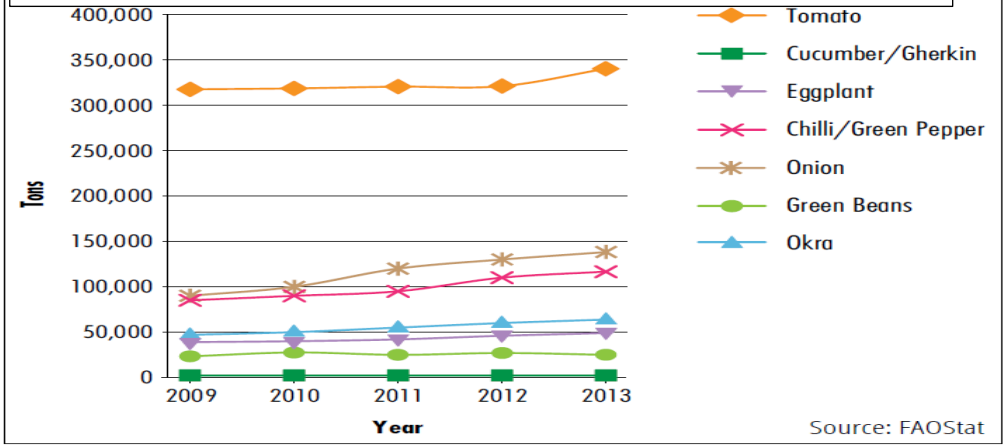
***Child labour issues in the fishing industry*:** The fisheries sector is plagued with concerns about child-rights abuses including child trafficking and slavery. According to the Ghana Child Labor Survey Report (2003), over 49,000 children (87% boys) are involved in fishing in Ghana. A study of the prevalence of child trafficking in selected communities in the Volta and Central Regions indicated that children from nearly one-third of the 1,621 households surveyed had been subjected to trafficking and are involved primarily in fishing and domestic servitude. The US government's humans rights report on Ghana (2017) reports of children subjected to forced labour and hazardous work. A CNN documentary also recently profiled these abuses on the Volta Lake.

Environmental factors in the fishing industry: The fishing industry is severely impacted by environmental factors and in turn impact on the environment. Fish-stocks in both inland and marine sources are fast depleting with hardly any efforts in place to re-stock them. Government efforts to regulate stocks is mainly in the form of enforcing periodic banning of fishing, a practice which is largely ineffective. Fish smoking, the main means of preservation also contribute significantly to deforestation while cage fishing pollutes the lake. The methods of fish-smoking and handling also raise several public health concerns.

iv. **Production and consumption of Vegetables**:

By volume, tomatoes, onions and chilies are the largest vegetables produced in Ghana by volume. Vegetable production largely fall short of demand although production has been growing in recent times. Except for baby corn and green beans, the production of these commodities is undertaken predominantly by small holder farmers. Onions and tomatoes face strong competition from Burkina Faso and Niger.

Figure 25: Vegetable Production (MT, 2009-2013



Over 300,000 mt of tomatoes were cultivated annually valued at US$ 118m, whilst 75,000 mt was imported annually between 2009-2013 to augment the shortfall (MOFA 2015). Additionally, an average of 92,120 tonnes of tomato paste valued at US$ 78m was imported annually. In 2013, tomato products import amounted to US$112.1 million, which puts a strain on government's purse.

Vegpro Kenya's largest horticultural company, is the most prominent new entrant into the vegetables market producing, packaging and exporting babycorn and chili pepper for exports. Cultivating a 1070 ha irrigated farm, the company also supports about 900 out-growers farming baby corn on a 450-hectare area, which plans to expand to 000 hectares and to include other commodity lines such as mango, avocado, rice, maize, and soybeans.

GhanaVeg (recently re named Hortifresh) - is the main player providing financial and other forms of support to the horticulture sector. An initiative of the Dutch and British governments, Hortifresh organises a Business Platform for service providers, producers, processors and traders and grants for innovation, research and consultancies. Hortifresh seeks to develop vegetables as cash crops and invested €4 million and leveraging at least €2.5 million in co-financing investments by the private sector players according to its 2018 report.

ACDI/VOCA, (Agricultural Cooperative Development International and Volunteers in Overseas Cooperative Assistance), a non-profit Washington-based organisation provides training for cooperative organization including out-grower farmers. Their training includes a focus on the sustainable use of agro-chemicals, staying within maximum pesticide residue limits and not over-irrigating land, as the heavy clay soils in the area are prone to flooding.

Traditional greens – cocoyam leaf, bitter leaf (sawaka), alefu and bera – used extensively in local cuisine are retailed almost exclusively by small traders in local market and currently have place in the emerging super-market phenomenon. The creation of the Ghana Green Label Certification Scheme by the GoG and other stakeholders seeks to promote the production of fruits and vegetables in a safe and environmentally sustainable an to give domestic

consumers confidence in the consumption of locally produced fruits and vegetables. This is a good step towards promoting the consumption of local and traditional vegetables.

Tomato production in the Upper East region of Ghana alone employs about 11,728 farming families with an average family size of 5 persons. It is estimated that 58,640 persons benefit from its production as noted in a survey report by Trade Aid Integrated. According to the Ghana National Tomato Producers' Federation, Ghana produces 510,000 metric tonnes of tomato each year, while it imports up to 7,000 tonnes per month from its neighbours, alongside 27,000 tonnes of processed tomato from Europe.

v. Nuts

The production of nuts (mainly cashew and ground) has increased noticeably in recent times. Cashew in particular is emerging as one of Ghana's most important non-traditional exports.

Cashew is emerging as the fastest growing commercial tree-crop in the drier Savannah and transitional agro-climatic zones of the country and grown predominantly for the export market.

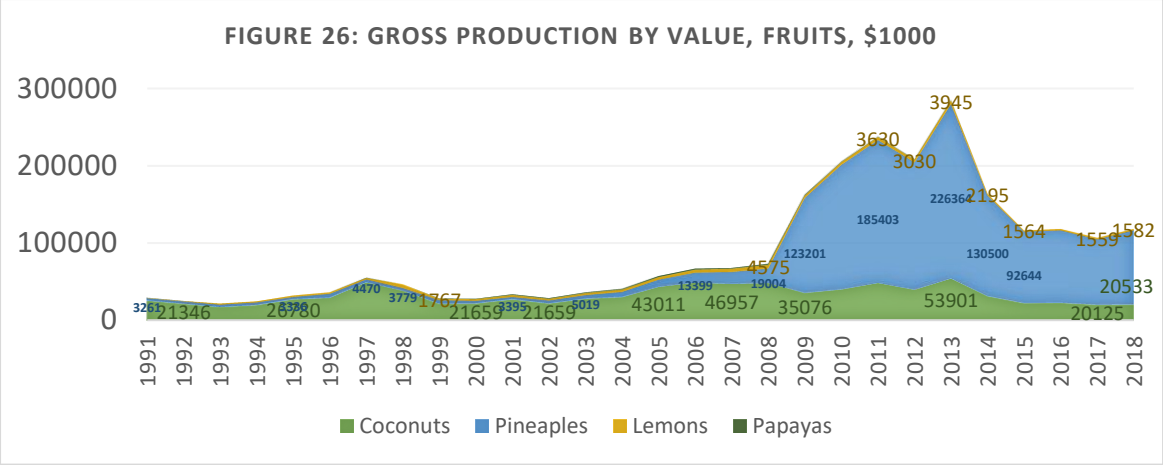
Groundnuts are a local staple and grown predominantly in the Savannah parts of the country and specifically the Upper-East and West regions and almost entirely by smallholder farmers. The production of groundnuts has been plagued by poor investment including poor seed varieties, lack of mechanised solutions especially for harvesting and total dependence on rain-fed farming as well as susceptibility to aflatoxins.

New seed varieties with high yielding potentials and resistance to aflatoxins have recently been launched by the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT). One of them, Nkatiesari, has 110 days of maturity with yield potential of 2.2 tonnes per hectares. Other varieties include Samnut22 with 115 to 120 days maturity and Yenyawoso, 85 to 90 days of maturity with a yield potential of 2.0 tonnes per hectares.

vi. Fruits

Ghana is not a major producer of fruits in the world. Pineapples are by far the largest fruit produced in Ghana by value. At its peak in 2013, production was valued at $220 million. This is followed by coconuts. At its peak, coconut production was worth more than $53 million annually.

Pineapple production was boosted in 1994 when sea-freight was introduced. This led a 172% growth in exports, increasing Ghana's market share in Europe from 7 – 8% in 1999, to 10% in 2004 with an annual volume of 71,000. In 2011 the value of exports of fresh pineapples amounted to US$20 million.



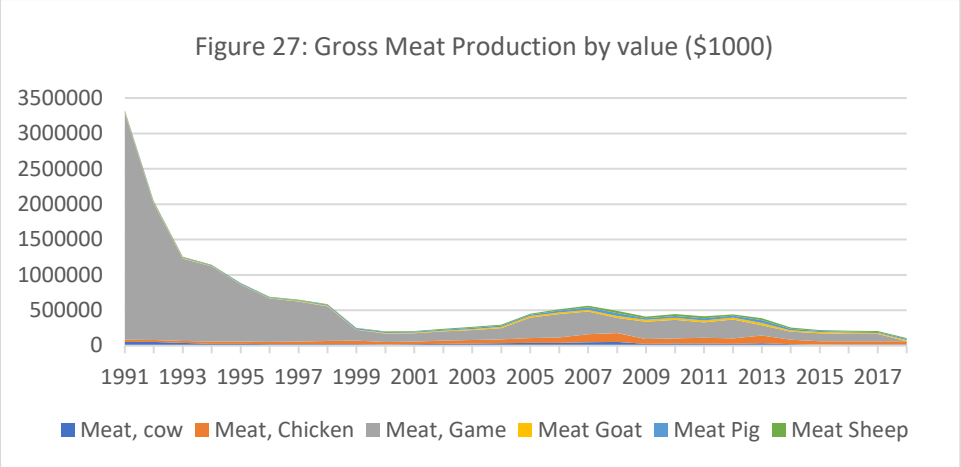
Source: FAOstats, November 2021

vii. Meat Production and consumption

Of the 96,329 livestock holders who produce meat in Ghana, 45,265 rear ruminants and 44,908 rear poultry, representing a total of 93.6%. There were 6,735 holders producing milk and 63,113 producing eggs (GSS, 2020).

A total of 210,598.5 mts of meat was produced by livestock holders in 2017/2018 with about the same proportions for both holders in urban (50.1%) and rural (49.9%) areas. Milk, though small relative to demand, is almost exclusively (99.8%) produced in rural areas. About two-thirds (66.4%) of the total production of eggs (29,550,479 crates) was from holders in urban areas.

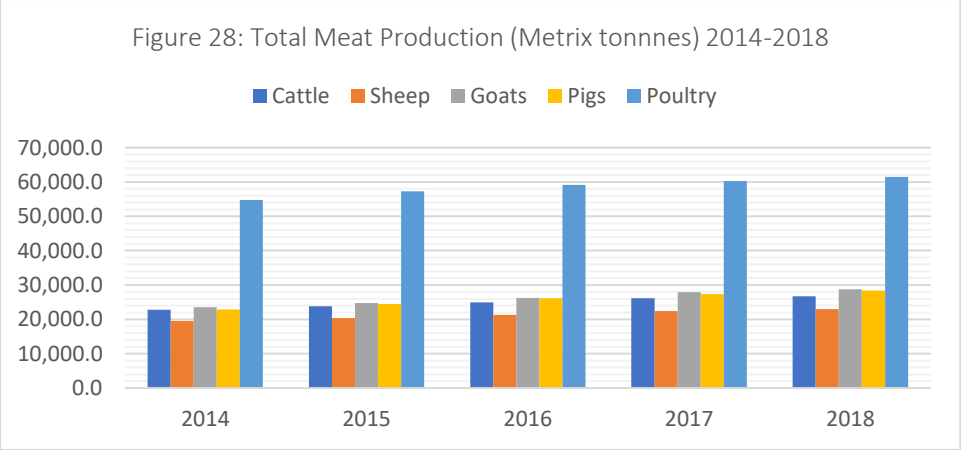
The largest source of locally produced meat in Ghana is game (wild life) to FAO data (FA)stats, November 2021). In the 1991, game meat constituted well over 90% of meat consumed and valued at over $400 million. Although game has declined in importance since then, it is still (2018) the largest source of meat, doubling the value of locally produced chicken and about six times locally produced cattle meat. Livestock and poultry meat contribute 40% of the total animal protein consumption in Ghana with the rest coming from fish.



Source: FAOstats, November 2021

Livestock contributes 5% to Ghana's agricultural production. 74% of the agricultural households are engaged in livestock rearing alongside crop farming. Only 4.9% of the agricultural households are engaged in only livestock production (MoFA, 2008).

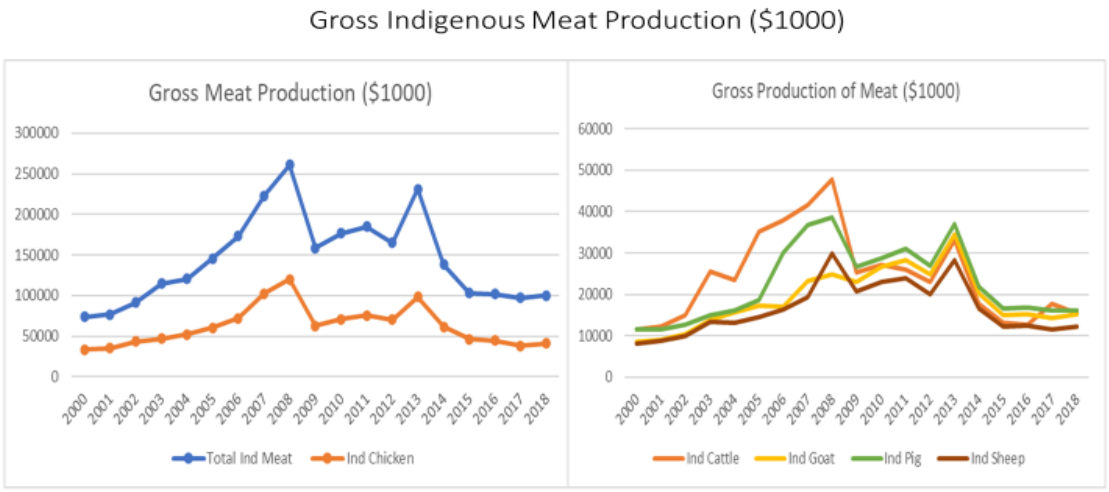
Chicken is the largest farmed meat source in Ghana by value followed by cattle. Poultry production currently averages 76 million birds per annum. In 2018, 13 million goats and sheep were produced according to the Veterinary Directorate of MOFA



Source: GSS Agristatistics, MOFA GSRID).

Compared to the 1990s, meat production has fallen quite sharply. Although production recovered somewhat, it began to decline once again since 2006.

Figure 29: Indigenous Meat production (US1000)



Source: FAOStats, June 2021

The rearing of large animals (cattle) and small ruminants (goats and others) is largely undertaken on a small scale and in the form of free-range, with the rearing of cattle increasingly dominated by pastoralists. Urban cattle farming is also prevalent.

The vast majority of poultry producers (95%) are small-to- medium scale farmers. Over 90% of poultry birds produced in Ghana are layer birds (Mariska Lammers and Thierry van Helden, FAO 2015). Indigenous birds such as traditional chickens and guinea fowls are raised free-range and by small farmers. According to the Ghana 2017 Poultry Report, broiler meat production is modest supplying less than 25% of demand. The production of layer birds for table eggs has been growing in recent times, taking advantage of growing per capita incomes and urbanisation.

Productivity in poultry production, except free-range chicken, is generally low due to the high cost of inputs which are mainly imported feeds and drugs. The sector faces many challenges. Slaughtering and processing facilities are limited and concentrated mostly in the Greater Accra and Ashanti Regions – the two largest cities; feed production is focused on layer feed and faces high input costs mainly maize and fishmeal; Commercial feed millers are few and capacity limited (1000 MT per day) with only 40-50% of capacity actually in use; Day-old chicks (DOC) and hatching eggs are mainly imported from the European Union, USA and Brazil; significant quantities of veterinary drugs are also imported by a handful of mainly foreign companies.

However, domestic production of livestock has potential to grow. It has a fairly well organised value-chain. Key associations such as the Ghana Cooperative Butchers and Small-Scale Livestock Owners Association (GCBSSLOA) and the Poultry Farmers Association of Ghana provide platforms for policy advocacy and for pooling resources. The viability of the sector

lies strongly in addressing the constraints of feed including increasing the of maize among others.

Some stakeholders interviewed believe that Ghana is unlikely to be competitive in either bovine or poultry meat production because of (a) limited economies of scale (b) inconsistent and unsupportive trade policies. For example, the Government of Ghana has slashed tariffs on meat imports, including chicken meat, a policy that will encourage further growth in imports (c) processing, packaging and refrigeration capacities are limited.

viii. Milk and dairy production and consumption

Ghana does not produce fresh milk in any appreciable quantity. Dairy cattle are rare. Instead, Ghana depends heavily on importation of powdered and packaged milk to meet is consumption needs.

The most commonly consumed products are condensed and sweetened condensed milk, much of it made from imported ingredients. Packaged fresh milk is beginning to penetrate the market. Local production of milk, mainly by nomadic herdsmen from cattle reared predominantly for meat, is processed into indigenous food products such as soft cheese. Direct employment in the dairy sector, estimated as 1.7 to 10.0 per 100 litres of milk traded daily comes largely from handling of imports and milk processing by 500 or so milk processors based in Accra and Kumasi, producing canned milk, recombining, reconstituting milk powder and re-packing imported milk products and the production of yoghurt. (MOFA, 2016. Ghana Livestock Development Policy and Strategy)

6.2. Yield

Yields are generally low even in comparison with developing country averages and in spite of input subsidies. Compared to 2012 yields for all food staples in 2015 fell below 50% of their potential with the exception of cow peas, sorghum and soybean. Whilst yields declined, total production, of maize for example, increased suggesting that more land was put into the cultivation. The highest yields have been achieved in horticultural crops, particularly pineapples, garden eggs and pepper.

Land and labor productivity, while increasing in recent years are still well below global benchmarks (OECD/SWAC, 2013).

Table 6: Yields of major Staples

	Yield under rain-fed farming (2015)		
	Av Yield on Farm (MT/ha)	Potential Yield (Mt/ha)	Achieved (%)
Cassava	18.78	45	41.73
Plantain	10.9	38	28.68
Yam	16.96	52	32.62
Maize	1.92	5.5	34.91

Rice (Paddy)	2.75	6	45.83
Cowpea	1.25	2.5	50
Soya bean	1.65	3	55
Groundnut	1.65	3.5	47.14
Cocoa	0.5	1	50
Pineapple	61.8	72	85.83
Pawpaw	34.5	75	46
Sorghum	1.1	2	55
Garden eggs	7.9	15	52.67
Pepper	15	30	50

Source: MOFA (Oct 2016) AGRICULTRE IN GHANA: FACTS AND FIGURES.

However high yields have been recorded in some crops in major growing region such as sorghum (100% of potential), cow pea (80% of potential) and soy bean (80% of potential) – MOFA SRID, 2019

7. Irrigation

One of the biggest constraints to agricultural productivity growth is limited irrigation. According to the Census of Agriculture (GSS 2016) only 6.1% of arable crop holders use irrigation in cultivating crops. The type of arable crops for which the use of irrigation is more common are non-leafy vegetables (31.4%), leafy vegetables (25.2%) and industrial crops (19.7%). Under mono-cropping, the type of crops for which more than one third of holders use irrigation are leafy vegetables (37.6%) and non-leafy vegetables (37.0%). In the case of mixed-cropping, more than one-quarter of holders in industrial crops (29.5%) and non-leafy vegetables (26.5%) use irrigation.

The FAO estimates that Ghana's potential irrigable land amounts to 1.9 million hectares. This potential, however, remains largely undeveloped. Only 1.6 percent, or 31 000 hectares, is under fully controlled irrigation – one of the lowest percentages in Africa. However, if informal irrigation is added, the total area under some form of irrigation in 2018 was about 223,000 ha (MOFA, 2019).

Although Ghana has an abundance of water from rainfall, this resource is very unevenly distributed, both geographically and seasonally. Irrigation is needed to ensure crops have water during the long dry season.

If well managed, Ghana's surface water and groundwater systems are able to meet most domestic consumption and irrigation needs. But the lack of installed water infrastructure posses a serious constraint to irrigation development (FAO, 2014, Irrigation market brief). A recent government policy of One Village One Dam (1V1D) is meant to develop water infrastructure for agriculture among others. Unfortunately, the few being constructed can hard hold water enough for livestock in the dry season.

8. Warehousing and cold storage

Data on private warehousing is hard to find although it is obvious that most storage facilities are privately owned. Indeed, traditional forms of storage and warehousing predominate.

There is also limited data on cold storage infrastructure. The Ministry of Food and Agriculture however reports that governments constructed warehouses at various stages of completion and use increased from 27 in 2017 to 160 in 2019. This expansion increased warehousing capacity from 34,000 metric tons in 2017 to 160,000 Mts in 2019.

9. Staples Production and Demand Balance

In terms of the balance between production and demand (table 7 below), demand outstrips local production for almost all grains crops, except millet and to some extent maize. Rice records the biggest deficit, exceeding 500,000 Mt since 2015 in spite of the increased policy attention. Tubers such as cassava and yam and forest products such as plantain and cocoyam achieve a positive balance. Cassava records the biggest surplus (about 9 million MTs), followed by yam, (3 million MTs) and plantain (over 1 million MTs). Ghana produces sufficient roots and tubers to satisfy its domestic demand.

Table 7: Consumption/production balance

Staple Crop Deficit/Surplus (SRID 2017)

Table 1. 2: Deficit/Surplus of Selected Staple Crops (MT)

Crops	Deficit/Surplus (MT)						
	2011	2012	2013	2014	2015	2016	2017
Maize	90,359	230,070	45,784	21,069	-61,007	-68,537	87,012
Rice (Milled)	-354,205	-540,280	-503,875	-497,515	-608,602	-577,977	-580,300
Millet	35,762	26,775	2,814	-88	-5,904	-3,197	-1,508
Sorghum	125,497	114,035	91,210	90,115	85,692	58,214	96,677
Cassava	6,169,042	6,221,456	7,151,811	7,431,688	7,681,605	8,130,414	8,969,099
Yam	1,930,112	2,072,344	2,355,910	2,314,737	2,266,545	2,413,745	2,982,777
Cocoyam	240,663	170,353	141,199	152,304	93,602	144,209	159,663
Plantain	969,579	825,877	882,737	924,762	937,416	999,816	1,181,490
Groundnuts	133,121	116,630	50,773	59,137	32,723	43,543	46,516
Cowpea	79,115	60,215	38,194	35,759	30,004	33,879	34,966
Soyabean	90,134	77,133	65,012	66,163	63,880	65,117	87,004

Source: SRID, 2017

For several of the food products with the most dynamic market demand – meat, fish, dairy, rice, vegetable oils and sugar – demand has also outpaced production.

The demand and domestic production gap are filled largely by imports. For example, Ghana does not produce dairy and sugar in commercial quantities. Production deficits combined with large post-harvest losses as well as changing consumer demand has fueled a sharp rise in imports for food staples and industrial inputs. See table 8 below.

Table 8: Imports and production losses of selected crops (1000 MT)

	1990	1995	2000	2005	2013
Wheat	196	133	292	421	407
Rice	126	116	172	482	656
Maize (feed)	320	470	459	563	795
Sugar	110	110	140	140	145

Tomatoes	1	18	44	122	371
Palm oil	8	3	23	141	165
Fruits	0	0	8	34	255
Production Losses					
Vegetables	29	26	33	32	23
Yam	155	320	500	720	1123

Source: FAOstats

Ghana spends substantial sums of money in cereal imports annually. In 2017, cereal imports amounted to US$ 715 million, with rice taking over $400million and wheat over US$230 million, according to the FAO. Maize imports were modest, US$14 million mainly for animal feed. As Table 8 above indicates maize production has recently overtaken demand.

Imports of food commodities that make up the bulk of Ghana's current food import basket are forecast to rise in the future. Rice imports will increase marginally by 2025 sugar imports will more than double and what will be about 80% bigger.

Table 9. Net imports Vs Forecast Imports

	Net imports 000MT) (Average 2010-2012)	Forecast, 2025 (000 MTs)
Rice (paddy)	450	500
Wheat	390	700
Sugar	250	610
Palm-oil	210	210
Maize	50	-180

Source: FAOStas, 2012.

10. Trade and the food system

Ghana is a moderately open economy with trade (imports and exports) exceeding 40% of GDP. Most of its trading relationships are outside of the African continent, with China emerging as the largest partner followed by the United States. The share of regional trade is currently small although the West African region (ECOWAS) is emerging as a thriving market for the food system.

10.1 Regional Trade

The West African food economy, which is about 36% of regional GDP and valued in 2010 to be about US$178bn, has grown more than 5-fold since 1960 (OECD, 2016). With more people living in urban areas, the market has replaced own-production as the principal source of food. It is estimated that between two-thirds and three-quarters of all food (in value terms) consumed in West Africa, including Ghana, now passes through markets (Reardon et al. (2015). The size of this market is expected to grow even bigger in the future as the 350 million strong population is expected to nearly double by 2040 and most countries in the region will be Lower-Middle Income will higher disposable incomes (African Futures, 2015).

Moreover, these markets are increasingly integrated, albeit not so smoothly, driven by both the ECOWAS integration agenda and the African Single market. Regional totals are heavily influenced by the performance of Nigeria, which produces 50% or more of the ECOWAS volume of many agricultural products. Ghana's share of the regional food market is less than 9%.

Forty percent of value addition in the food economy in the West African region is generated by non-agricultural activities, notably, down-stream processing, transport and logistics (OECD, 2016). These "post-harvest" activities are expected in the coming years to grow more quickly than production-related activities of the food system.

The West African market is a net-importer of cereals (rice, wheat, maize and pulses), sugar, dairy and processed food from the rest of the world. The demand for these food commodities is income elastic, opening up production opportunities for farmers in the region. Following the emphasis that the CAADP programmes put on the production of basic staples, rice and maize production has increased over the years but in the case of rice, not sufficient to meet regional demand. Nigeria has taken the extra-ordinary step of closing its rice market to imports. The production of perishables and vegetable oils, for which demand was growing rapidly, has however increased much more slowly (or in some cases declined), but with substantial variation between Nigeria and the rest of the ECOWAS zone.

Like Ghana, yields across the region are well below global benchmarks. For example, yield growth has accounted for only 16% of the growth in agricultural production in West Africa since the mid 1980's. Intensification has been largely confined to horticultural and livestock production in peri-urban areas, irrigated rice in some areas and a few export crops.

Also similar to Ghana, the ECOWAS market is also fast urbanizing driving new food habits across the region. Increased demand and new food consumption habits are creating new markets and new opportunities for production, diversification and processing. To maximize impacts requires, in particular, a re-evaluation of the commodity value chains that are deemed strategic.

An effective supply chain requires that producers and other stakeholders meet more stringent quality standards, particularly in terms of food safety. Standards and norms play a fundamental role in sharing information about products and production, processing and

transport conditions. The coordination of food standards in the West African market is at best poor.

Transportation, storage and communication infrastructures that facilitate mobility and trade help shape markets and trade networks. Road infrastructure plays a special structuring role in the organization of trade, connecting production areas, and improving access to agricultural inputs and markets. Whilst the regional road network is improving, the Ghana-side of the network is plagued by congestion and broken roads.

Ghana is a net-importer of food commodities in the regional market. She exports mostly re-exported processed and packaged dairy products as well as sugar, vegetable oils, eggs, and roots and tubers mainly to Sahelian countries and imports vegetables, live animals, groundnuts and cowpea. Ghana's agro-climatic conditions could make Ghana regionally competitive in a variety of food commodities and the relative availability of energy resources could favor the export of processed products.

Ghana's production and trade expansion potential are constrained by poorly developed irrigation systems, poor access by farmers to credit, low yield and poor infrastructure, among others. The trade expansion potential is constrained by low yield, by non-tariff barriers (including corruption and delay on regional trade routes and by trade policies that privilege imports (FAO, 2015).

***Child labour in the West African market*:** Child Labour is a common feature in the West African food system and is pervasive in the fishing industry and cocoa sector. A US Department of Labour assessment of child labour in the cocoa sector in Ghana and Cote d'Ivoire (Assessing Progress in Reducing Child Labor in Cocoa-growing areas of Cote d'Ivoire and Ghana – US Dept of Labor – Dec 2015-Nov 2019) estimated that over 2.1 million children were engaged in child labor in the cocoa sector of the two countries in 2013-2014. Nearly all of these children were engaged in hazardous work.

In response, representatives from the International Chocolate and Cocoa Industry (Industry) signed the Harkin-Engel Protocol to address the issue in 2001 whilst the Governments of Côte d'Ivoire and Ghana, USDOL, and Industry signed the Declaration of Joint Action to Support Implementation of the Harkin-Engel Protocol in 2010. Child trafficking and child slavery on the Volta River Basin is also in the spotlight. Artisanal fisherfolk operate across national borders all across the West Africa coast. Regional collaboration and joint monitoring is necessary to address these matters.

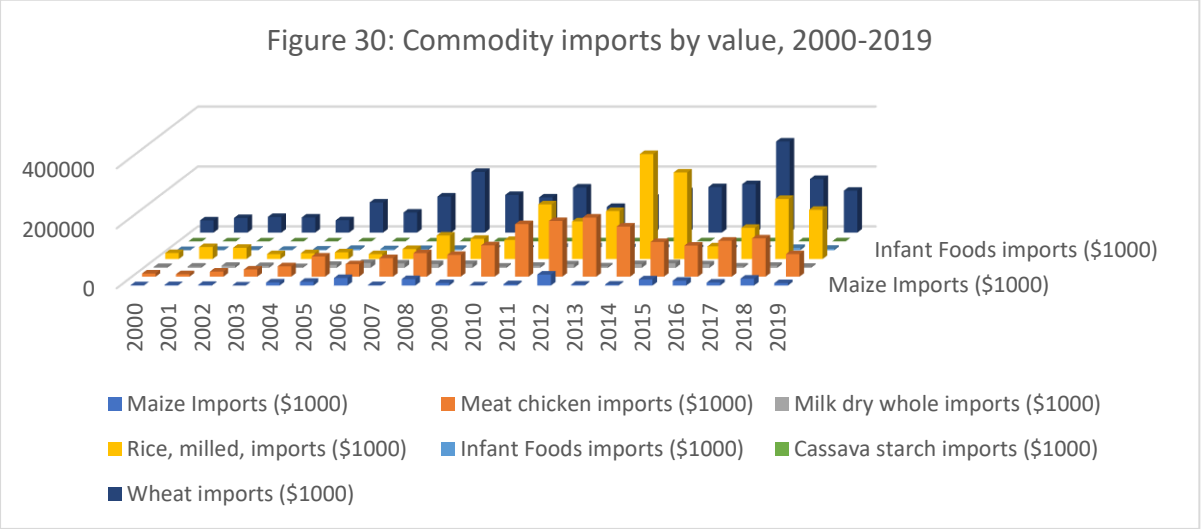
10.2 Food trade with the rest of the world.

Ghana's demand for food commodities exceeds its production in almost all cases. Ghana is a net importer. It also imports more than it exports, meaning it is also in food trade deficit.

(i) Imports

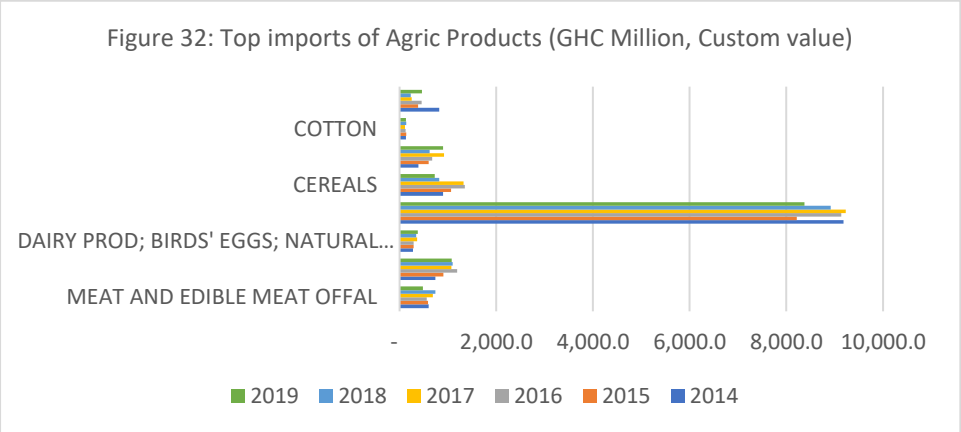
The largest imports by value are wheat, milled rice and chicken meat in that order. Imports of wheat and chicken meat began to rise from 2006 and milled rice from 2011 or so. At its

peak annual rice imports exceeded $350 million, followed closely by wheat ($300 million) and chicken meat ($197 million). Annual food imports average $1billion.



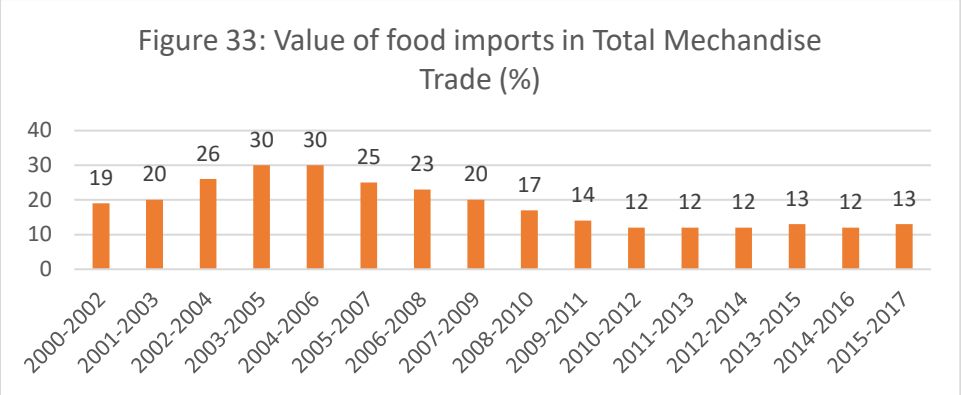
Source: FAO stats, November 2021

Food imports have declined in recent times. In 2019, importation of rice fell to $164m from over $350 million in 2014 whilst that of wheat was a little more than $140 million from 0ver $300 million a year earlier. This decline in rice imports may be on account of a modest recovery in production. Other significant imports include fish, crustacean and molluscs averaging US$200million, meat and meat products averaging $140million and fertilizer, averaging $180 million per annum.



Source: MOFA, 2016

Food import as a percentage of merchandised trade peaked in 2004/06, amounting to 30% on average. It has since falling conssitently and currenly averaged 13%.



Source: FAOStats, 2018

(ii) **Net food imports:** Ghana's net imports are expected to grow strongly in food commodities in which the West African market does not produce in adequate quantities.

Table 10: Net imports Vs Forecast Imports (selected items)

	Net imports 000T) (Average 2010-2012)	Forecast, 2025 (000 Tons)
Rice (paddy)	450	500
Wheat	390	700
Sugar	250	610
Palm-oil	210	210
Maize	50	-180

Source: FAOStats, 2018.

This may explain why Ghana's trade policy appears to be oriented more towards the global markets than the West African one, and some policies (such as the ban on rice exports across land borders and very low import tariffs for rice and poultry) directly undermine regional trade prospects.

(iii) **Imports of Vegetable**

In 2017, Ghana imported the equivalent of US$14.9, of onions, shallots, garlic, tomatoes and chillies mainly from Niger, Burkina Faso, China and Belgium and exported only $3million worth.

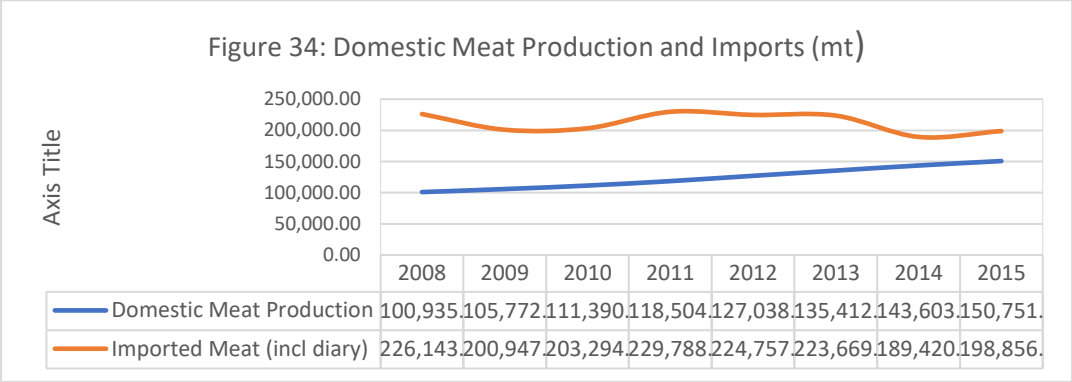
(iv) Meat imports

The estimated per capita consumption of poultry products in Ghana increased by 33 percent from 4 kg meat in 2010 to 6.6 kg in 2012. This demand is likely to have increased further with

the increase in per capita incomes. The demand is only partially met by domestic production and the rest by imports.

Livestock production however is unable to meet domestic demand in spite of increased production, necessitating the importation of meat and live animals.

Meat production and Imports



Source: Statistics, Research and Information Directorate (SRID), MoFA – November, 2015

To meet the demand for poultry there has been a steady increase in the importation of poultry into the country. In 2013 alone, imports of poultry products amounted to US$169.2 million.
Total imports of all meats from averaged $106million annually between 2014-2018, according to MOFA. More than half of all meat imports is poultry.

Table 11: Key Imports 5-year average – 2011-2015

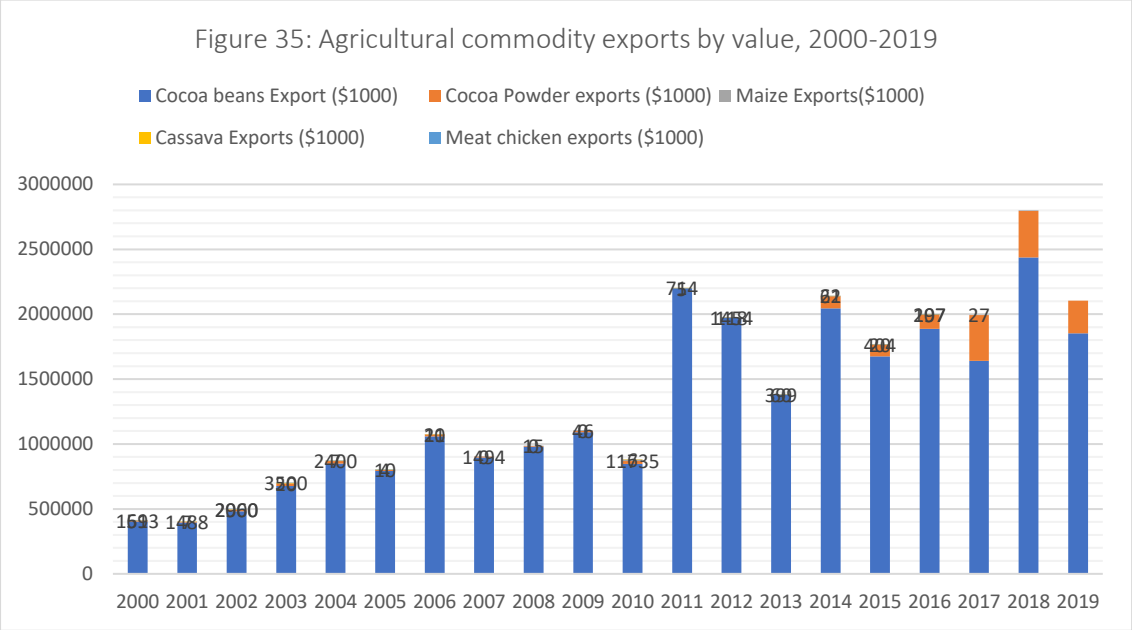
Meat Product	Quantity imported (mt)	Share of Total Meat Products (%)
Bovine (mostly beef)	15,800	14.41
Poultry (mostly chicken meat)	58,007	52.88
Mutton	2, 743.18	2.50
Pork	1, 685.99	1.54
Milk (mostly powder)	31,442.72	28.67
TOTAL	109,678.89	100

Source: Veterinary Services Directorate, MOFA, 2017

Life animal imports have also increased significantly. From 3,996 animals imported in 2008, the number increased more than 20-fold to 75,148 in 2014 and further to over 200,000 in 2018, according to the Ministry of Food and Agriculture.

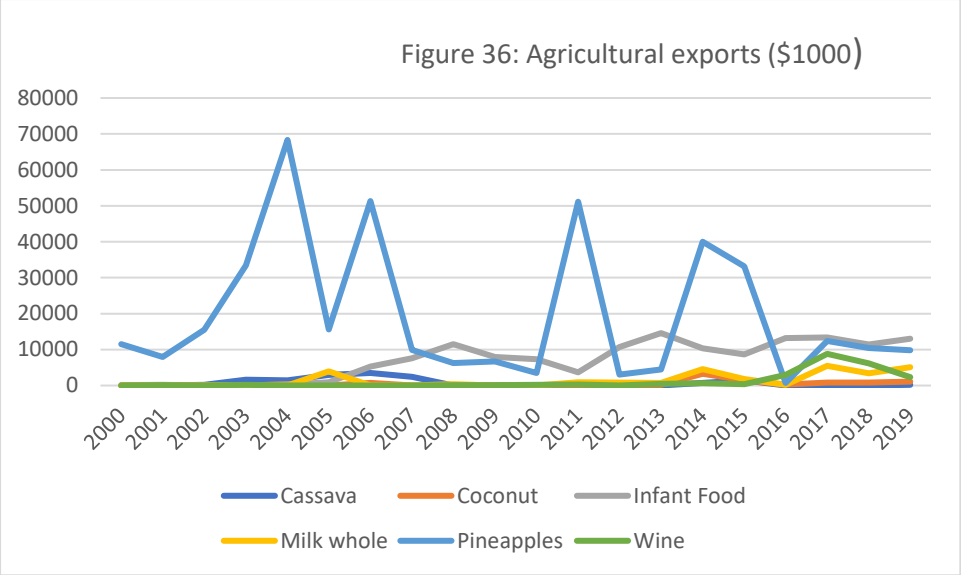
(iii) Exports

Ghana is not a major food exporter. Ghana's agricultural commodity exports are almost entirely cocoa and cocoa products. Other tree crop products like palm oil and shea beans are small in comparison. Ghana hardly exports any grain and only modest amounts of fruits and nuts – the so-called non-traditional exports. Cocoa beans and cocoa powder are the dominant agricultural commodities exported from Ghana to the rest of the world.



Source: FAOstats, November 2021

In 2018, whilst the exports of coco and cocoa products earned nearly $2.8 billion, to total for six agro-products (which include the re-export of imported Products), - cassava, coconut, infant food, milk whole, wine and pineapples earned a mere $32 million (FA) stats). Cassava exports that showed promise between 2001 -2013 has declined in importance as an export crop.



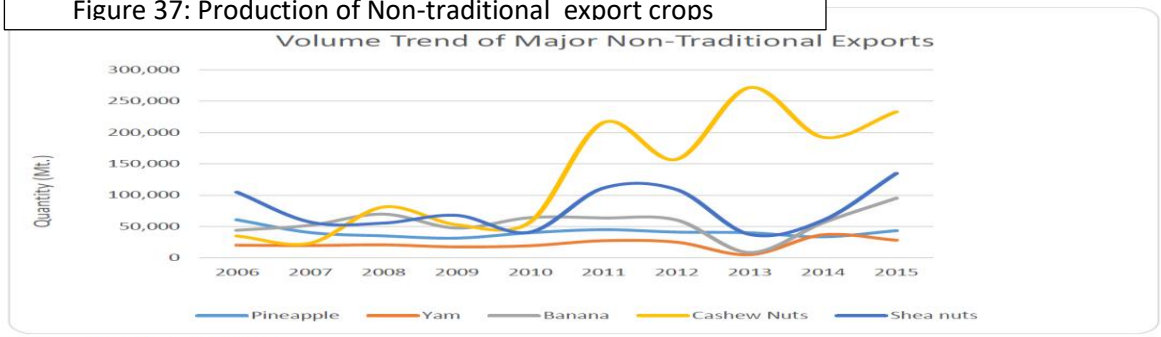
Source: FAOstats, Novenber 2021

Pineapples and bananas have emerged as Ghana's largest exported fruits. Firms began exporting by air the Smooth Cayenne (SC) variety of fresh pineapple to Europe in the mid-1980s, relying predominantly on smallholder farmers who contributed about 50% of export volumes. Since 2004 with shifts in consumer tastes in Europe going against the SC variety, the market began to be highly concentrated and most small farmers unable to adapt to the new variety dropped out of production. In 2018, about 30 companies, including 14 large scale companies in nucleus farms dominate the pineapple industry and the number of small farmers has dwindled to about 200 still producing the Smooth Cayenne variety but at very low volumes.

(v) **Non-traditional export:**

Banana Exports: Banana, is arguably the single most important non-traditional export crop in Ghana. In 2018 it employed over 5,000 employees directly. Production and export of banana from Ghana was started by the Volta River Estates – a Dutch-owned company - in 1994. The Golden Exotics variety is by far the biggest brand in the production and exports of bananas although small-holder producers dominate the local consumer market and are also beginning to plant the Golden Exotics variety. Banana exports from Ghana has grown from about 3,000 tonnes per year in 2007 to over 70,000 tonnes in 2017, positioning the commodity as the third largest agricultural export, following cocoa and oil palm. Golden Exotics is planted as a mono-crop and therefore impact negatively on biodiversity.

Figure 37: Production of Non-traditional export crops



Source: Based on Table 8.7

Source: FAOstats. June 2018

Cashew: The production of cashew nuts has been growing steadily since 2010, peaking in 2013 well above 250,000 MTs and is produced mostly by small holder farmers based in the Bong Ahafo and Northern regions. In 2017, Ghana exported $310 million worth of cashew, mainly in shelled form

Fish Exports: Ghana has been exporting fish for a long time. Total fish exports peaked in 2003 with the value at USD 120 million but declined to $88 million by 2017. Export markets are mainly Iran, Italy, Thailand, China and Portugal. Like other sources of meat, domestic production falls far short of demand. Fish import are therefore rising and was three-times the value of exports in 2013.

11. Agro-processing

There is a generally a weak link between agriculture and industry. The manufacturing sector overall has grown slowly for decades since the early 2000s. At the same time the share of manufacturing in GDP has been stagnant or declined until very recently.

According to IFPRI study, (Kwaw Adams et al, 2015), Ghana's agro-processing industry is in its nascent stage, constituted by 97% micro- and small-scale and 3% medium-scale processing firms. This industry largely produces commodities for the local Ghanaian economy rather than for global export and heavily relies on the informal economy. Food processing in Ghana is dominated by predominantly small- and medium-scale firms which operate in the informal sector of Ghana,

Over the years, the processing industry has moved from completely traditional methods to semi-mechanized and then to fully mechanized methods. (WIDER, 2017/9). Although the agro-processing industry in Ghana is dominated by small and medium-scale players, it continues to play a significant role in the Ghanaian economy. According to the Ghana Export Promotion Authority, the industry grew at an average rate of 14.93% between 2008 and 2013 (GEPA 2014). A report from the United Nations Industrial Development Organization (UNIDO 2011) shows that within the manufacturing sector in Ghana, the agro-industry represents

more than half (54.6%) of total manufacturing value added. Specifically, the food and beverages sub-sector of the agro-processing industry accounted for about 32.5% of total manufacturing value added in 2003 (World Bank 2009).

A number of reasons explain the low uptake in agro-processing in the country. These include the lack of agro-processing facilities and modern equipment, which often results in significant agricultural yields going to waste; the high cost of equipment is another factor; low access to adequate packaging materials and limited marketing skills on the part of agro-processors.

Nevertheless, the past decade has witnessed an emergence of private sector enterprises specializing in food processing, with a growing number of formal medium to large enterprises. The small to medium enterprises constitute about 70% of agro-food processing in Ghana (Owusu-Kwarteng 2014). Large scale processing is dominated by a handful of foreign companies although Ghanaian owned fairly large processing companies are emerging.

Most processing activities involve nuts and oils, grains, roots and tubers, fruits and vegetables and cocoa and milk products as well as alcoholic and non-alcoholic beverages. An IPRI (2015) study highlights the following:

Processing of nuts and oil: The major nuts produced and processed in Ghana include palm nut, shea nut, ground nut, cashew and coconut. Palm oil and shea butter/oil are the predominantly processed nuts; these activities are typically carried out on small- and medium-scales in the country. The major nuts produced and processed in Ghana include palm nut, shea nut, ground nut, cashew and coconut. Palm oil and shea butter/oil are the predominantly processed nuts;

Processing of grains: In Ghana, processing of these grains is primarily undertaken by women using simple household equipment. Processing usually involves de-husking, roasting and milling into flour. The flour is further processed into different kinds of porridges, beverages, and other foods. Milling of the grains is usually done with mechanized locally fabricated grinders, which is an improvement from the use of stone grinders and pestle and mortar that were employed in the past.

In fairly recent times, grains have been processed on a medium to large scale using relatively more sophisticated technology. At the medium-scale level, grains are roasted and milled into flour and mixed with other legumes such as soya beans and groundnut and packaged for both domestic consumption and for export. On a large scale, grains are processed into grits and serve as raw materials for poultry farms and for giant brewery companies such as Guinness Ghana Brewery Limited and Accra Brewery Limited in the production of new beer varieties and other beverages. Also, grains in Ghana are processed into high-end infant cereals such as Cerelac, using state of the art food processing technology by renowned food processing companies such as Nestle.

Processing of roots and tuber: The processing of cassava in the past has predominantly been carried out by individual micro and small processors. These processors have relied on very rudimentary technology made from local materials. Some of the finished products include gari, *kokonte* (sun-dried cassava chips/flour), cassava dough (agbelima), tapioca, and starch, usually for local and domestic consumption.

The introduction of starchy high-quality cassava flour (HQCF), glucose syrups, and industrial alcohol (which served as potential cassava-based industrial raw material for the bakery, plywood, paperboard, pharmaceutical, confectionery and beverages industry in the mid-1990s) has seen the emergence of several medium and large-scale processing enterprises in the country (Dziedzoave 2008). Medium- and large-scale processing of cassava benefitted from the introduction of motorized cassava graters in the 1ate 1960s

Processing of fruits and fruit juices: Between the mid-1990s and 2002, Ghana depended on about four large fruit-processing companies that employed very expensive, capital-intensive and imported technology for fruit-juice processing in the country. The huge capital outlay required for fruit-juice processing therefore served as an entry barrier. During the same period, there was a proliferation of flavoured drinks through the use of syrups and these types of drinks required substantially less start-up capital. Due to the large number of producers of flavoured drinks, the Soft Drinks Manufacturers Association of Ghana was formed

12. Transport

A recent Business Establishment Survey estimated that the transport and storage sub-sector employs about 75,000 workers, about 2.2 % of all establishment employment. Road transport provide more than 95% of all transport services in Ghana.

Accessibility to markets is influenced by factors such as transportation and transaction costs. Efficient transportation linking farm-level production to cities and within the cities are essential for both farmland expansion and intensification to occur because farmers in these areas can sell their produce at lower transaction costs and reduce post-harvest losses.

The quality of Ghana's trunk and feeder roads are variable although feeder roads that lead to farms are generally unpaved and poor road transport is the major carrier in Ghana's land transport system, currently taking up about 98% of freight and 95% of passenger traffic.

Ghana's Integrated Transport Plan (2011-2015) identified congestion issues for the Central Corridor trunk road that links the north the south as ere is similar congestion on parts of the road that link the Tema and Takoradi ports. Congestion is expected to be even worse in 2035. The World Bank's Logistics Performance Index (LPI) which identifies opportunities and challenges that countries face in their trade logistics, ranks Ghana 100 out of 160 countries. A survey of Ghana's urban transport system found that fewer Ghanaians in 2012 (60.3%)

believe that the system is reliable compared to 2007 (77%). Those who perceive the system as totally unreliable increased three-fold from 8.6% in 2007 to 26% in 2012.

Poor, unreliable and expensive transportation and logistics combined with the urban sprawl raise transport cost of produce, increase commuting time and decrease the competitiveness of food produced from the hinterland, further privileging imports and processed and packaged food.

13. Drivers of the Food system

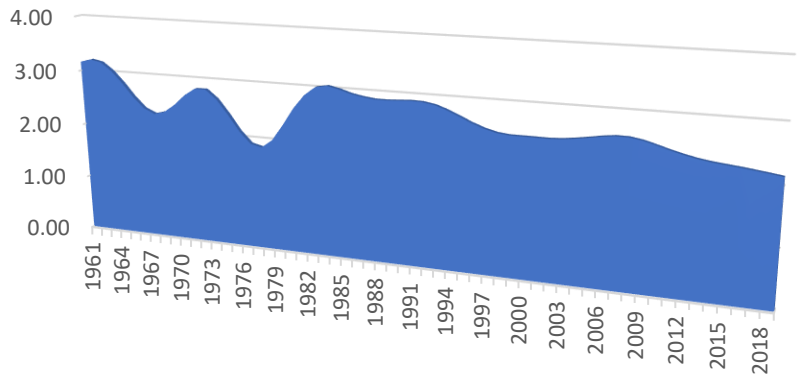
13.1 Population, urbanization and the Food system

i. Population growth:

Ghana's population is not only rapidly increasing, it is also rapidly urbanising, with the latter driven by both natural growth as well as migration.

The recent population and housing census (PHC) estimates Ghana's population as 30.79 million, a fraction less than the 31.07 projected by the World Population Prospects (2019) database of the United Nation. The census data showed that Ghana's population had grown 5-fold since 1960 and by 6.1 million people compared to the last census (2010), giving an intercessional growth rate of 2.1%, which less than the 2.5% of the previous intercessional period. At this rate Ghana's population will more than 50 million in 2050.

Figure 38: Population Growth Rate - Percent (1961-2019)



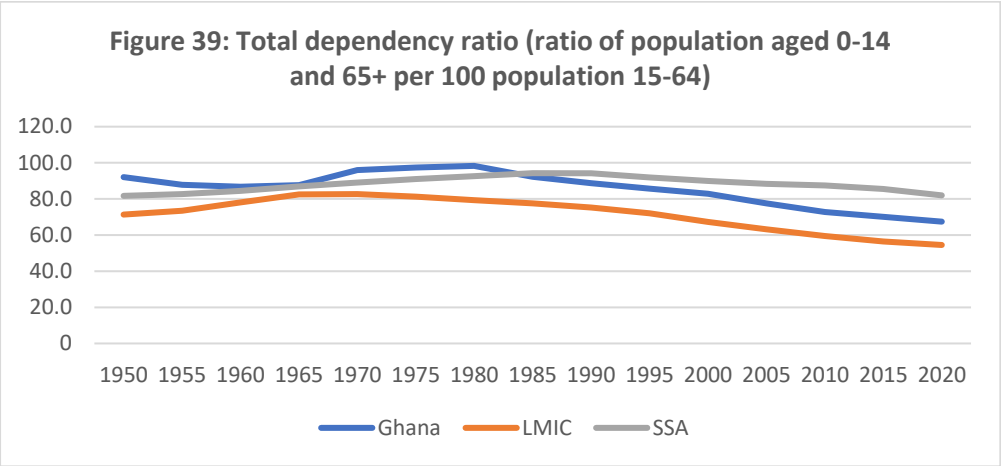
Source: World Bank (May 2021), World Development Indicators.

ii. Population structure

As per the 2021 PHC, the average household size of 3.6 persons represents a decline by 0.8 from the 2010 census.

The national population density of 129 persons per sq. km represents an increase of 26 persons per sq. km.

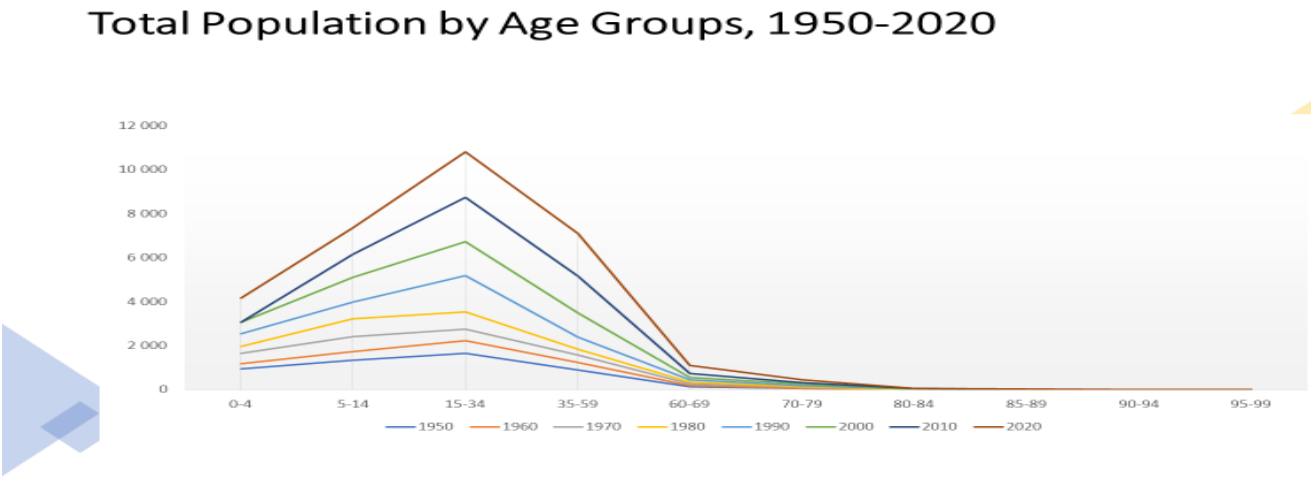
As per World Bank estimates (Figure 39 below) Ghana's dependency ration is 73%. This compares favourably with the average for Sub Saharan Africa but far higher than the average for Lower Middle-Income Countries (LMIC).



Source: World Bank, World Development Indicators, 2021

There are more females (50.7%) than males 49.3% of the population, giving a national sex ratio of 97 males for every 100 females. The population is increasingly youthful. As per projected population data, 57% of the population is 24 years or less. By 2040 this cohort will likely exceed 50% dropping below 30% only in 2065, more than forty years hence. If youth is defined as 14-34 years, the share of the youth population is close to 58%.

Figure 40: Population Pyramid

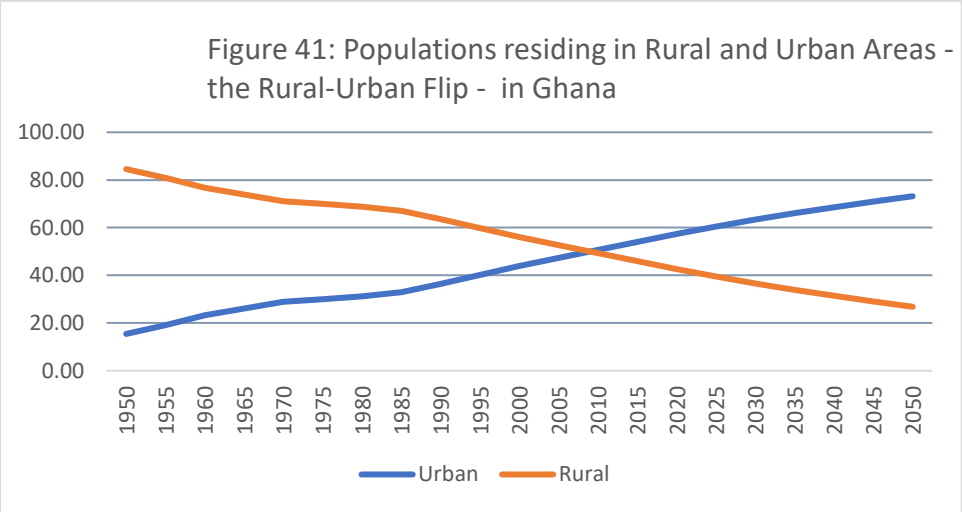


Source: UN Population Division, World Urbanization prospects, 2018

Life expectancy at birth is expected to increase steadily to 70 years in about 2055 at the current rate of economic and social development.

iii. Spatial distribution

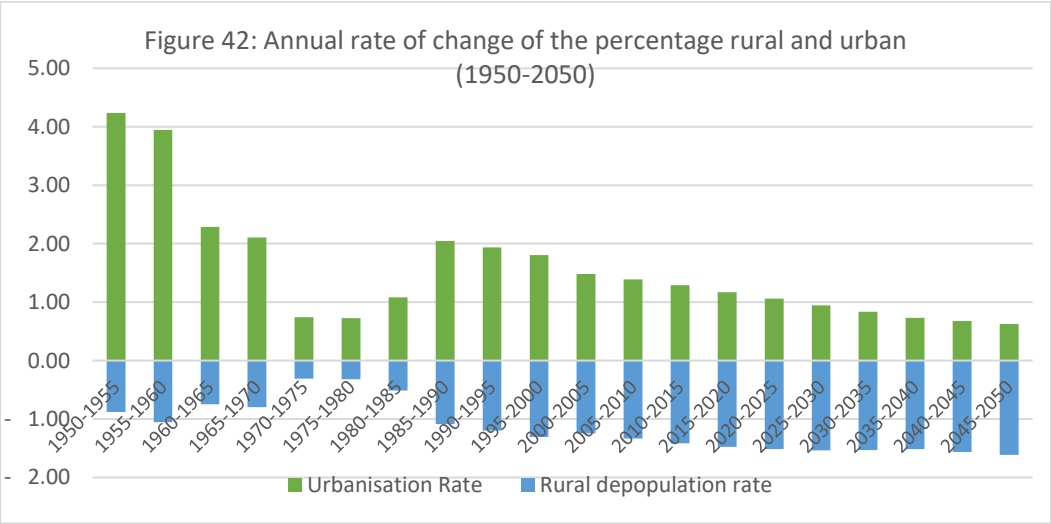
Ghana's population is rapidly urbanizing. In 1960, only 23% of Ghanaians were living in urban areas. This proportion doubled in 40 years and by 2016 was projected to exceed the 50% mark. About 14 million people now live in urban areas compared to 4 million three decades ago. At this rate, the urban -rural population balance could flip in 2035 with 70% residing in urban areas.



Source: UN, World Population Prospect, 2017 (revised)

The rising pace of urbanisation is driven by three factors: rural-urban migration, natural increases in towns and cities and the reclassification of villages as they attain the threshold population of 5,000 (Ghana Statistical Service, 2013: 223).

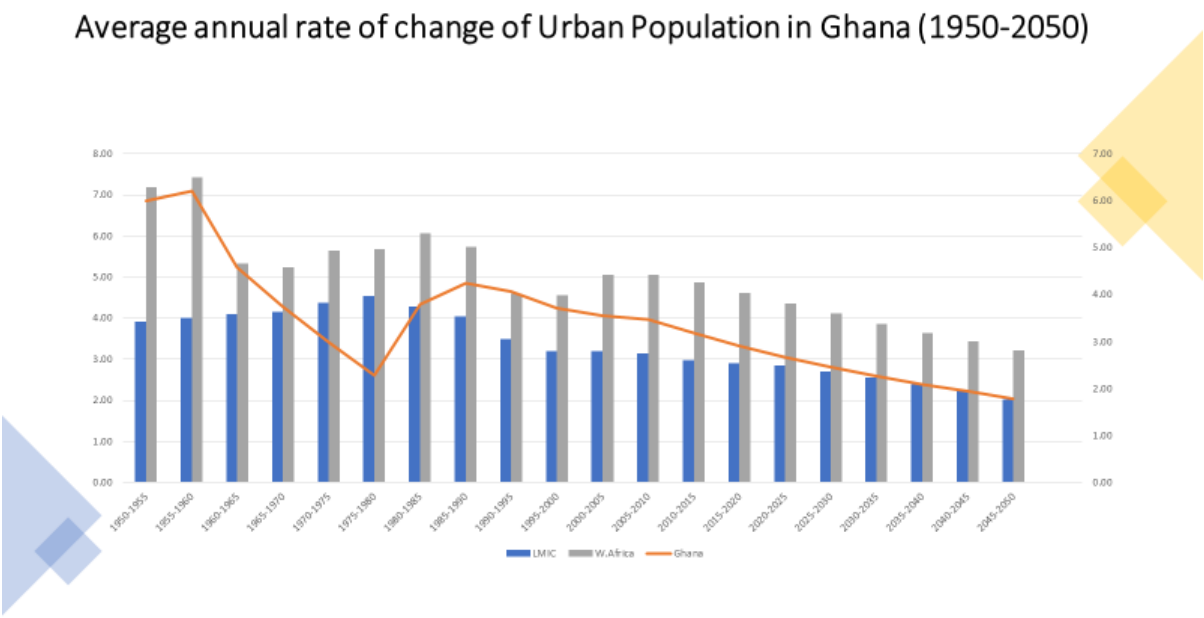
Prior to about 2005, the rural depopulation rate – the population shift from rural to urban driven largely by rural push factors and urban pull factors – exceeded the urbanisation rate – the growth of the urban population. This has since reversed – urban population growth is driven more by natural growth and urban to urban migration than merely rural to urban.



Source: World Population Prospects, 2018

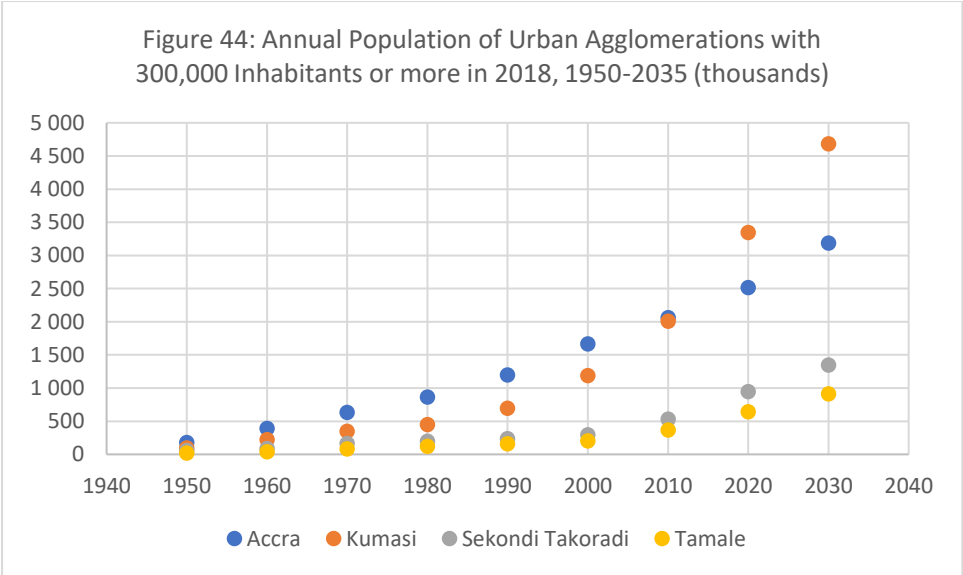
Ghana's urbanisation rate has slowed significant since the early 1990s. Although the annual rate of change of the urban population exceeds the average for LMICs, it has lagged behind the West African average, especially since the mid-1990.

Figure 43



Source: World Population Prospects, 2018

Also, the rate of urbanization across the geographic regions is uneven. The Greater Accra Region is 91% urbanized whilst the Upper West region is 16% urbanised. The 3 regions of Northern Ghana and the Savannah zone in general are the least urbanised, although Tamale, the largest urban centre in the north is urbanising faster than the national average.



Source: GSS (2020)

An important feature of the urbanization process is the increasing concentration of urban populations in two cities – Kumasi and Accra with Kumasi being the fastest growing city, and projected to overtake Accra as the most populous.

i. Migration and the food system

According the Labour Ford Survey (GSS, 2016), nearly 1 in 2 persons 15 years and older (47.3%) in Ghana had moved to their current location at some point in time and the proportion is similar to that reported in the 2010 Population and Housing Census. The report also shows that the proportion of migrants in urban areas (50.9%) is higher compared to their counterparts in the rural areas (43.3%). At the regional level, the Greater Accra region had the highest proportion of migrants (68.1%), followed by Western (52.2%), Brong Ahafo (51.7%) and Ashanti (49.2%) regions. The Upper East region had the lowest proportion of migrants (17.4%).

Migration currently accounts for more than 40% of the change in the urban population. In the period 1984 –2010, nearly four million people drifted from rural to urban areas. Females in the 15 - 34-year age group constituted the biggest number of urban migrants. For both men and women, the 35 -60 years group largely stayed put in in their rural communities. The percentage of the working population in the rural communities engaged in smallholder agriculture did not migrate. Most of the women who migrated to urban centres were engaged in retailing agricultural products.

Inter-regional migration has been uneven over the years resulting in net-Based on the 2010 population census, the Greater Accra region has been the biggest net recipient of migrants, taking more than 2.3 million people (60% of net migration) cumulatively from 1984-2010. Western Region comes a distant second. Volta Region lost the most people (a little over 1 million) whilst the drier northern part of Ghana put together supplied the most people to other regions., exceeding one million people.

The migration exodus from the net-losing regions began in 2000. Of the cereal producing regions only Brong Ahafo (the largest producers of maize) were net recipients of migration. It will seem that but for Brong Ahafo region, migration form the net-losing regions end up in the urban centres of the net-gainers. Intra-reginal migration also boosts the large urban centres of respective regions.

Table 12. Net gainers and losers in Inter-regional Migration (Net), based on 2010 Census

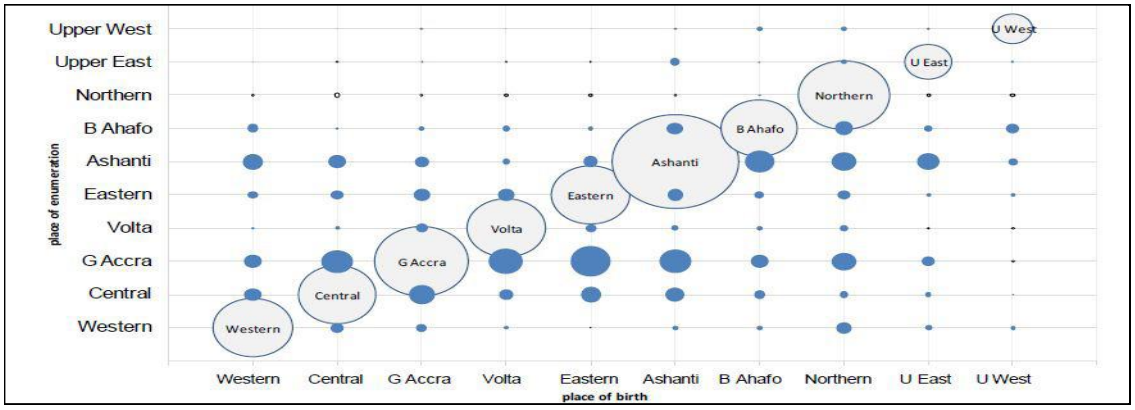
Region	1984	2000	2010	TOTAL, NET CHANGE (1984-2010)
Net Gainers				
Western	46,087	380,752	282,119	708,958
Greater Accra	153,154	90,1750	1,278,452	2,333,356
Brong-Ahafo	52,192	163, 740	117,884	170,076
Ashanti	-28,327	197,057	240,020	408,750

Net Losers				
Central	-77,874	-274,579	-238,015	-590,468
Volta	-97,192	-403,404	-535,671	-1,036,267
Eastern	-78,136	-224,386	-332,086	-634,608
Northern	+10,716	-139,216	-332,086	-460,586
Upper-East	-20,762	-201,532	-267,692	-489,986
Upper-West	-3083	-191,653	-209, 414	-194736

Source: GSS, Population Census, 1984, 2010.

Where do the migrants go to? The largest intra-regional migration takes place in the Ashanti region, followed by the Greater Accra and Northern Regions. In terms of movement between regions, most migrants from the Eastern Region go to Greater Accra. Those from Central Region also tend to move to Greater Accra. Migrants from Volta either go to Greater Accra or the Ashanti. Brong Ahafo's migrants mostly move to the Ashanti region; migrants from Western Region mostly go to Central and Greater Accra regions whilst populations from Northern Region mostly go to Ashanti, Greater Accra and Brong Ahafo. Upper-West migrants Region mostly end up in Brong Ahafo region. Upper East migrants mostly go to Ashanti. Migration from south to north is negligible.

Figure45. Regional Migration Patterns.



Source: NGSDF (2017): Estimated inter-regional migration from 2000-2010

ii. Implications of urbanization and migration for the future of the food system.

The rapid urbanization and migration patterns described above impact variously on the food system. Rising population density has been associated with changes in farm holding sizes. For example, in Kenya, Muyanga and Jayne (2014) found that both household landholding size and cultivated land decreased with population pressure. As noted earlier, between 1960 and 2010, population density in Ghana has increased, though rural population density has not changed much. However, the land-labor ratio has risen in rural Ghana (Diao et al., 2014), which may suggest that farm sizes have expanded instead.

According to the World Bank (2017) urban migration has led to a reallocation of labour to sectors with higher marginal productivity leading to structural transformation as reflected in the declining share of the primary sector to GDP. However, Ghana's lack of a vibrant industrial sector means that jobs are concentrated in low value-added informal services and small household farms. Indeed, the services sector (especially commerce) has become the largest contributor to Ghana's GDP while manufacturing employment has witnessed a decline. The growth areas in the services sector are government services, telecommunications and hospitality. Urbanisation has so far not ignited manufacturing, including agro-processing that would boost demand for farm level production according to the World Bank.

Nevertheless, as population growth and urbanization concentrate firms, people and networks in smaller spaces, it makes economies of scale more feasible. Small cities and towns interface with the rural economy and serve as a means by which farm-level output is transmitted to larger cities. The metropolitan areas are the main interface with global markets.

Accessibility to markets is influenced by factors such as transportation and transaction costs. Efficient transportation linking farm-level production to cities and within the cities are essential for both farmland expansion and intensification to occur because farmers in these areas can sell their produce at lower transaction costs and reduce post-harvest losses. The quality of Ghana's trunk and feeder roads are variable although feeder roads that lead to farms are generally unpaved and poor.

As noted earlier, Ghana's Integrated Transport Plan (2011-2015) identified congestion issues for the Central Corridor trunk road that links the north the south as ere is similar congestion on parts of the road that link the Tema and Takoradi ports. Congestion is expected to be even worse in 2035. The World Bank's Logistics Performance Index (LPI) which identifies opportunities and challenges that countries face in their trade logistics, ranks Ghana 100 out of 160 countries. A survey of Ghana's urban transport system found that fewer Ghanaians in 2012 (60.3%) believe that the system is reliable compared to 2007 (77%). Those who perceive the system as totally unreliable increased three-fold from 8.6% in 2007 to 26% in 2012.

Poor, unreliable and expensive transportation and logistics combined with the urban sprawl raise transport cost of produce, increase commuting time and decrease the competitiveness of food produced from the hinterland, further privileging imports and processed and packaged food.

Although urbanization has led to the increase in employment and incomes with a fast-expanding middle class, income disparities have also been widening. According to the African Development Bank (AfDB, 2011) the middle class comprises individuals or families earning more than USD 2/capita/day (in 2010 dollars). In 2010, Ghana's middle class, according to this definition was 47% of the population, most of them urban-based. Ghana's income disparities have also widened with the Gini coefficient worsening between 2012/13 and 2016/17 (GSS. 2018).

With more people living in urban areas, the market has replaced own-production as the principal source of food. It is estimated that between two-thirds and three-quarters of all food

(in value terms) consumed in West Africa, including Ghana, now passes through markets (Reardon et al. (2015). Moreover, these markets are increasingly international as reflected in rising food imports from the rest of the world.

13.2 . Environment, Climate, Natural Resources and the Food System.

The spatial distribution of agricultural production is largely determined by the 5 agro-climatic zones that Ghana is divided into and influenced by the limited role that irrigation plays in the sector. The rain forest zone to the South-West is the main producers of tree crops - cocoa, palm oil and coconut. The Coastal Savannah is the main source of rice, high value vegetables, fruits and fish. The Volta Region and the Accra Plains (largely Savannah terrains) lead in rice production followed by the Northern region. The deciduous forest zone in the middle belt leads in the production of maize, cassava, plantain, cocoyam. The transition zone leads in the production of maize and cashew. The Northern Savannah leads in the production of sorghum, millet, groundnuts and cowpea and shea nuts, and is second to the Volta Region as a main producer of rice. Commercial vegetable production takes place in irrigated valleys in the drier and water-rich parts of the country.

The availability of land for agriculture varies with agro-ecological zone. The Savannah ecological zone commands 62% of all agricultural land followed by the deciduous forest area (15%) and the rain forest (11%%, (MOFA, 2016). With rural population density lower in the northern Savannah in particular more land ca be put into the cultivation of dryland crops compared to forest crops. Whilst there is relative land abundance in the Savannah, suitable agricultural land is more scare in the coastal regions.

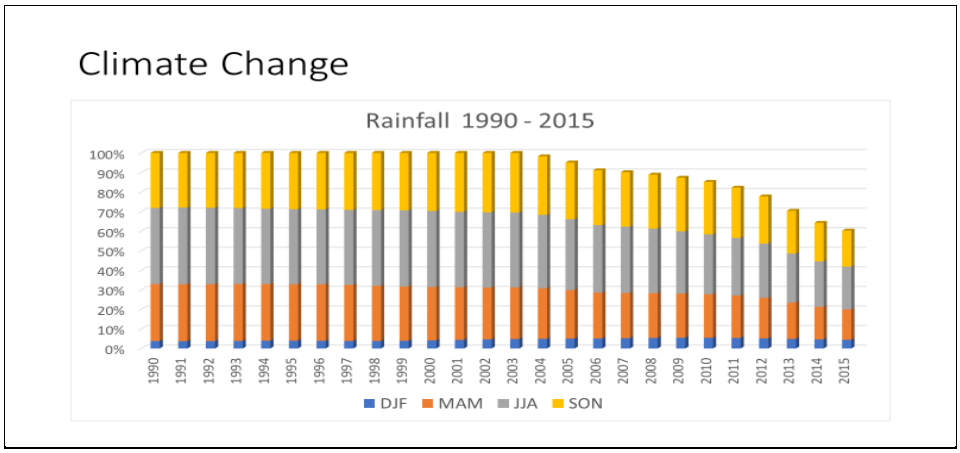
i. Climate and the Food system:

The heavy dependence on rainfall for agricultural production exposes the sector to risks associated with weather variability, inadequate or excessive rainfall. Annual agricultural output is tied heavily to rainfall. The northern Savannah, which houses most of Ghana's share of the Volta River basin experience regular extremes of floods and drought.

The volume of rainfall has been declining steadily since 2003. However, over the past 20 years to 2018, average rainfall has increased by 1.5%. Rainfall patterns vary widely across ecological zones and geographic regions. The Upper West region has experienced the steepest decline in average rainfall, averaging over 30% over a 30-year average and 4.4% over a 20-year average. The Central region on the other hand has experienced the biggest increase in rainfall, averaging 39% over 30 years. Rainfall in the Northern and Brong Ahafo regions have seen rainfall increase on average over the past 20-years.

Rainfall has also become progressively shorter during the critical months of crop production. Without shorter- maturing seed varieties, output will mostly likely decline. Climate models seem to suggest that in the long run, while the overall volume of rainfall may not decline, variability and extremes are likely (IWMI, 2015).

Figure 46: Rainfall trends



Source: Ghana Meteorological Services

Will climate change affect food production which is predominantly small-holder driven? On the negative side, climate change will likely reduce productivity and output due to the risk of extreme weather conditions and increased rainfall variability, drive up consumer prices of key staples due to uncertainties and reduce exports due to increased transaction costs impacting negatively on competitiveness. Imports will likely rise to substitute for lower domestic production. Some climate models back the proposition that climate change will reduce output and revenues compared to a non-climate change scenario. For example, the graphs below suggest that both revenues from and the value of aquaculture output will decline with climate change.

Figure 47 : Impact of climate on aquaculture revenues

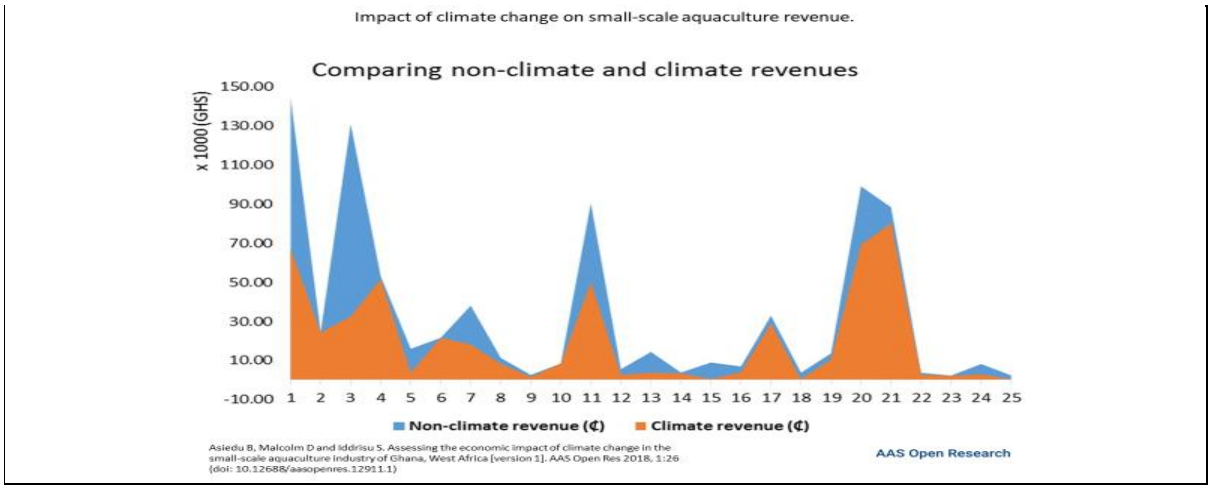
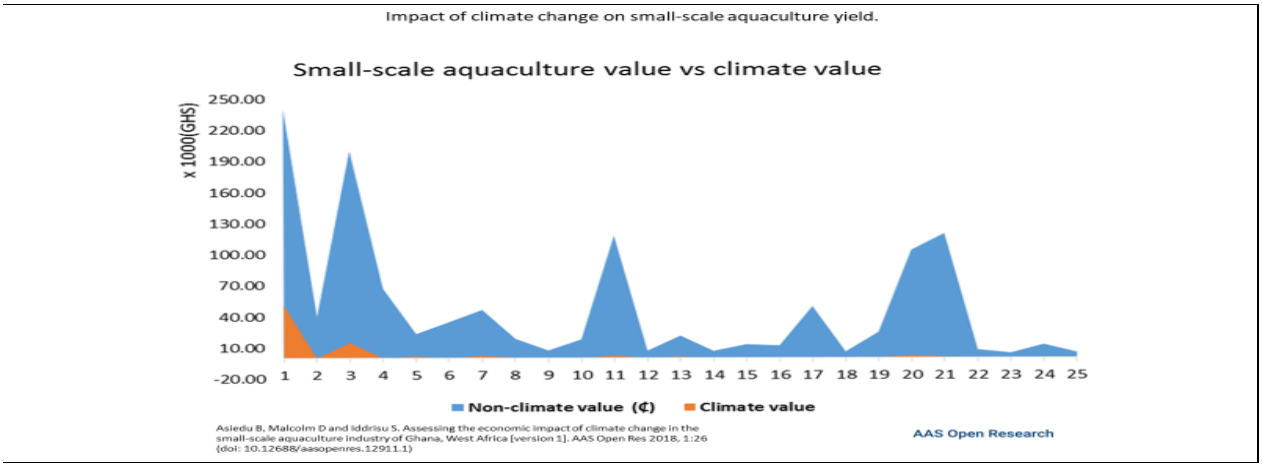


Figure 48. Impact of climate on aquaculture output



Source: WRI CAIT 2.0, 2015 and FAOSTAT, 2015

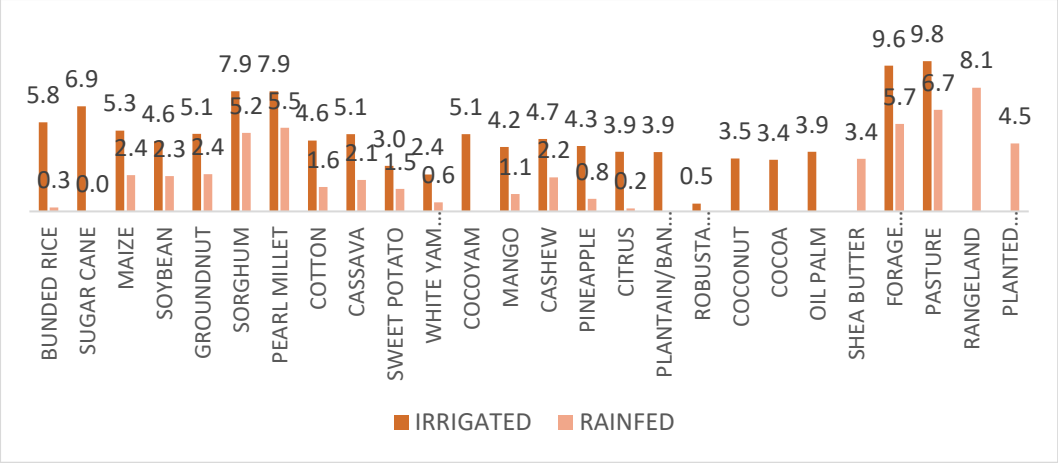
Weather extremes leading to flooding of both farms and cities will not only harm farm-level output, flooding in cities will raise the cost of housing, damage critical infrastructure, thereby raising transaction costs for processors and reducing disposable incomes of urban dwellers. However, climate change can be beneficial if it inspires smart, resource saving agriculture, stimulate innovation within and outside of the food system and orient diets towards less processed, fresh-food and less chemical-intensive diets that suit domestic production compared to imports.

The harmful effects of climate change can be moderated by coordinated long-term planning to enhance resilience and the development of tool for monitoring shocks and early-warning. This provides an opportunity for technological innovation and the adoption of a system's approach to policy-making. Participants were of the view that the Foresight approach is a useful tool to guide such planning and visioning.

Agro-ecological conditions can be modified by public investments and public policy. For example, with irrigation, lands that were previously unsuitable for tree crops or water-thirsty crops can be and the overall quantity of suitable land for agriculture can increase tremendously. For example, with irrigation in the Northern Savannah, large quantities of land will be more suitable for crops only grown in forest areas and will increase productivity immensely compared to cultivation under rain-fed conditions. The development of flood control dams can turn potential flood disasters into a dry-season farming opportunity.

Figure 49: Impact of irrigation on size of land suitability of various crops

Changes in land suitability under rainfed and irrigated agriculture in the NSEZ (Mn



Source: SADA (2016) Masterplan for the Transformation of agriculture in the NSEZ

13.3 Deforestation

Ghana's food system faces not only the specter of climate change but also rapid deforestation and loss of biodiversity which in turn contribute to global warming. About, 1.76 million ha, constituting 21% of Ghana's High Forest Zone (HFZ), are permanently protected forest areas. Currently, around 2,555,900 ha of Ghana's forests are under some form of protection either as forest reserves of wildlife protected areas. There are 266 gazetted forest reserves of which 204 in the HFZ, occupy 1,634,100 hectares and 62 in the savannah zone cover 0.6 million hectares. Only 16% of the HFZ may be categorized as being in good state, while the rest are in various stages of degradation.

In the period 200-2015, deforestation reduced Ghana's forest cover annually by about 140,000 ha annually with the fastest rate occurring in the grassland areas. Add to this the annual burning of tens of thousands of hectares of grassland, and the scale of carbon release to the atmosphere and the loss of biodiversity becomes apparent. Ghana's deforestation rate is second to none in the West African sub-region. Global Rainforest Watch (2019) estimated that there was a 60% increase in Ghana's primary rainforest loss in 2018 compared to 2017, the highest rate in the world.

Wetland flood plains however increased in size over the period 1975-2013 from 1.69% of total land area to 2.63% (Ghana Forestry Commission, 2017)

Table 13: Deforestation Rates Across Savannah and Forest Zones

Forest structure	Post-deforestation land use	Annual Deforestation 2000-2010 final (ha yr-1)	Annual Deforestation 2010-2013 final (ha yr-1)	Annual Deforestation 2013-2015 final (ha yr-1)	Annual Deforestation 2000-2015 final (ha yr-1)
Closed forest	Cropland	530	883	1,844	769
Closed forest	Grassland	1,445	3,546	5,437	2,331
Open Forest	Cropland	25,248	69,799	52,135	33,199
Open Forest	Grassland	70,607	154,385	211,487	100,539

Source: Forestry Commission (2017). REDD+ Strategy

As Table 13 above shows, the decline of the forest ecology accelerated between the years 2000-2013, falling by more than 20% of land area. Most forest degradation occurred in the off-reserve areas. The gallery forest in the Savannah habitat, the most biologically diverse habitat, also experienced accelerated decline, reducing by 25% over a 38-year period.

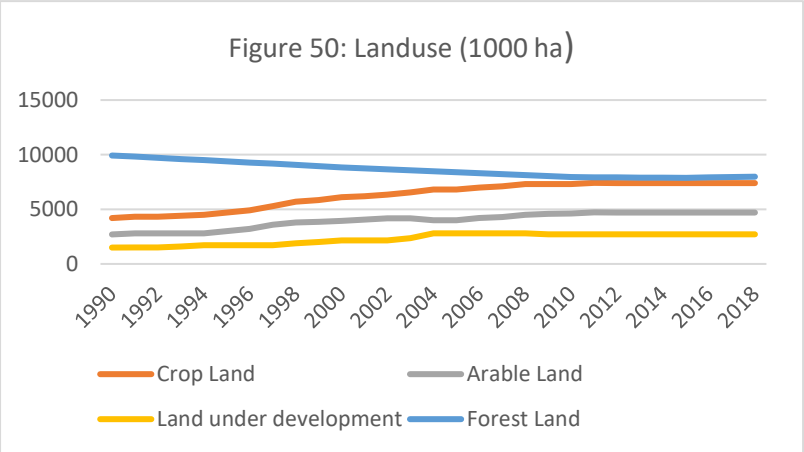
This rate of forest loss threatens the production and competitiveness of forest crops such as cocoa, palm oil, plantain and cocoyam among others. The burning and decaying of forest contribute significantly to greenhouse gas emissions and reduce the forest's role as a carbon sink. Ghana's REDD+ Strategy although aimed predominantly on developing resilience for adaptation, also seeks to contribute to the reduction of greenhouse gas emissions though re-forestation and forest/grass preservation strategies.

14. 14. Land-use and land degradation

14.1 Land-use changes:

Of the competing use of land, the fastest growing has been cropland. In 2018 about 57% of Ghana's land area was put under agriculture. Agricultural land has increased at an unprecedented rate. Between 1975 and 2000, agricultural land expanded from 13% to 28%. Between 1990 and 2018, cropland it increased by 3.2million ha, a 76% expansion whilst land under development increased by 120,000 ha. These increases were at the expense of forest land which shrunk by nearly 2million ha over the same period. Natural habitats of the Savannah zone declined from 51% to 40% between 1975 and 2013.

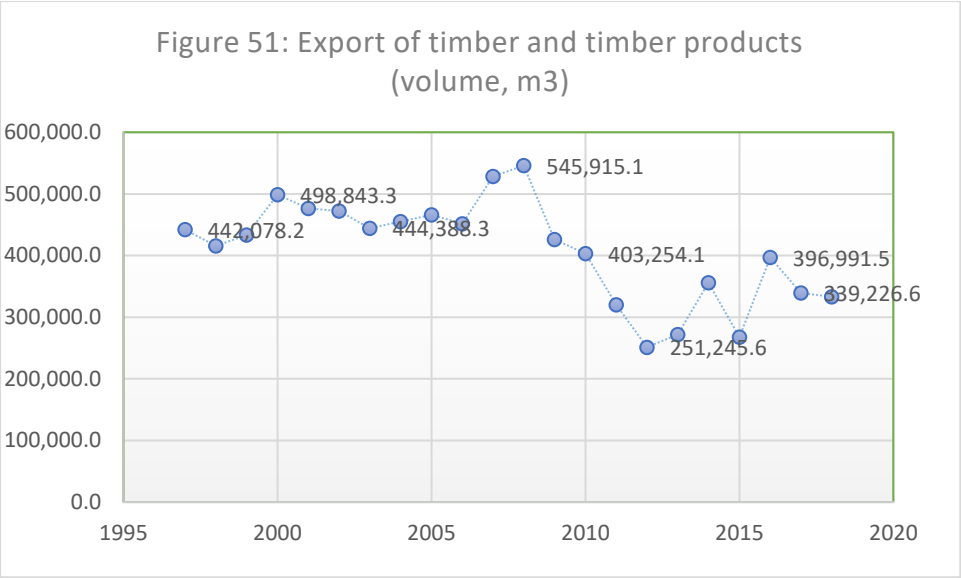
Most agricultural land is used for planting cocoa. In 2018, the amount of land put into cocoa cultivation is larger than the combined total of land put into cultivating maize, millet, rice and soy bean. Indeed, the amount of land used put into growing cow pea, maize, millet, sorghum and groundnuts declined in 2018 compared to 2016 (MOFA SRID, 2018).



Source: Forestry Commission, 2018

The second driver of the loss of forest cover was timber harvesting, for domestic use and for exports. At its peak (Figure 51), more than half a million cubic metres of timber wood was extracted. Although the volume of timber extracted has declined since 2010, annual harvest

still exceeds 300, 000 cubic metres. The period when timber exports were at their highest also coincided with the highest forest cover loss.



Forest and arable lands are also lost through settlements driven by rapid population growth.

14.2 Land degradation

According to a report by the United Nations Convention on Combatting Desertification, 5.4 million Ghanaians were living on degrading agricultural land in 2010. This number represented an increase of 1.1 million people compared to year 2000, bringing the share of rural residents who inhabit degraded agricultural land up to 45% of the total rural population.

Land degradation can severely influence populations' livelihood by restricting people from vital ecosystem services (including food and water), increasing the risk of poverty. During the same time period (2000-2010), the number of people residing in remote degrading agricultural areas with limited market access increased by 28%, reaching 730 thousand people. Populations in remote areas have restricted options for managing land and accessing other benefits of economic development. The annual cost of land degradation in Ghana is estimated at 1.4 billion United States dollars (USD). This is equal to 6% of the country's Gross Domestic Product. Land degradation leads to reduction in the provision of ecosystem services that takes different forms - deterioration in food availability, soil fertility, carbon sequestration capacity, wood production, groundwater recharge, etc. - with significant social and economic costs to the country.

Given that agriculture contributes nearly 40% of employment the intensification and expansion of land degradation may severely affect labor productivity, ultimately jeopardizing agricultural livelihoods in the country. The total annual cost of land degradation was estimated at US$ 1.4 billion in 2010, equivalent to 6% Gross Domestic Product (GDP).

Table 14: Populations on Degraded Land in Ghana

Population categories	2000	2010	% change from 2000 to 2010
Rural population on degrading agricultural land	4,267,382	5,390,742	26.3%
Share (%) of rural population on degrading agricultural land	40.4%	45.0%	*4.5%
Rural population on remote degrading agricultural land	570,724	729,754	27.9%
Share (%) of rural population on remote degrading agricultural land	5.4%	6.1%	*0.7%
Rural population	10,555,362	11,985,482	13.5%
Total population	18,824,994	24,317,734	29.2%

Note: Due to rounding, some figures in the text may not correspond with those reported in the tables or the sum of separate figures. *percentage-point difference between 2000-2010.

Source: UNCCD (2018), Ghana Profile

Land fertility degradation may also have been affected by the increasing use of chemical fertilizers. Fertilizer consumption has increased significantly starting from 2013. There was a 36% increase in apparent consumption from 2018 to 2019 amounting to 423,603mt and 1,669,986 litres. Ghana heavily subsides the consumption of chemical fertilizer which is used not only by farmers but also by mines.

15. Fertilizer use and the environment.

Fertiliser use, although increasing is not widespread. According to the report of the Ghana Census of Agriculture (GSS 2017/18) out of the 3,876,778 agricultural holders in Ghana, more than 72.0 percent of those who cultivate arable crops do not use fertilizer. More than two-thirds of those who cultivate pulses/legumes (83.4%), industrial crops (78.3%), starchy staples (74.3%) and leafy vegetables (67.7%) do not use fertilizer. The types of arable crops for which majority of holders use fertilizer are horticulture (67.4%), non-leafy vegetables (58.3%), and herbs/spices/condiments (50.1%).

Starchy staple crops for which higher proportion of holders use fertilizer are rice (53.9%) and maize (46.9%). Less than 10 percent of the holders in the cultivation of cocoyam (6.3%), plantain (7.3%), yam (9.0%) and cassava (9.9%), use fertilizer. More males (28.6%) than females (17.7%) use fertilizer in the cultivation of starchy staple crops females, only holders in the

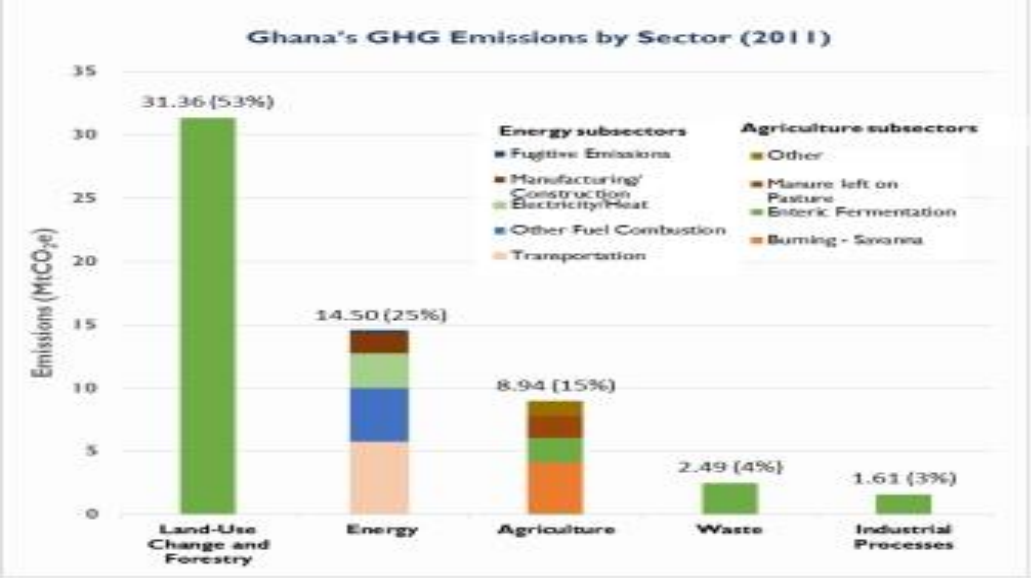
There is no primary production of inorganic fertilizers in Ghana. All fertilizers consumed in Ghana are imported in compounds and bulk. The bulk fertilizers are blended into various formulations and distributed through a network/system of distributors and retail agro-dealers. A small percentage of organic fertilizers is produced locally.

16. Climate Change and GHG Emissions in Ghana (1990-2011)

In Ghana, the Agriculture, Forestry and Other Land Use (AFOLU) sector is responsible for 71% of the total greenhouse gas emissions of the country according the Ghana Forestry

Commission. It is estimated that the removals of carbon emissions through deforestation account for 47% of the total emissions. The agricultural sector accounted for about 15% of total GHG emissions in 2011 as indicated by Figure 52 below..

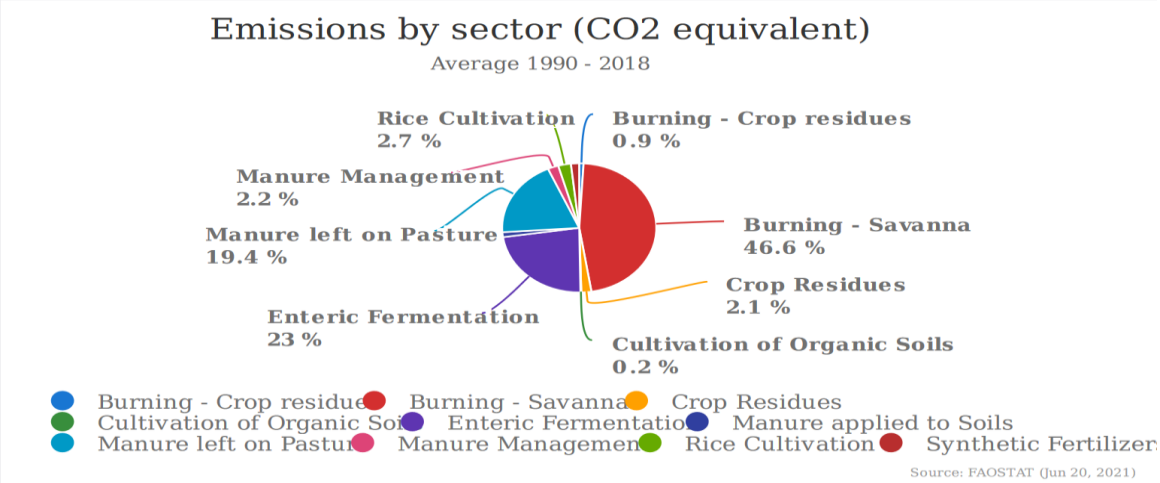
Figure 52: Greenhouse Gas Emissions by Sector



Source: WRI CAIT 2.0, 2015 and FAOSTAT, 2015

Of the agricultural sector emissions, farm burning, especially in the Savannah ecological zone, accounts for about 47% (Figure 53 below). Manures left in pasture and enteric fermentation make up the bulk of the rest.

Figure 53: Greenhouse Gas Emissions by Sector, 1990-2018



Sources: WRI CAIT 2.0, 2015 and FAOSTAT, 2015

Ghana's total GHG emissions grew 20% from 1990-2011. The average annual change during this period was 0.9%, with sector-specific average annual change as follows: LUCF (-0.7%), energy (6.4%), agriculture (1.9%), waste (6.8%), and IP (3.2%) (WRI, 2015) [3]

17. Water and Sanitation

Ghana has made significant improvement in access to drinking water. According to a recent survey by the Water Supply, Sanitation and Hygiene (WASH) of the World Food Programme, 86% of household members use improved sources of drinking water. More than 88% of household members have access to a water source when needed. These figures are skewed by access by rural communities to boreholes and low-income communities, public standpipes. Only about 19% of household members have access to an improved drinking water source on premises, whose source water was tested and free of E. coli and available when needed.

However, water safety is poor as. E. coli infestation is widespread. It is estimated that more than 76% of water used by household members tested positive for E. coli. More than 48% of source water tested positive for E. coli.

The sanitation situation is poor as only 14% of Ghanaian households have an improved, unshared sanitation facility. This creates a huge risk for potential contamination of water bodies as well as health outcomes. In rural areas, 41% of households lack improved sanitation facilities compared to just 14% of households in urban areas.

18. Some policy Highlights

The overriding objective of Ghana's food policy is to "ensure access to safe and nutritious food for all". Whilst the responsibility for ensuring the supply of food through production lies with the Ministry of Food and Agriculture (MOFA), that for nutrition lies with the Ministry of Health and Food Safety lies with institutions allied to the Ministry of Science and Technology. Various research and academic institutions feed into these ministerial channels. Other aspects of the system – pollution, land tenure management and degradation, trade, transport, population and urbanisation, deforestation, water resources etc. operate autonomously. The production of food takes a dominant place in the Food system and there is no entity, including a standing inter-ministerial body, dedicated to addressing the system as a whole and how the different bits interact in order to produce not only food and nutrition security but also a green economy, job creation and other Food system outcomes.

Food Production Policies: The overarching policy aimed at promoting the production of agricultural commodities under the current government is "Planting for Food and Jobs" (PFJ). This has several components; A focus on cereals and some extent pulses; Rearing for Food and Jobs (livestock cultivation); Planting for Exports and Jobs which focuses on tree crops and Investing for Food and Jobs. The fisheries sector is under the Ministry of Fisheries and Aquaculture Development.

Key elements of the PFJ include: a subsidy programme for fertilizers, agro-chemicals and improved seeds; support for research and local production of improved seeds; some degree of mechanisation in the form of a subsidy programme for tractors and harvesters; the supply of subsided seedlings for tree crops among others and a buffer stock programme for grains as well as Commodities Exchange that help in demand side of produce. There is far less strategic support for livestock except poultry which also benefits from some level of subsidies.

Fisheries development: Support for marine fishing is basically in the form of subsidies for nets, outboard motors and fuel. Financial support for aquaculture is less pronounced.

Nutrition: The principal focus is averting child malnutrition through the supply of micronutrients and infant/maternal mortality through iron and zinc supplements and general nutrition monitoring. There is far less attention paid to obesity.

Pollution and waste management: Ghana's monitoring of pollution levels is poor and information poorly disseminated. There is little enforcement of urban pollution laws, including pollution from automobile and industry. Waste management is inefficient and plastic pollution is widespread, often choking gutters and triggering flush floods during raining season. The Environmental Protection agency is the leading public sector body on the environment.

Transport: With the dominance of road transport in Ghana's transport system, the overwhelming policy focus is road construction, road maintenance and road safety. However, local air transport network is expanding. There are operational airports in 7 out of 15 regional capitals. Rail transport is limited operating only in some parts of the coast.

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Annex 2.2: Ghana Workshop Report

Summary of Proceedings:

Food Systems and Foresight Training in Ghana

10 & 12 May 2021

Background

The Foresight Capability for Food System Transformation in Ghana and Uganda project is focused on consolidating food systems foresight capability in Ghana and Uganda to strengthen the basis of transformation planning towards more sustainable and resilient food systems. Funded by the Open Society Foundation (OSF) and developed in partnership with the FARA Africa Foresight Academy, the project is working closely with local institutions to contribute to national strategy on food systems foresight. Building on earlier OSF-funded and ongoing SENTINEL research in Ghana, and on the OSF-funded IFSTAL projects in Ghana and Uganda, the project will develop a methodology for national-level foresight for food systems transformation and an associated foresight toolkit. In this regard, the project has designed two sets of 2-part training workshops for each country to gather information on food systems and explore food system futures. This document reports on the proceedings from the first set of food systems training workshops conducted for Ghana. See Appendix A for the agenda for Sessions 1 and 2, and Appendix B for a list of workshop participants. See Appendix C on the outputs from breakout activities in Session 2.

Session 1: Food Systems

The workshop kicked off by **Dr Monika Zurek** (ECI's Food Systems Group) introducing the overarching project, connections with on-going and previous work in Ghana, and the role of the workshops in developing the project outcomes.

Paulina Addy, Head of the Food and Agriculture Development Directory then explained the progress on the Food Summit and set out the activities carried out thus far. This has included a currently ongoing series of sensitizations for ministries, departments, agencies, the private sector, scientific groups, and facilitators from research and academia. The media was involved in amplifying the effort and activities carried out. This took place on regional and sub-national levels. Secondly, a lot of work has already been done on the Summit's 5 Action Tracks.

Charles Abugre connected the workshop with the previously conducted project focused on the future of small-scale agriculture in Ghana in 2018 led by Foresight4Food's Jim Woodhill and emphasised the necessity of adopting a food system approach nationally.

The first interactive session was introduced by Foresight4Food's co-lead **Dr Jim Woodhill.** The activity was organized around examining the degree of food system thinking in the participants' organizations and exploring how food system thinking could improve current work. The breakout session was an opportunity for the diverse range of participants to meet each other.

Key themes emerging from this breakout session:

1. Recognition of:
    a. the importance of finance as a key driving force in food systems,
    b. the necessity of value addition and marketing of value-added products (e.g., cassava beer)

c. exploring nutrition and health improvement activities throughout value chains (e.g., climate related aflatoxin risks, complimentary feeding food items, and enrichment)

2. Focus of activities is on cultivation.
3. Significant produce losses due to insufficient markets.
4. Middlemen connect farmers with markets.
5. Connect stakeholders across food system in dialogue for improving activities and outcomes.

The session provided a grounding of status of food systems thinking and application in Ghana and was followed by a presentation on key food systems concepts by **Dr John Ingram** (ECI, Food Systems Group) (see Figure 1 below).

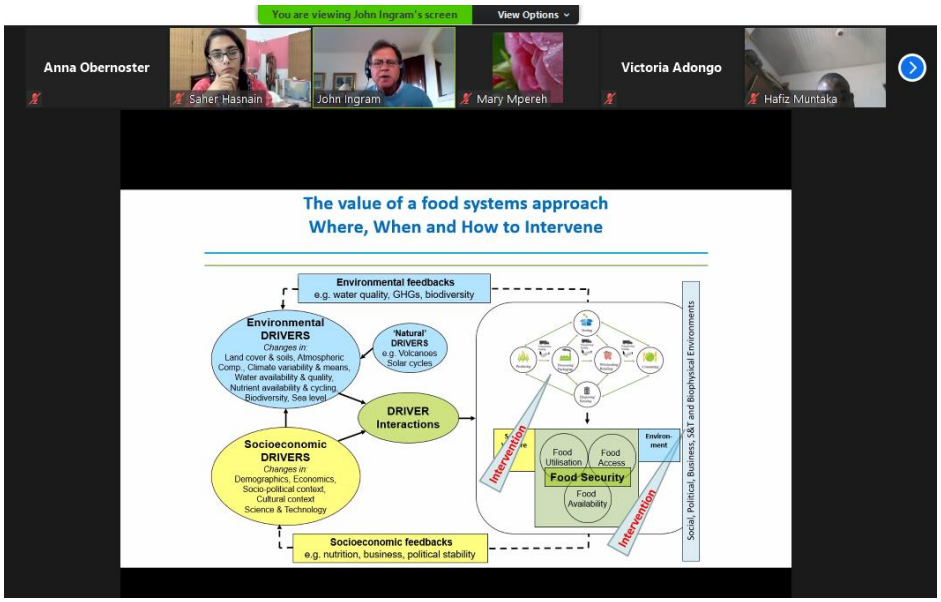


Figure 3 Dr John Ingram presenting on the value of a food systems approach

Dr Annabel de Frece (IFSTAL) shared a presentation on framings and boundaries within food system thinking and introduced the second interactive session of the day. The activity (divided across a short break) focused on collaboratively exploring a key food system outcome keeping in mind the boundaries, system, relationships, and framings. The session used Google JamBoard. Facilitated by John Ingram, Jim Woodhill, and Annabel de Frece, the session resulted with each breakout group agreeing on a key food system outcome of concern for Ghana and who will need to take action.

Key Food System Issues:

Triple Burden of Malnutrition: overweight, undernutrition and micronutrient deficiencies are critical areas of concern resulting in long-term health issues such as poor brain development. These are linked to the dependency on processed and ultra-processed foods, lack of physical activity, and staple foods lacking in essential micronutrients. The group determined the churches, ministries (e.g., agriculture, youth, sport, health, finance, education, etc.), big food companies, banks (e.g., for promoting responsible financing by giving loans for nutritious and fortified crop seeds), and urban planners are well-placed to act for this outcome (see JamBoard in Image 2 below).

Figure 4 JamBoard on malnutrition, causes, and responsible stakeholders

Food Waste and Quality:

1. Most consumers are unable to afford good quality food,
2. Pests and diseases reduce the volume and quality of food,
3. Inadequate policies mean that ensuring food quality becomes difficult,
4. Sufficient infrastructure (e.g., unhygienic transport and storage) degrade food quality,
5. Insufficient awareness on 'food potentials' (e.g., maximizing use of hybrid maize),
6. Inadequate policy linkage and connection to private sector resulting in policy confusion (particularly for farmers)
7. Lack of synchronization and harmonization across the supply chain (e.g., unnecessary delays along the supply chain)
8. Inadequate investments by smallholder farmers

Figure 5 JamBoard on food waste and quality and potential causes

The final activity of the day involved mapping the responsible stakeholders for the food system issues discussed before. After a presentation on stakeholder mapping by **Dr John Ingram**, the activity resumed on JamBoard with a collaborative mapping of key stakeholders on an axis of influence of power and degree of impact (see Figure 4 and 5 below).

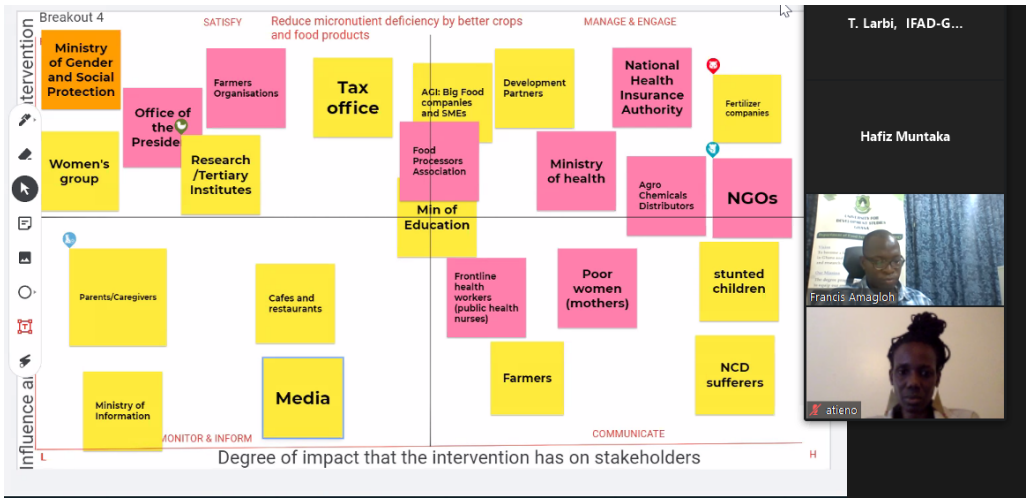


Figure 6 Stakeholder mapping of the food system issue

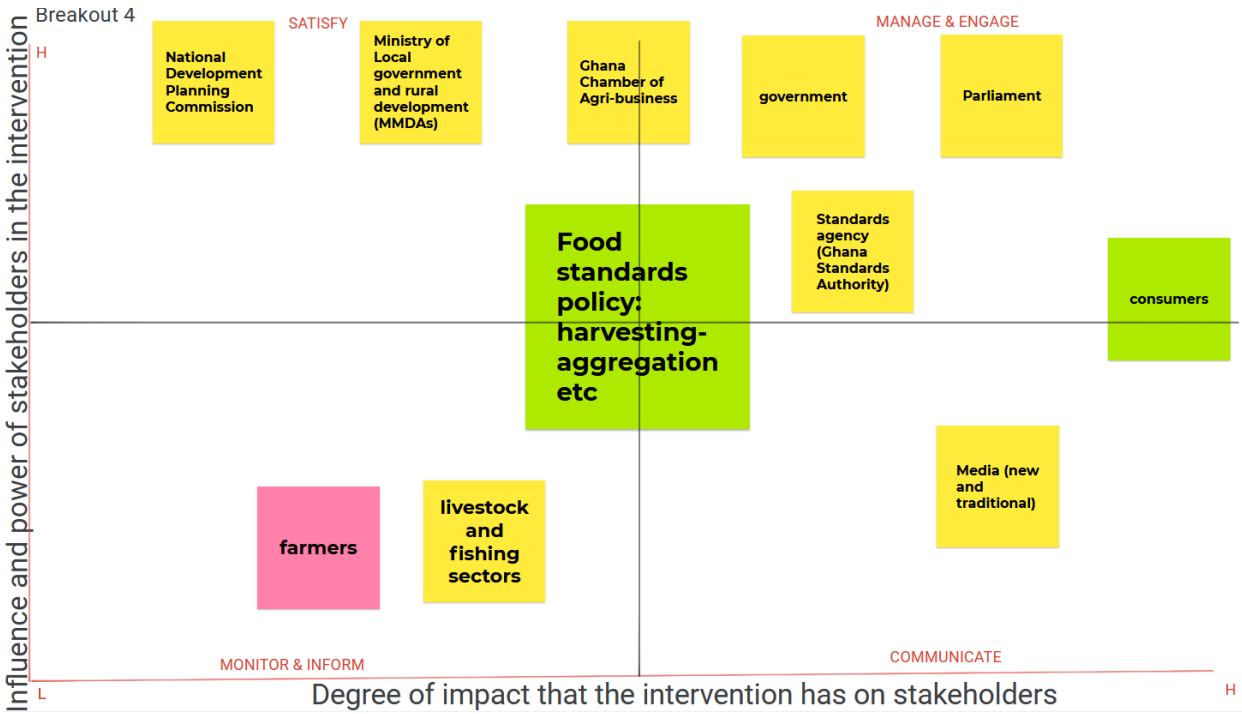


Figure 7 Stakeholder mapping of the food waste and quality issue

After a report-back session from both groups, the day was brought to a close by **Dr John Ingram** with thanks to the workshop participants for their insights and **Charles Abugre** and **Atieno Ndomo** for organizing the convening.

Session 2: Drivers and Foresight (09:00 am to 12:00 pm Accra time)

The second session of the workshop began with **Charles Abugre** reflecting on the workshop thus far. Concerns on the short time periods of the breaks, unfamiliarity with the collaborative tools, and desire for longer breakout sessions were pointed out. **Dr Monika Zurek** acknowledged these points and thanked the participants for their input and honesty with the collaborative experience. She then shared the timeline for the overall project and reflected on how the preparation for the Food Summit's Action Tracks would be accomplished. This was followed by a brief presentation explaining drivers of change in food systems (see Figure 6 below).

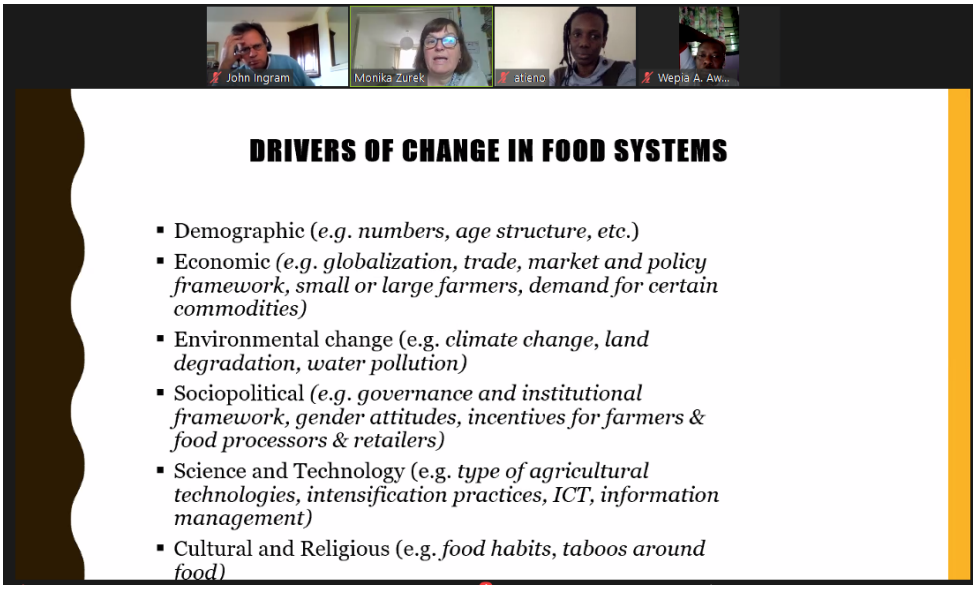


Figure 8 Dr Monika Zurek presenting on drivers of change

Dr John Ingram introduced the first interactive active of the day. The goal of the breakout sessions was to explore key food system trends and drivers and was facilitated by **Dr Annabel de Frece** and **Dr John Ingram**. These insights were captured in a table for each topic (fresh fruit and vegetable sector and dairy sector). Key themes emerging from this session were:

Dairy sector:

1. Production is stable despite no investment and decreasing breeding programs. The sector's production practices are aimed at maintaining a way of life instead of improving business. Overgrazing and bush burning is taking place in the north.
2. The dairy market is undeveloped, with increasing imports from Belgium (dry powder), and reconstitution of fat from skimmed milk dry powder taking place with some addition of vitamins and minerals in processed products.
3. There is an increase in plastic packaging which contributes to food safety but is raising concerns of plastic waste.
4. Hospitality sector is encouraging growth because of ease in bulk purchasing and an increasing preference for convenience and catering efficiency.
5. Increased presence and consumption of yogurt may be driven by an improving awareness of health, strong marketing practices, and refrigerated vehicles part of the cold supply chain.
6. Tempering increasing imports of dairy products might relate to trade-related problems.

Fresh fruit and vegetables:

1. While there is increased production, pests and other barriers to production lead to variability and post-harvest losses. Increased production is driven by consumer demand.
2. There is significant wastage from the processing sector, but the government is also driving an increasing number of processing factories which is creating new employment opportunities.
3. Improvements in the sector are necessary for retailing, with opportunities for SMEs, employment, and nutrition. Plastic waste is a continuing issue.
4. There is increased consumer demand for better nutrition through fresh fruit and vegetables, and there is a consumer preference for more locally grown produce. There are national level campaigns for locally grown foods and improved nutrition.

The breakout session was followed by a presentation introducing foresight in food systems by **Dr Saher Hasnain** (ECI, Food Systems Group). The second breakout session focused on identifying

trends of concern and implications of food systems foresight approaches for the Food System Dialogues and Food Summit. The sessions were facilitated by **Dr Monika Zurek** and **Dr Jim Woodhill** using Miro (a collaborative working tool). Key themes emerging from this session were:

1. There is an overreliance on donor funding.
2. Farmers have limited access to finance.
3. Food wastage and post-harvest management are main issues in the Ghanaian food system.
4. Better coordination mechanisms are needed, particularly in streamlining agricultural policy.
5. A stronger regulatory environment is needed for managing food safety.
6. Clarity is needed on who is managing change and how.
7. It is important to recognise small signals and early signs for managing emerging issues.
8. It is necessary to move from the general to the specific, particularly in terms of engagement.

See Figures 7 and 8 below for the Miro boards resulting from the breakout sessions.

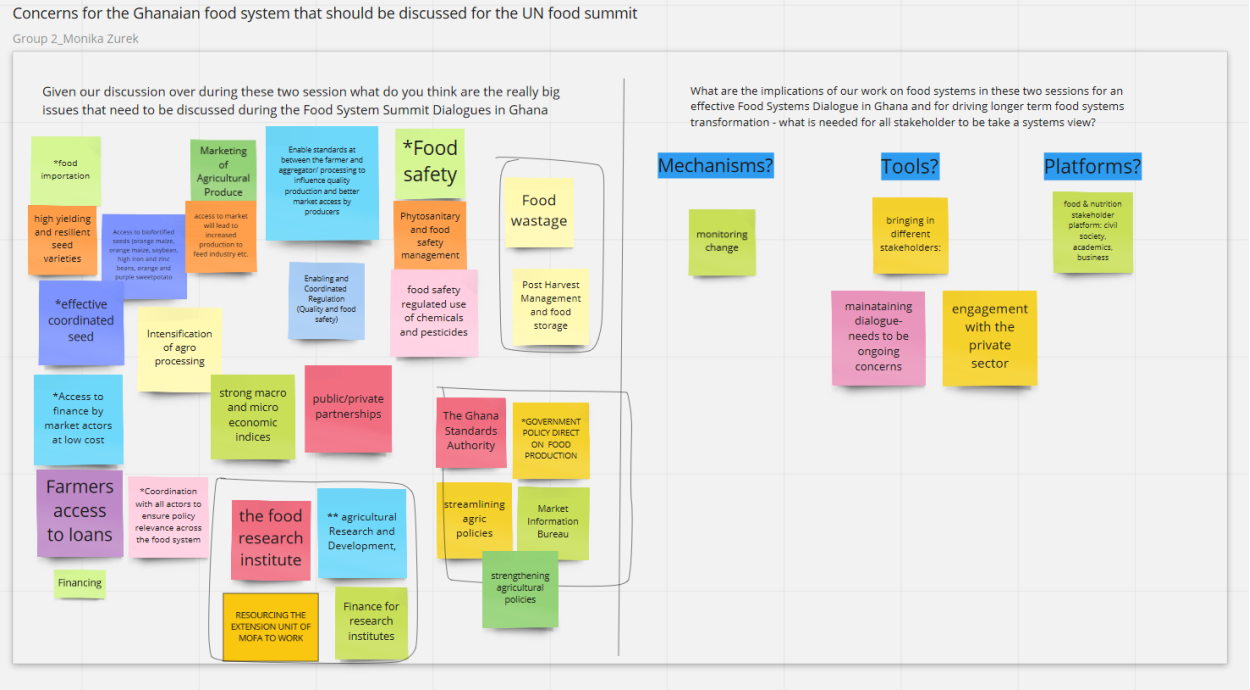


Figure 9 Insights captured on big issues and implications for the future (facilitated by Dr Monika Zurek)

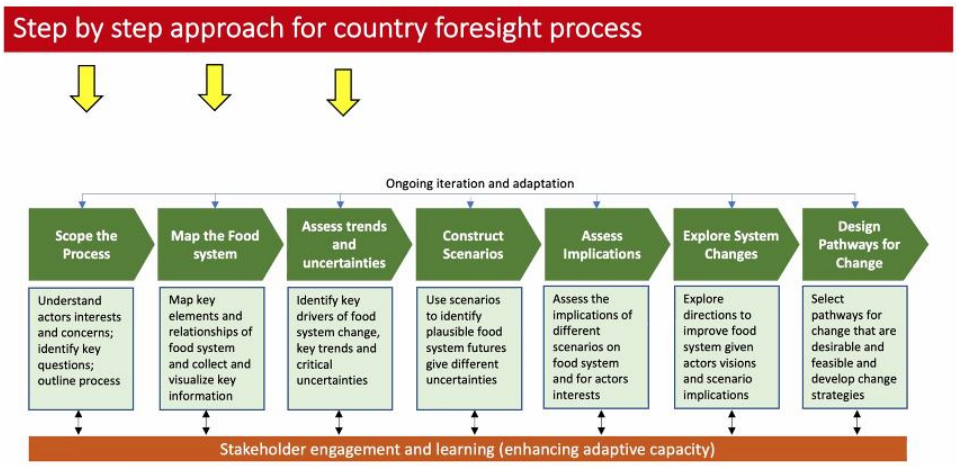
Figure 10 Insights captured on big issues and implications for the future (facilitated by Dr Jim Woodhill)

Session 2 of the workshop was closed by **Dr John Ingram**, with final comments from **Charles Abugre**. It was discussed that the food system approach is useful, but it is necessary to integrate insights from diverse stakeholders into foresight and planning processes. Finally, it is important to include critical voices that can challenge dominant narratives placed by policy makers and for consultation and research to go hand in hand.

Session 3: Drivers and Uncertainties (9:00 am Accra time)

The session began with a recap to the first two sessions in May, highlighting the key concerns of over-reliance on donor funding, limited access to finance for farmers, post-harvest management, food wastage, the need of better coordination mechanisms, stronger regulatory environment, clarity on change managers, and the necessity of recognizing early signals of change for identifying emerging issues.

This was followed by a presentation from **Jim Woodhill** on the introduction to the foresight and scenario process to be employed in the workshop. The ‘green boxes’ approach, that takes participants through a step-by-step approach for developing a country foresight process was discussed.



Charles Abugre then presented an overview of the food system for Ghana, focusing on the food insecurity and obesity picture and the proportion of the population depending on agriculture in the country. He noted that there were big changes coming down the pipeline for the national food system, which need to be addressed using foresight processes. Discussions after the presentation considered:

How is land settlement impacting land use change?

- Agricultural productivity mainly depending on fertility level of land
    - Ie smaller fertile land could be more productive
    - Important to consider: what can we do to improve soil nutrients?
- Lots of settlements have taken up arable land, but would still be important to improve soil quality to make smaller land more productive
    - Important debate; what does sustainable intensification mean?
- ➢ Critical comment: urbanisation does actually have a significant impact on agriculture
    - Important: what is the impact of the urban population, what is their diet, how does this influence food systems?

Is energy sufficient diet automatically a healthy diet? What would the development scenario look like to improve the situation?

The group then divided into breakout rooms for deeper facilitated discussion on these questions on Mural in terms of current and long-term concerns and interests of key stakeholder groups, common goals and desires, and areas of potential conflict and tension. These are summarized below:

<u>Consumers</u>

- ➢ Concerns
    - Food safety issue: issue nr one
        - Use of pesticides, bad traceability of food
    - High cost of food
    - Bad transportation and storage systems
    - High food waste in urban centres
    - Loss of nutrients because of bad cooking
    - All-year round availability of foods (i.e. vegetables)
- ➢ Long term
    - Better infrastructure

- Food safety issues resolved
- Address food imports
- Better consumer education for good nutrition
- Deal with high food costs
- Better information on food labelling
- Better regulation of processed foods and foods in general

Farmers

- Issues
  - Poor road networks
  - Low farmer incomes
  - Gender inequalities
  - Land pressure
  - Post-harvest losses
  - Lack of credit facilities
  - Youth not encouraged to farm, mainly older farmers
- Important discussion: is farming getting better or worse? Do government schemes make things better at all?
- Long term
  - Better value and nutrient crops
  - Less exploitation of farmers by middle-men
  - Better credit systems
  - Better data around what is going on, effects of government programmes

Value chain businesses

- Current issues
  - Labour: enough labour for processing etc.
  - Standards: issue of pesticide residues
  - Appropriate packaging and labelling
  - Environmental impacts
  - Reliability of supplies for processes
  - Value addition
- Long term interests
  - More investment
  - Issues in patronising
  - Export market development
  - subsidies, especially with electricity, water, work force
  - Streamline permits and licenses
  - Improve technologies
  - Skill and workforce development

Government

- Current issues
  - Important in creating enabling environment for businesses to thrive
  - Improve food systems: importance of national framework
  - Strong institutions supporting private sector
  - Weak policies

        - Issues: i.e. high imports of rice, bad for small-scale farmers
        - No access to markets by farmers
    - Cross- coordination between ministries and institutions
    - important to consider social, economic, and environmental issues
    - malnutrition: is government ensuring that quality and quantity of food is appropriate?
    - Important to respect limits of environment
- Long term interests
    - National framework for development and food systems planning
    - Enabling collaboration and coordination btw stakeholders
    - Important to ensure sustainability of different systems

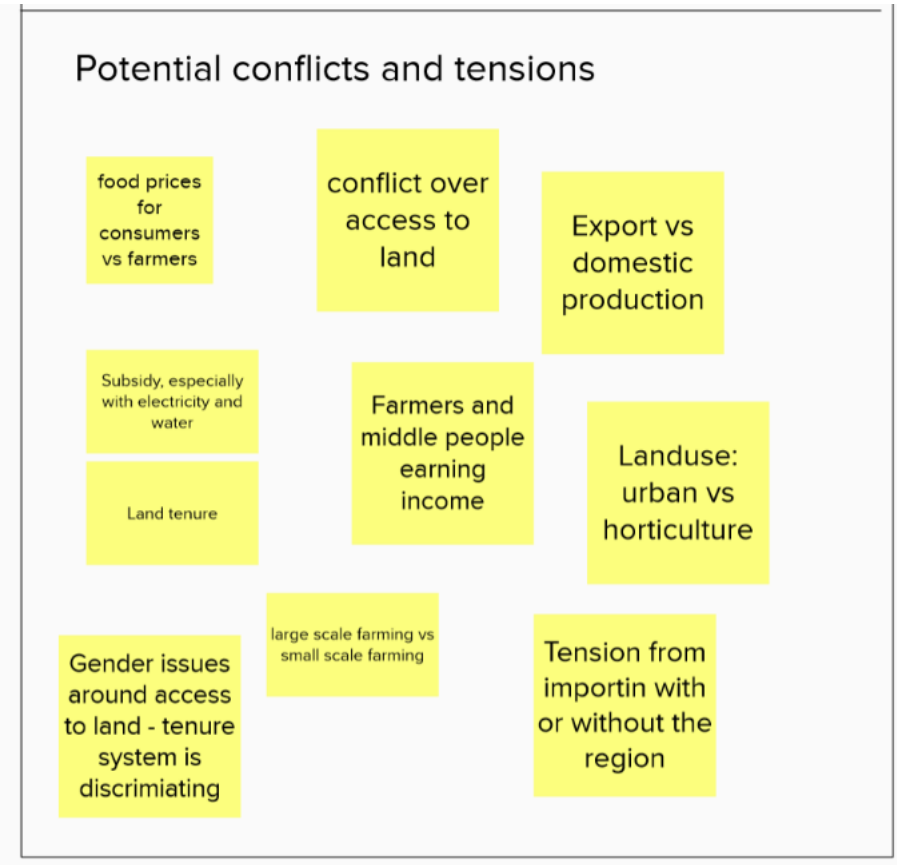
<u>Common goals and interests</u>

- Food safety
- Infrastructure: food storage and transport
- Access to technology
- Role of government vs food industry/ consumers
    - Who is responsible for ensuring sufficient/ nutritious food?
- Resource tenure

<u>Potential conflicts and tensions</u>

- Land conflicts
- Subsidies: for whom and for what?

- Food prices: farmer vs consumer prices – who makes money out of the food system?
    - Value addition: where?
- Export/ import market development
- Tenure security
- Food affordability
    - Tensions btw large-scale, cheap farmers and smaller scale farmers
    - Massive imports also driving down prices, but often detrimental to production within country, especially by small scale farmers
- Different income/ opportunity distributions

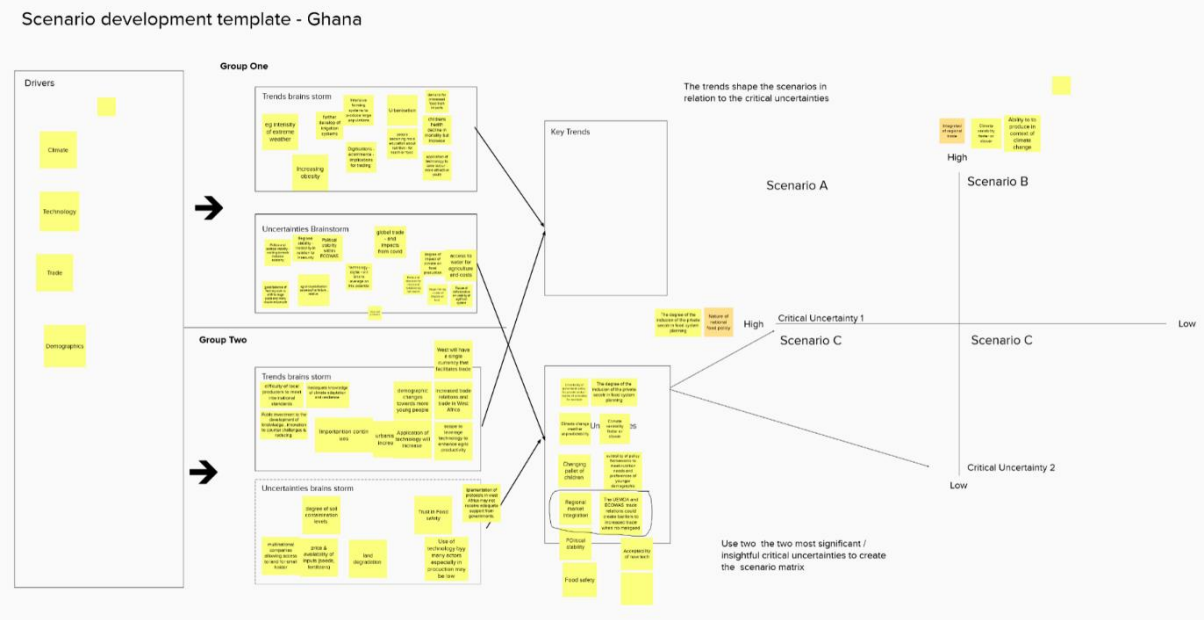


<u>Current issues – (both in conflicts and goals)</u>

Gender imbalances

- Women often having difficulty accessing land – can often not own/ access land
- Tenure system discriminating
- Often much easier for men than for women
- Even though women often greater part of labour
- Influenced by “older” traditions: only men can own land
    - BUT: now new development: highest bidder w most money often gets land, women could also get land BUT often have less money than men

This activity was then followed by an identification of key uncertainties, again in a facilitated environment:



Key trends

- urbanisation increasing
- Climate change, more extreme weather
    - More irrigation
    - More intensive farming
- Increased demand for processed food
    - Also impacts on health status, i.e. obesity
- Child mortality declining, improved child nutritional status
- Increased use of digital technology, i.e. e-commerce
- Demographic changes: more young people
- Lack of knowledge about adaptation and resilience
- Public investments in training

Key uncertainties

- Impacts of covid on global trade
- Regional market integration
- Political stability
    - Could improve, “mature” into democratic society, or could unravel into other political systems
- Regional stability, terrorism
- Good farm size balance OR too many large scale farms and lots of displaced peoples
- Climate change – unpredictable weather
    - Access to water
    - Droughts/ floods
- Changing diets and tastes
    - Uncertainties around future demands for production and processing
- Instability of government policies?
- Pests and diseases
- Deforestation rates’ impact on agri-food system
- Agroindustrialisation level

- Land and labour demand: exact size
- Degree of soil contamination levels
- Degree of access to accurate weather information
- Multinational companies allowing access to land for smallholders
- Suitability of policy frameworks responding to changing needs
- Implementation of protocols not receiving enough support from government
- Trade barriers could be created if regional trade frameworks and agreements are not managed
- Food safety

The session closed with a recap of the day and key findings, with a reminder of the activities for the final session in the series of workshops.

Session 4: Scenario Development (9:00 am Accra time)

The session began with a recap of the first day by **Dr Monika Zurek** who highlighted the importance of considering how different scenarios affect stakeholders differently. The key stakeholder concerns and issues of interest discussed in Day 1 were shared (see Figure below)

The interactive session on fleshing out the scenarios was introduced with guidance on how to think about the uncertainties in terms of linkages between sectors, development of key food system goals, and descriptors on what Ghana in 2035 will look like. The participants were divided into breakout rooms and led through a facilitated discussion on Mural boards for each scenario.

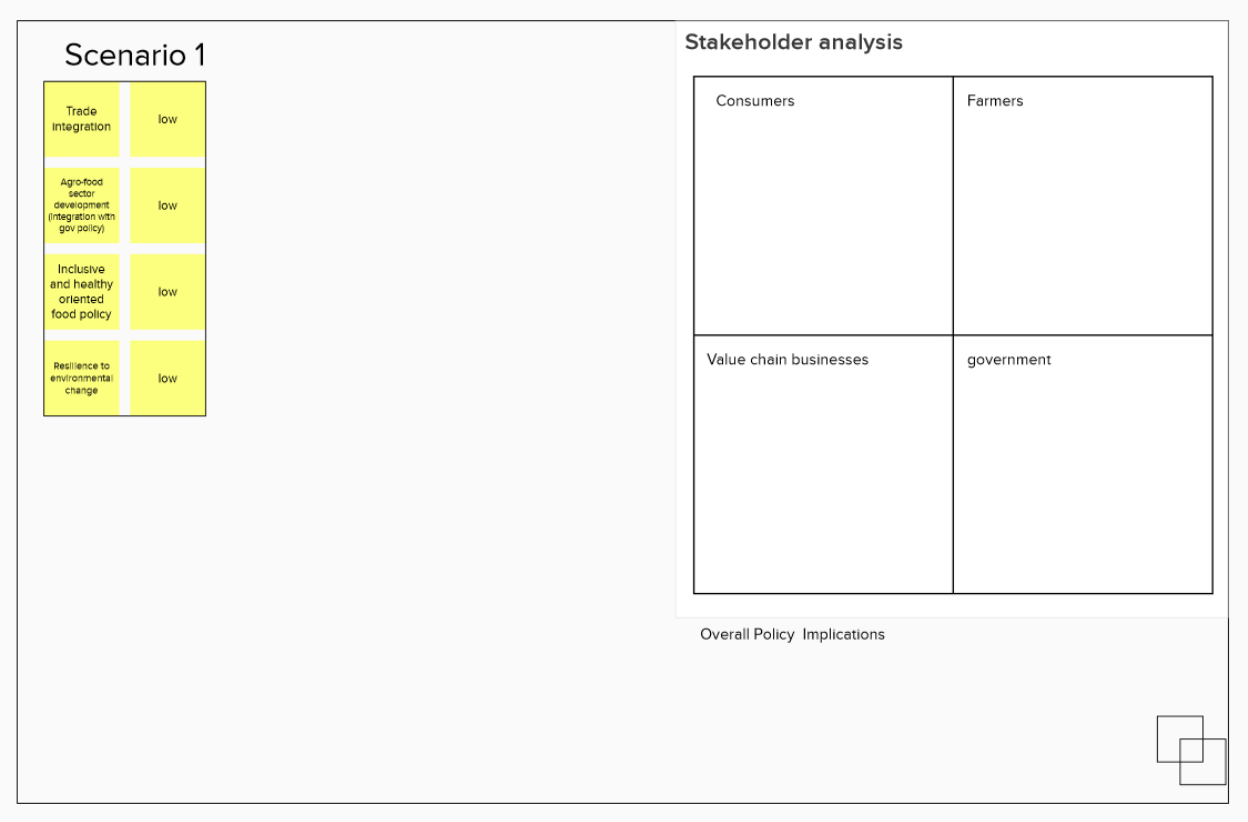
Scenario Elaboration

The scenario elaboration table below used the key uncertainties for the future of Ghana that had been identified over the workshops:

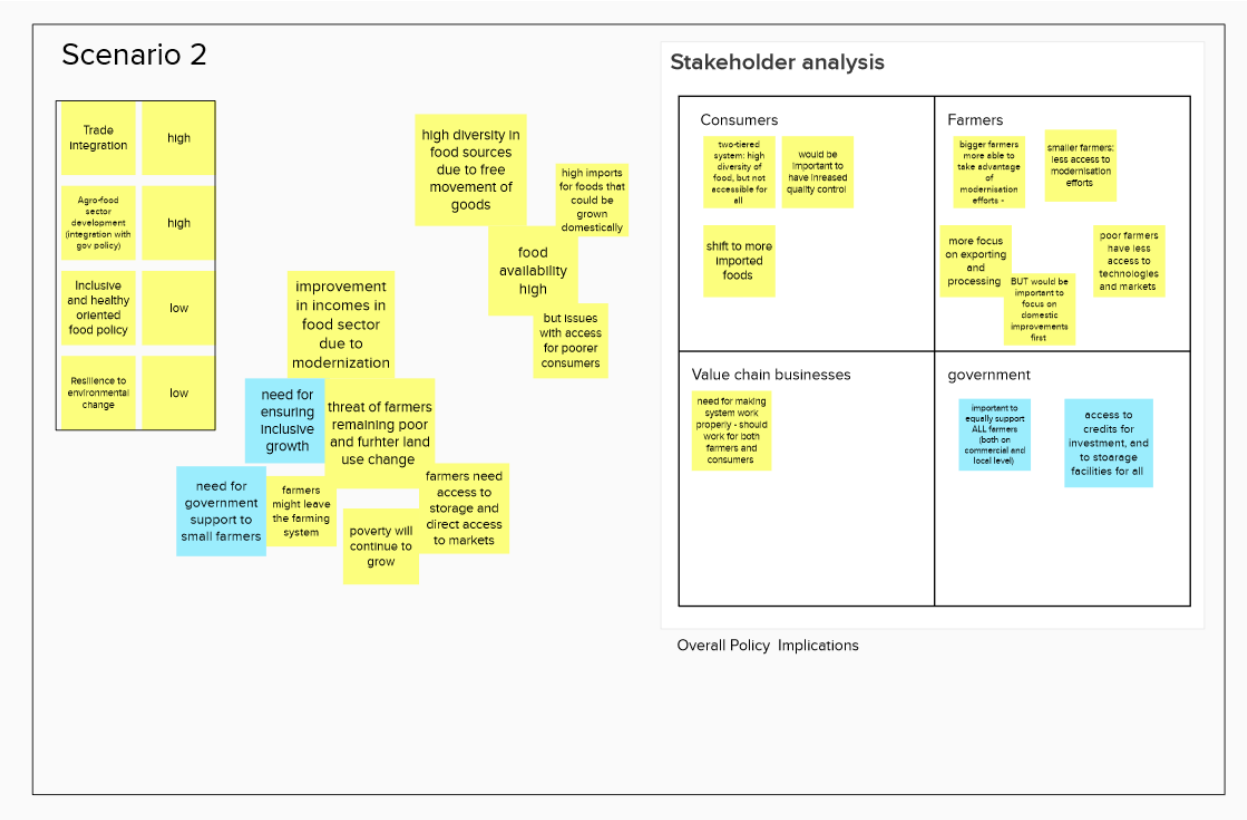
Scenario Name/Uncertainty	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Trade Integration	low	high	low	High

Agro-food sector development (integration with government policy)	low	high	High	High
Inclusive and health-oriented food policy	low	low	High	Low
Resilience to environmental change	low	low	high	High

Scenario 1



Scenario 2



This scenario featured a high degree of trade integration and agro-food sector development with a low orientation towards inclusive and healthy food policies and resilience to environmental change. Key themes that emerged are:

Food and Nutrition Security:

With the free movement of goods, there is high food availability and a good diversity in food sources. However, this includes imported food that could be domestically grown.

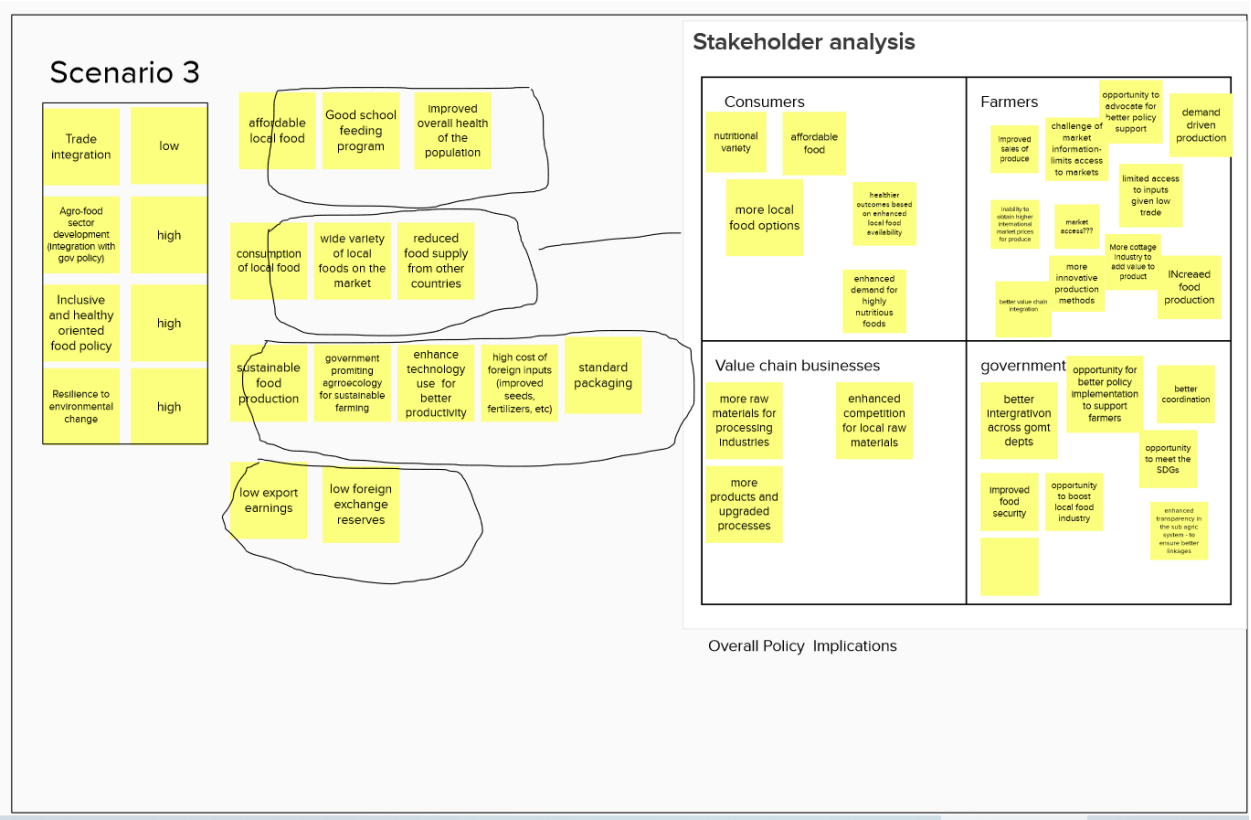
Economic and Social Wellbeing:

Despite a higher availability of food, issues remain in access for poorer customers. Consumers will face a two-tiered system in terms of accessibility. Consumption patterns will shift towards imported foods, and increased quality control will become essential. Farmers will need support from the government, access to storage, and direct access to markets. There is a danger that some farmers will leave the sector for good. Poverty will continue to grow and there will be a need to ensure inclusive growth. However, there will be income improvements in the food sector because of modernization.

Environmental Sustainability:

Land use change will impact farming practices and hit poorer farmers the most.

Scenario 3



This scenario featured a low degree of trade integration and high agro-food sector development with a high orientation towards inclusive and healthy food policies and resilience to environmental change. Key themes that emerged are:

Food and Nutrition Security:

The health of the population is improved through improved feeding programs, low rates of processed foods, and widely available and affordable variety of local and organic foods. There is greater consumer demand for highly nutritious foods.

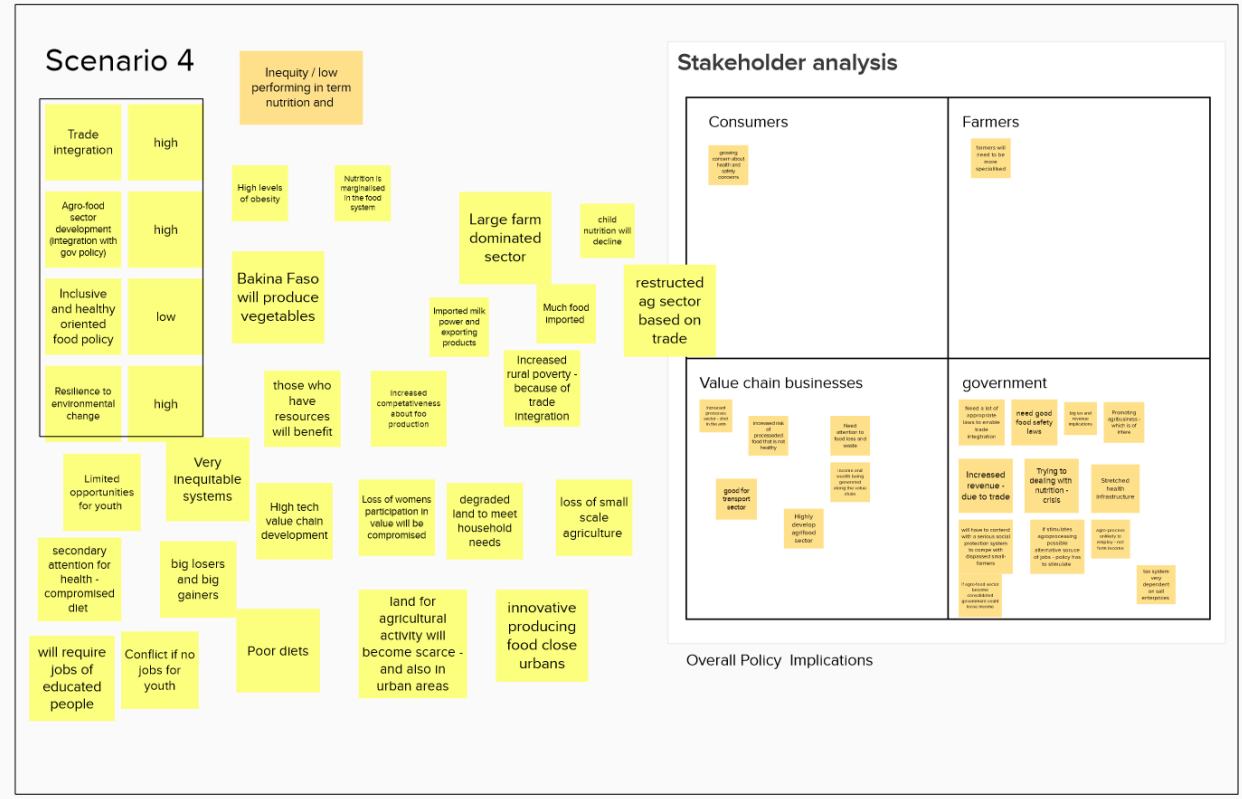
Economic and Social Wellbeing:

Foreign exchange reserves and export earnings are low. Despite the enhanced use of technology for productivity, foreign inputs such as improved seeds and fertilizers is prohibitively high. Farmers have improved produce sales but face an inability to obtain higher international market prices. Processing and cottage industries have better access to raw materials and more products can be processed. There is increased competition domestically for local raw materials. There is improved coordination and integration across government departments, with enhanced transparency in the sub-agricultural system. Because of this, there is a greater opportunity to implement policies for supporting farmers.

Environmental Sustainability:

Sustainable food production is supported by the government, enhanced technology, and fewer food imports.

Scenario 4



This scenario featured a high degree of trade integration and high agro-food sector development with a lower orientation towards inclusive and healthy food policies, and higher resilience to environmental change. Key themes that emerged are:

Food and Nutrition Security:

Nutrition will be marginalized, with high levels of obesity and poor health. Children's nutrition will further decline, and dietary consumption will be poor on the whole. Health and safety will be a major concern in this scenario. The government will need to safeguard food safety, respond to the growing nutrition crisis, shore up the national health infrastructure, and implement social safety nets to protect small farmers.

Economic and Social Wellbeing:

There will be high inequality between socio-economic classes and negative outcomes for women. Small scale agriculture will decrease, and rural poverty will increase, driven partly by high trade integration, domination by larger farms, and large proportions of imported food. Limited opportunities for the youth will be linked with potential conflict. Farmers will need a greater degree of specialization and investment to survive. The agri-food sector will benefit from development but will need to focus on improved safety and management of food loss and waste. Processing and transportation in food sector will also benefit. The government will need to implement appropriate laws for enabling trade integration, managing improved trade revenues and taxes.

Environmental Sustainability:

Policies should be aimed at minimising environmental degradation.

Discussion

The scenario elaboration was followed by a plenary discussion focused on the changes needed today to achieve the main food system goals for Ghana. Led by **Dr Jim Woodhill (Foresight4Food)**, the discussion resulted in the following outcomes:

- The private sector's importance in the food system in relation to scaling up productivity and quality, improving regional markets, providing access to loans and low interest rates, and preparing Ghana for the local, regional, and international trading environment.
- The UNFSS presents an opportunity to improve the overall food systems situation in Ghana.
- There are big disparities in outcomes for stakeholders across the food system, particularly between consumers and farmers.
- Governmental departments will benefit from taking a holistic and food system approach.
- The livestock sector will need increased attention beyond crop production given its contribution to livelihoods and health.

Appendix A: Agenda (Food Systems Mapping)

Session 1 Food Systems: Monday 10 May 12:30 – 17:00 Accra time

12:30 Start up, Welcome and Introductions (John/Monika Overview of Project)

12:40 Link to Food System Summit: Ghana perspective (Charles/Paulina)

12:50 Building on previous work (Jim)

13:00 Breakouts #1: Participant introductions/role in Ghana food system; Degree of Food Systems Thinking in your work/how Food System Thinking could improve your work (Facilitation by Annabel, Jim, and John)

13:30 **Presentation 1.1 Food systems and the value of the food system approach** (John) (During the presentation, note 2-3 things that concern you about the Ghana Food System)

13:45 **Presentation 1.2 Framings, Boundaries and System Mapping; Rich Pictures** (Annabel)

14:00 Breakouts #2: each group agrees 1 food system outcome for further discussion in Breakout #3 (Facilitation by Annabel, Jim, and John)

14:30 Break

15:00 Breakouts #3: Rich Picture on Breakouts #2 topics (Facilitation by Annabel, Jim, and John on Google JamBoard)

15:45 Group Feedback

16:00 **Presentation 1.3 Stakeholders and Stakeholder Mapping** (John)

16:10 Breakouts #4: Stakeholder Mapping of major issues for Group's issue

16:40 Group Feedback

16:55 Summary of Day 1 (John)

17:00 Close

Session 2 Foresight: Wednesday 12 May 09:00 – 13:00 Accra time

09:00 Start up, Welcome and Reflections on Session 1 (Charles)

09:15 Overall plan for the Project (Monika)

09:20 **Presentation 2.1 What are drivers?** (Monika)

09:30 Introduction to exercise on implications of trends and drivers for food system outcomes (John)

09:35 Breakouts #1: food system tends and drivers (Facilitation by Annabel and John)

10:30 Group Feedback

11:00 Break

11:30 **Presentation 2.2 What is Foresight?** (Saher)

11:45 Breakouts #2: Identify trends of concern, and implications of Food Systems/Foresight approaches for the Dialogues and Summit (Facilitation by Monika and Jim)

12:30 Group Feedback (Jim)

12:50 Summary of Course (John) Next steps: Scenarios Workshop (Monika)

13.00 Close

Appendix B: Participant List (Food Systems)

Session 1

1. John Amimo (AFRACA, African Rural and Credit Association)
2. Mary Mpereh (National Development Foundation)
3. Mark Offei (FAO – nutrition and food systems focal point)
4. Ibrahim Akalbila (Ghana Trade and Livelihood Coalition)
5. Victoria Adongo (Peasant Farmers Association of Ghana (PFAG))
6. Abdulrazak Ibrahim (FARA)
7. Edward Kareweh (General Agricultural Workers Union)
8. George Akuriba (Lecturer, ReCAS)
9. Theophilus Larbi (IFAD)
10. Chrysogonus Anab (TAMA Foundation)
11. Kwaku Antwi (FARA)
12. Augusta Clottey (National Association of Seed Traders)
13. Kofi Takyi (Research Fellow, Institute of Statistical, Social and Economic Research (ISSER))
14. Hafiz Muntaka (Ghana OXFAM)
15. Charles Nyaaba (Peasant Farmers Association of Ghana (PFAG))
16. Dr Ophelia Amoako (Research Scientist, SCRI)
17. George Prah (Directorate of Crop Services)

18. Francis Amagloh (University in Kamale)
19. Thomas Essel (AFRACA)
20. Paulina Addy (Head of the Food and Agriculture Development Directory)
21. Wepia Adugwala (Board member, Peasant Farmers Association of Ghana (PFAG))

Session 2

1. Francis Amagloh (University in Kamale)
2. John Amimo (AFRACA, African Rural and Credit Association)
3. George Akuribo (Lecturer, ReCAS)
4. Kofi Asante
5. Hafiz Muntaka (Ghana OXFAM)
6. Victoria Adongo (Peasant Farmers Association of Ghana (PFAG))
7. Wepia Adugwala (Board member, Peasant Farmers Association of Ghana (PFAG)
8. Ibrahim Akalbila (Ghana Trade and Livelihood Coalition)
9. Thomas Essel (AFRACA)
10. Ophelia Amoako (Research Scientist, SCRI)
11. Theophilus Larbi (IFAD)
12. Kwaku Antwi (FARA)
13. George Prah (Directorate of Crop Services)
14. Augusta Clottey (National Association of Seed Traders)
15. Mark Offei
22. Paulina Addy (Head of the Food and Agriculture Development Directory)
16. Mary Mperah (National Development Foundation)

Appendix C: Agenda: Scenario Development

Day 1: 23 June 2021

09:00 Welcome and Introductions (*Monika Zurek*)

09:15 Presentation: Recap of Workshop 1 (*Monika Zurek*)

09:30 Presentation: Introduction to foresight and scenario process to be used in this workshop (*Jim Woodhill*)

09:45 Presentation and Discussion: How does the Ghanaian Food System look like today? (*Charles Abugre*)

10:15 Introduction to BoGs: What are the main concerns and interests for the different stakeholder groups for the next 10 years? (*Jim Woodhill*)

10.20 Breakout Group work (using Mural): List of interests and concerns of different stakeholders

11:00 *Coffee break*

11:10 Report back from BoGs work: A list of key concerns and interests for the Ghanaian food system by stakeholders (*Monika Zurek*)

11:25 Introduction to breakout group: Drivers overview (*Jim Woodhill*)

11:35 Breakout Group work (using Mural): What are key future trends that might affect the food system and what are the shocks, stresses and uncertainties that will affect the food systems?

12:15 Report back and plenary discussion with voting: Which ones are the most important and most uncertain drivers for the Ghanaian Food System over the next decade? -> Four scenarios (*Jim Woodhill*)

12:45 Wrap up and outlook to Day 2 (*John Ingram*)

13:00 Adjourn

Day 2: 28 June 2021

9:00 Introduction and recap of Day 1 (*Monika Zurek*)

9:15 Presentation: Introduction to Breakout Group work: Fleshing out the scenarios – How does Ghana and its food system look like in 2035 in each scenario? (*Monika Zurek*)

9:25 Breakout Group work (30min): Imagine Ghana in 2035 in your scenario: Write post its/call out descriptors of that future. And describe why did this occur.

9:55 Report back on key themes in each scenario by facilitators and discussion of each scenario (*Jim Woodhill*)

10:15 *Coffee break*

10:30 Break out groups (30 min): How would different scenarios affect the different stakeholder groups?

11:00 Report back from BoGs and discussion on how each scenario affects the stakeholders (*Monika Zurek*)

11:20 Discussion: What changes are needed today to achieve the Food System goals identified in Day 1 under all scenarios? (*Jim Woodhill*)

11:50 Wrap up, reflecting on the scenarios for your own work and the UN Food Summit (*John Ingram*)

12:00 Adjourn

Appendix D: Participant List (Scenario Development)

Session 1:

1. George Akuriba
2. Gordon Kofi Sarfo-Adu (Forestry Commission)
3. Seth Adu-Afarwuah
4. Sylvester Koranteng
5. Ibrahim Akalbila
6. Sam Danse
7. David Kpelle

8. Theophilus Otchere Larbi
9. Angela Dannson
10. Akasamoah
11. Moses
12. Phyllis Parbey
13. Tilly
14. Gideon Ashitei
15. Mary Mpereh
16. Patricia Sampson
17. Victoria Adongo
18. Bagbara Tanko
19. Gloria Essilfie
20. Charles T Nornoo
21. Maame Addo
22. Maame Yiadom
23. Wepia A. Awal Adugwala
24. Benedicta Aganiba
25. Rev John Manu
26. Charles Asem-Bansah
27. Esther A Gyinde
28. Benjamin Ninnoni
29. Enoch Amasa Ashie (Forestry Commission Wildlife Division, Takoradi)
30. Elliot Ansah
31. Raannan Cos
32. Esenam Bonsu
33. Alhaji Issifu Seidu Iddi
34. Felix Oteng
35. Henry K Crentsil Jr
36. Lydos
37. Peter Aboagye
38. Simon Ogah
39. Bertha Karbo
40. Richard Twumasi Ankrah
41. Desmond Dugbatey
42. Mark Kofi Tettey
43. Lydia Fiatuho
44. Atieno
45. Charles Abugre

Session 2 :

1. Gordon Kofi Sarfo-Adu
2. Sylvester Koranteng
3. George Agana Akuriba
4. Albert Oppong-Ansah
5. Lydos
6. Obrien Nyarko
7. David Kpelle
8. San Danse

9. Wepia A. Awal Adugwala
10. Kwaku Antwi
11. Victoria Adongo
12. Dr Ophelia Amoako
13. Anna Obernoster
14. Jim Woodhill
15. John Ingram
16. Monika Zurek
17. Roger Sykes
18. Atieno
19. Charles Abugre
20. Saher Hasnain

Annex 3.1: Uganda Country Report

Foresight4Food
International Collaborative Initiative

OSF Project Report

Ugandan Food System

Charles Muyanja and Catherine Nankinga

Executive summary

Although Uganda has transformed into a middle-income economy, agriculture remains a core engine to drive transformation. Agrobiodiversity and a good climate in most parts of the country provides impetus for food production, trade and market development, industrial growth and overall improvements in employment and livelihoods. Agriculture employs more than half of all Ugandans and contributes more than 20% of the Gross Domestic Product (GDP). The COVID-19 pandemic and its associated disruptions with lockdowns and limited movement did not affect the agricultural sector. Agriculture has remained a cushioning sector and lifeline of many households who have been put out of work due to pandemic containment measures. Uganda has the potential to grow enough food to feed its population and other markets within the East African Community and the world at large, but her food systems are challenged with poverty and food and nutrition insecurity. Lack of competitive edge is a norm for the agro-food sector. Some of the challenges in the Ugandan food system are food loss and waste, lack of quality infrastructure, negative effects of climate change on productivity and livelihoods, rapid urbanization, youth unemployment, gender inequality, and pressures on natural resources and eco-systems. The burden of non-communicable diseases (NCDs) is on the increase with 24% of adult women and 9% of men being overweight or obese. Raised blood pressure is also estimated at 24% in adults while 7% have raised cholesterol levels. While Uganda currently has a relatively small urban population (25% of the total overall population), it is projected to increase to 50% by 2040, which will put further pressure on food systems.

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1. Introduction

Today's unsustainable and inequitable food systems demand attention. Top-down rural development, industrial agriculture, and oligopolistic food systems have been increasingly called into question (Altieri et al., 2017; IPES-Food 2017). Furthermore, the production, distribution, and consumption of food and related activities are responsible for biodiversity loss, water depletion, and land degradation and cause up to 29% of anthropogenic greenhouse gas emissions (Vermeulen et al., 2012; Allen and Prosperi 2016; IPES-Food 2016). Malnutrition is on the rise, with an estimated 821 million undernourished people (FAO et al., 2018), as well as 1.9 billion overweight adults, of which 672 million are obese (HLPE 2017).

Uganda's food system has changed over the years and it's still growing due to different drivers, but to have a clear picture about our country's national food system, we need to use the data available on different drivers to analyse the change.

Working with several stakeholders from government, private sector, production, and academia to understand the current status of foods system of our country, discussions of how the food system in Uganda is growing, the challenges it's facing, and the possible solutions were put on the table for discussion. They also made their contributions basing on how the food system has been the previous years, the current situation in the country, and the predictions soon.

1.1. Situation analysis of food systems

1.1.1 Global context

The global food outlook is one of demand and supply uncertainty with fast-expanding food markets and a surge in the food import bills across continents. By 2020, up to 3 billion people could not afford healthy diets. In effect, world hunger increased under the shadow of the COVID-19 pandemic and drove up the prevalence of undernourishment by 1.5%. Current estimates put the undernourished at 768 million, inclusive of an estimated 118 million added from the time of the pandemic. The undernourished proportion is now around 9.9% of the global population, heightening the challenge of achieving the Zero Hunger target by 2030 (FAO, IFAD, UNICEF, WFP and WHO. (2021). Stunting in children under 5 years of age affects about a quarter of all children (149.2 million), while among adults, 677.8 million are obese, 1.13 billion have raised blood pressure and 422.1 million suffer from diet-related type 2 diabetes mellitus (Development Initiatives (2020).

Unhealthy food environments and diets, inadequate consumer protection and poor consumer behaviour and choices among other factors, are responsible for the rise in non-communicable diseases (NCDs), especially the four of the world's top ten leading risk factors causing death: high blood pressure, high blood glucose, cancer, overweight and obesity (WHO, 2018). About 8 million deaths annually are attributable to excess consumption of food high in sodium and other salts, sugars, and fats, particularly saturated and trans fats, and inadequate consumption of whole grains, pulses, vegetables, and fruits. Together, these risks contribute to around one-third of all deaths (WHO, 2020). The challenge of food safety is also linked to unhealthy diets. Despite no specific globally agreed on food safety target for 2030, by 2018, reports indicated an additional global burden of more than 1 million food borne illnesses.

1.1.2 African Context

The African continent is endowed with indigenous food systems that encourage wholesome foods rich in essential nutrients, dietary fibre, and low refined sugars and fats. However, there is a seemingly high cost of nutritious food on the African continent and the burden of malnutrition remains high. Estimates indicated that in 2020 up to 281.6 million Africans (21%) were undernourished, with Eastern Africa contributing 125.1 million (28.1%) FAO, IFAD, UNICEF, WFP and WHO, 2021). Furthermore, the continent contributes 74% of the 3 billion people who cannot afford healthy diets. In effect, malnutrition costs economies between 3 and 16% of GDP annually (AUC, 2015). Stunting on the continent also reduced from 34.5% in 2012 to 30.7 in 2018 (Development Initiatives, 2020). This situation complicates the path towards the African Union target of reducing stunting to less than 10% on the continent.

1.1.3 Uganda Context

Uganda has registered significant progress in reducing the proportion of households in the subsistence economy from 69% in 2016/17 to 38% in 2019/20 with agriculture, forestry and fishing being the third contributing factor for household income (UBOS 2021). But over 10 million people experience some level of food insecurity of whom about 2.6 million (23%) face acute levels (FEWS NET, 2020). The problem is exacerbated by the resurgence of crop and livestock pests and diseases, declining land for food production, reduced household buffer stocks, rising food prices and poor consumer choices dictated by cost. Anaemia in children increased from 49% to 53% from 2011 to 2016 (UBOS, & ICF, 2018). 24% of Uganda's women and 9% of men are overweight or obese as the NCD burden progressively escalates especially among adults in urban areas (UBOS, 2020).

Although Uganda is generally self-sufficient in food supplies, food shortages still occur. This can be attributed to limited use of appropriate agricultural technology, over-dependence on rain-fed agriculture, lack of markets and market information, inadequate rural financial services, poor feeder roads, poor and inadequate storage and processing facilities, stress food sales and inadequate buffer stocks. Food shortages are further exacerbated by civil strife, low incomes, poverty, man-made and natural disasters such as prolonged droughts, landslides and civil strife.

Like many other countries around the world, Uganda is battling with a triple burden of malnutrition with the prevalence of stunting at 29%, wasting at 4%, underweight at 11%, overweight at 4%, and Iron deficiency anaemia at 53% among children under five years of age. This trend is also observed in adults where 9% of Women of Reproductive Age (WRA) are thin and 24% overweight/obese and 32% anaemic. There has also been an increase of diet related health conditions including obesity, diabetes, Cardio-vascular disease (CVD), coronary heart disease (CHD), and cancer (Black et al., 2013; UDHS, 2016; Adebayo et al., 2019).

Over nutrition is largely attributed to the changing food environment and a transition to a sedentary lifestyle as well as consumption of unhealthy diets where consumption of home-grown plant-based foods have been replaced by ultra-processed foods and beverages commonly purchased especially among high-income households which are associated with several chronic diseases. This transition in diet has led to a rise in Uganda's Mean Dietary Energy Consumption (DEC) from 2156 kcal/person/day in 2012 to 2,226 kcal/person/day in 2016 with households in West Nile (2,573 kcal/person/day) and Ankole (2,463

kcal/person/day) consuming the highest, above the WHO recommended calorie intake for an average adult of 2000-2500 kcal/person/day (UBOS, 2016).

Meanwhile, food safety remains a very big issue in Uganda. Multiple but limited small food-borne infectious disease outbreaks have been reported in the country in the past. The most recent outbreak of food poisoning occurred in North-eastern Uganda in 2019. This provides us with reminder of the importance of developing the capacity of the food system to detect toxins and infective agents that contaminate foods in a timely manner to facilitate response.

2. Food Systems.

High Level Panel of Experts for Food Security and Nutrition (HLPE, 2014) defined food systems "gather all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, marketing, distribution, preparation and consumption of food and the output of these activities, including socioeconomic and environmental outcomes".

Food systems refer to the sum of actors and interactions along the food value chain. The term food system is used frequently in discussions about nutrition, food, health, community development and agriculture. A food system includes all processes and infrastructure involved in feeding a population: growing, harvesting, processing, packaging, transporting, marketing, consumption, distribution and disposal of food and food-related items. It also includes the inputs needed and outputs generated at each of these steps. A food system operates within and is influenced by social, political, economic, and environmental contexts.

Food system and their drivers

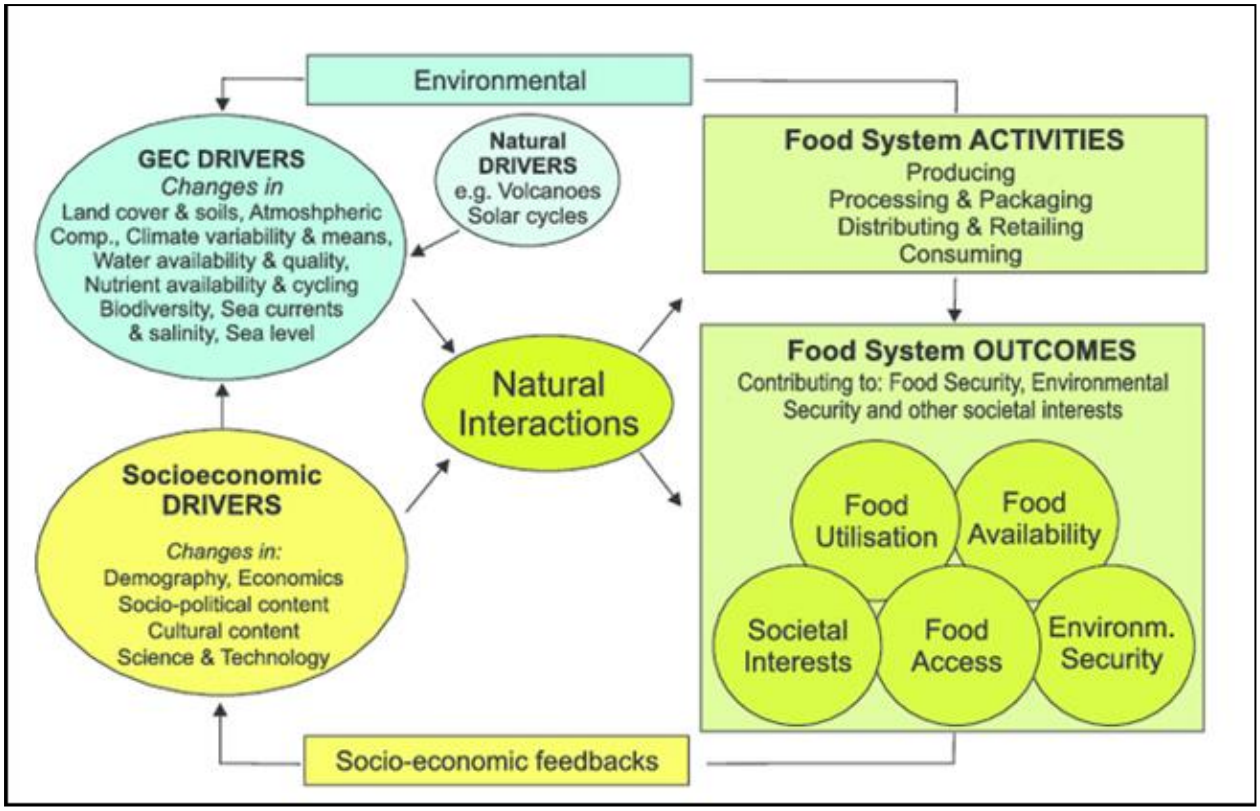


Figure 11 Food System and Drivers (Source: GECAFS, 2005)

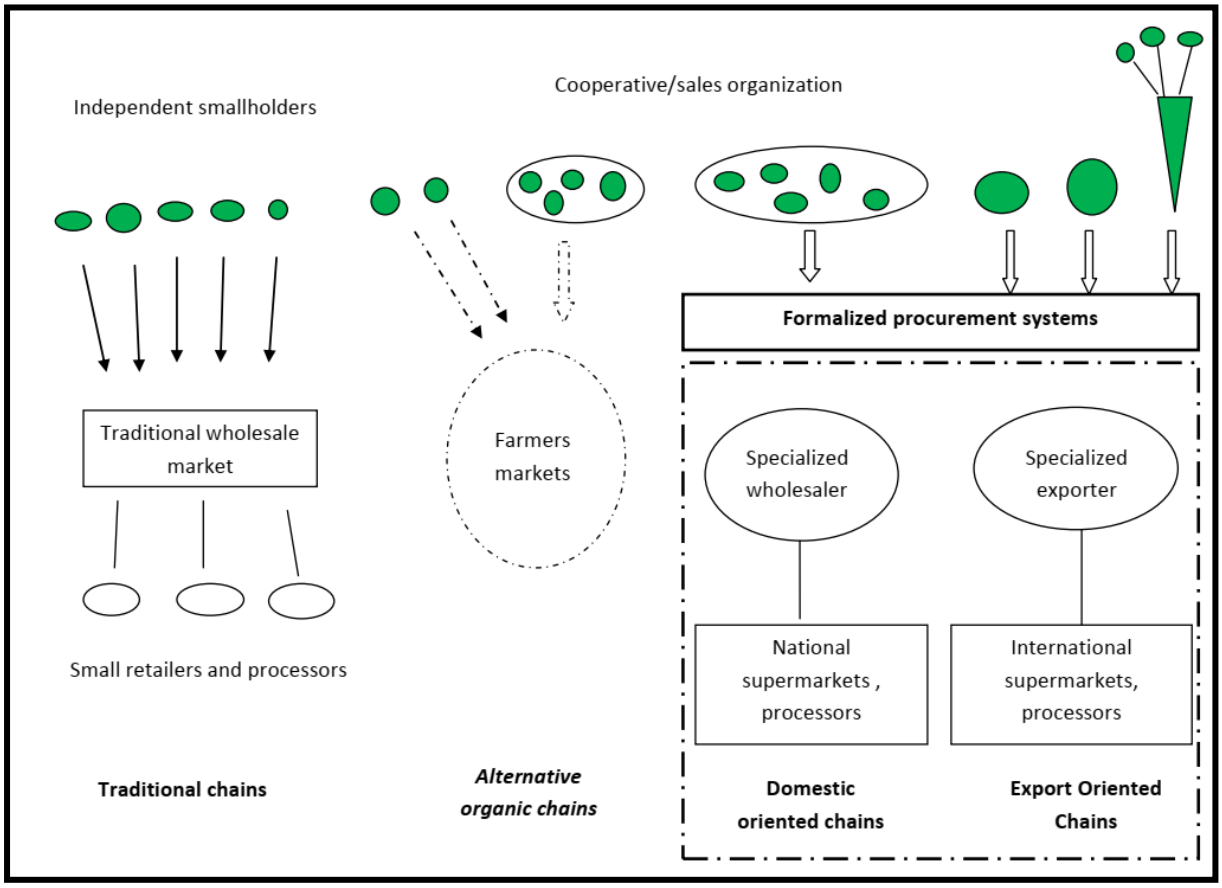


Figure 12 Food Systems in Developing Countries: balance between modern, traditional, and hybrid (Source: Kledal 2009)

2.2 Food system activities

These include production to processing, distribution of these products, and consumption. At all these stages, there is a component of storage and disposing off or reusing of some materials. In a similar way many materials are being transformed and value addition is done to improve the final product of the produce. It is important to keep in mind that with all these activities there are factors such as trade, marketing, and transportation.

2.3 Food system outcomes

Food system outcomes refer to “what we get” (the outcomes/ results) from “what we do” (food system activities).

The impacts of the activities conducted in the food system are divided into three categories.

- Socio economic outcomes include
    - income levels of people,
    - wealth,
    - employment,
    - social and political capital,
    - human capital and livelihoods of people.
- Food security outcomes include
    - food utilization, which is looked at in terms of nutritional value, food safety and social value,
    - food access, which includes affordability, allocation, and preference,
    - food availability,
    - distribution and exchange.
- Environmental outcomes include the effect of food system activities on land, soils, fossil fuels, minerals, biodiversity, water, and climate.

2.4 What shapes the food system?

- Policy: Agricultural and food policy includes the regulations producers need to follow to sell their goods, government aid to producers and consumers, trade agreements, and more. Uganda is strengthening, reforming her food law, policies, and regulations to ensure that a healthy and sustainable diet is maintained
- Climate: Climate and weather patterns have always had a large impact on farming. There’s no question the unpredictable weather patterns, extreme temperatures, floods, and droughts brought on by climate change add more uncertainty to the food system. Seed scientists are working to breed drought-resistant and heat-loving varieties that are adapted to local conditions. Many universities and research groups are searching for climate-smart ways to ensure that we can grow food and get it to those who need it for generations to come.

2.5 What moves food through the food system?

- Labour: Farmers, family members and community members, farmers’ market staff, supermarket staff, meat plant workers, restaurant staff—it requires an incredible amount of human effort to get food from the field onto plates. Providing workers, a living wage and safe working conditions can help protect the people who make it possible for us to eat.

- Energy: The food system can be very energy-intensive, with all the fuel and electricity needed to power tractors, farm equipment, factories, delivery trucks, restaurants and grocery stores, and kitchen appliances.
- Waste: Food is packaged and repackaged as it moves through the food system, and there are losses at every step. Reducing packaging, recycling used packaging, and turning waste into biogas or compost can slash waste within the food system.

3. Key features in Ugandan food systems

Productivity levels are relatively low and food availability is highly seasonal. Only one third of the crop production is marketed and less than 7% is exported (CIAT, 2017). Over 85% of farmers sell crops directly in local markets (FAO, 2019). Data on catering, retail, packaging, and handling of waste food in Ugandan situation has not been fully documented because they normally function in the informal sector. The fear of taxation also hinders information sharing between the informal sector operators and relevant bodies such as academia and UBOS thus limiting documentation of relevant information.

Factors contributing to low productivity, seasonal availability and limited market opportunities are listed. These were generated through interaction with stakeholders over online (zoom) meetings during the national food track summit dialogues on food systems and physical meetings with World Food Program and the Ministry of Health. The stakeholders interacted with included government officials, academics, production, and implementing partners:

1. Government influence on what is done in the food supply system (agricultural production as conducted by farmers, food storage, transport and trade, food processing, food provision and food consumption) is limited.
2. Congestion makes transportation of food, especially perishable food to parishes within the country more especially Kampala, very cumbersome.
3. Cold storage and cold transportation are uncommon leading to food losses.
4. There is a lack of access to high quality inputs, including seed and poor agronomic practices. The practice of seed saving is still common in rural farming communities.
5. Enabling environment of rural transport network is poor, research infrastructure is not well developed and poorly financed, and regulations and institutional arrangements are not coordinated.
6. Food safety and quality along the food value chains is poor and not effectively monitored.
7. Awareness of what healthy (nutrient-rich) and safe food is low, consumers have insufficient knowledge and purchasing power ranges is variable across the population.
8. Extension services, financial services and technological support are limited, and agro-chemical providers are not knowledgeable and sometime unscrupulous.
9. The food system is characterized into rural and urban food systems. Urban food system is mainly for job creation, rural food system is for household livelihood.
10. There is high food loss and waste which leads to food insecurity, loss of resources, labour, and energy in food production.
11. Livestock production is on the increase which contributes to GHG emissions. Deforestation to increase agricultural land is common, resulting in land degradation and erosion.

3.1 Critical uncertainties of Uganda's food systems

- **Poverty:** Poverty reduction is essential for productive human resource in the food system.
- **Unemployment:** Increase in number of unemployed people may further drive migration to cities.
- **Women's economic equality/empowerment:** Women are key in food production. If inequality increases and they are denied access to land for agriculture, the food system can be greatly affected. Gender has a key role in food systems change. Empowering women in agriculture can shape the Uganda's food system in a different way.
- **Climate change:** Rainfall and temperature changes could impact on food system greatly if climate mitigation policies are not put in place.
- **Land use:** Increased population of human and domestic animals and higher pressure on land usage may result in reduced crop yields, land degradation, and climate change. Agriculture practices such as follow rotation may be affected. This may call for improvements in unit production per unit resource.
- **Water Availability:** As the population increases more food will be required which demands an increase in water utilization, and to some extent may cause water pollution. More water will be required for both agriculture and industrial production. As population increases with urbanization, domestic water needs will increase as well.
- **Pests and diseases:** Climate change may worsen pest and disease problems which the current control methods cannot deal with. Such situations may result in changes in agricultural practices.

3.2 Drivers of change in Uganda's food system

Drivers have a great influence on the food system activities from the time of production to the time of consumption. This brings about outcomes like food and nutrition security, economic, social well-being, and environmental sustainability.

Drivers are defined as any natural or human-induced factors that directly or indirectly causes change in a system. These drivers could be direct or indirect, human, or biophysical, dependent, or independent, and primary or secondary.

Drivers of change in the food system:

- Demographic (e.g., population, age structure, etc.)
- Economic (e.g., globalization, trade, market, and policy frameworks, small or large farmers, demand for certain commodities)
- Environmental change (e.g., climate change, land degradation, water pollution)
- Socio-political (e.g., governance and institutional frameworks, gender attitudes, incentives for farmers & food processors & retailers)
- Science and Technology (e.g., type of agricultural technologies, intensification practices, ICT, information management)
- Cultural and Religious (e.g., food habits, taboos around food)

Drivers of change in Uganda's food system are:

- **Climate:** Unpredictable rain patterns affect the productivity of the food system. The impact of agriculture on climate has changed the nature of food produced and consumed.
- **Technology:** Technological developments affect the way food is produced. Use of inputs such as hybrid seeds and commercial fertilizers affect food productivity.
- **Trade:** Policy emphasis on value addition to support regional trade may focus on export-orientation at the expense of the local food system.
- **Demographics:** Age distribution of the population greatly affects the industrial food sector's offer.
- **Urbanization:** While Uganda still has a relatively small urban population (25% of the total overall population); this is projected to increase to 50% by 2040 (World Bank 2020). Urbanization has been fuelled by the population growth and lack of employment in rural areas particularly for the youth.
- **Markets:** Linking small-scale farmers to markets can stimulate change in food produced and the way they produce it to meet market requirements. Improving road infrastructure in rural areas where the farmers are located improves their access to markets. The growth of local and multi-national supermarkets provides a large market for small scale food producers.
- **Policy:** Policies should support food system activities, for example, the Uganda National Coffee Bill 2018, restricts farmers from engaging freely in coffee farming and proposes a 2% tax on every kilogram of coffee sold, which demotivates stakeholders.

3.3 Status and directions of key Uganda food system outcomes

1. Promotion of agricultural industrialization can encourage a push to diets rich in ultra-processed foods. This can increase overweight and obesity prevalence in the Uganda population. However, the agricultural industrialisation agenda of NDP III could be utilised to support increased mechanisation and irrigation.
2. Poor agronomic practices can lead to the destruction of natural resources, contribute to climate change and loss of agricultural biodiversity.
3. Discrepancies in livelihoods and purchasing power will lead to some eating poorly, thus contributing to NCDs.
4. Lack of financial support and investment for small scale farmers will lead to inadequate food production as they contribute the biggest percentage of food production in the country. Increase in food prices aggravates food accessibility and affordability.
5. Crop yields will continue to be affected because of natural resource degradation and increased pest and diseases due to climate change. The demand for land for agriculture and for urban development is on the increase, thus affecting arable land available for food production. Land grabbing has become rampant, mainly affecting underprivileged and marginalized persons.
6. Competition for land and water resources will increase because of the increase in agriculture, climate change pressures, industrial development, and urbanization.
7. The demand for food is growing whereas land for production is decreasing. There is a low per capita dietary energy supply (kcals per person) and food availability (kg/capita) for nutritious foods and value chains such as milk, poultry, eggs, fruits, and vegetables.
8. There are a few indigenous nutritious foods prioritized as strategic commodities with focused agriculture extension and value chain development programmes. There is a

need to preserve and develop indigenous chains in terms of biodiversity, productivity, and value addition to provide for incomes, food security, nutrition and resilience.

4. Hunger

Hunger in the country remains high; on average, four out of every ten Ugandans are unable to meet the required dietary intake. There is a high reliance on staples for caloric intakes and yet their productivity is low (Birungi, 2020; Hunger et al., 2017, Ssewanyana & Kasirye, 2010).

The diets of most Ugandans remain inadequate both in terms of quantity (adequacy and availability) and quality (diversity and safety). On average, in the last seven years, Ugandans have been consuming 1,860 kcal per day, as opposed to the minimum required intake of 2,200 kcal per person per day. Although there has been an improvement in the quality of diets as reflected by a dietary diversity score (number of food groups consumed over time) that grew from 7.6 in 2009/10 to 8.2 in 2015/16, the improvement remains below the average recommended score of 9.2 as reflected in the USAID report, Feed the Future, 2020. The trends in caloric intake, based on Uganda's geographical regions, shows that eastern Uganda is regressing, registering an increase in the prevalence of food insecurity from 33 to 46% during the 2009/10 and 2015/16 reporting periods. Despite the low caloric intake observed in the eastern and northern regions, households in these regions consume a wider variety of food groups relative to their counterparts in the western region. Apparently, the expansion of cash crop production in eastern Uganda (especially sugar cane and rice), is achieved at the cost of food production. This factor coupled with increasing land fragmentation appears to have compromised food and nutrition security in eastern Uganda (Birungi 2020).

4.1. Nutrient Deficiency-

The typical diet in Uganda is relatively low in dietary diversity and micronutrient-rich foods. A study in Kampala and two rural regions in southwestern and northern Uganda revealed substantial variation in food and micronutrient intakes across regions. It also showed widespread inadequacies in people's intakes of vitamin A, vitamin B-12, iron, zinc, and calcium—micronutrients for which foods of animal origin are good sources (Harvey, Rambeloson, and Dary 2010). A study in Kiboga district, North Central region, found that the study population's diet was high in white roots, tubers, and bananas and low in other fruits and vegetables and animal-source foods (Nabuuma, Ekesa, and Kennedy 2018). In urban Uganda, fruit and vegetable consumption is low and is influenced much more by educational status than by household income, suggesting that more should be done to raise awareness of the importance of fruit and vegetable consumption (Madhavan-Nambiar et al. 2015). An analysis of the diets of pastoralist and agro-pastoralist households in the cattle corridor, North Central region, found that meat, poultry, and eggs were consumed infrequently even among pastoralist households (Black et al., 2013; Mayanja et al., 2015).

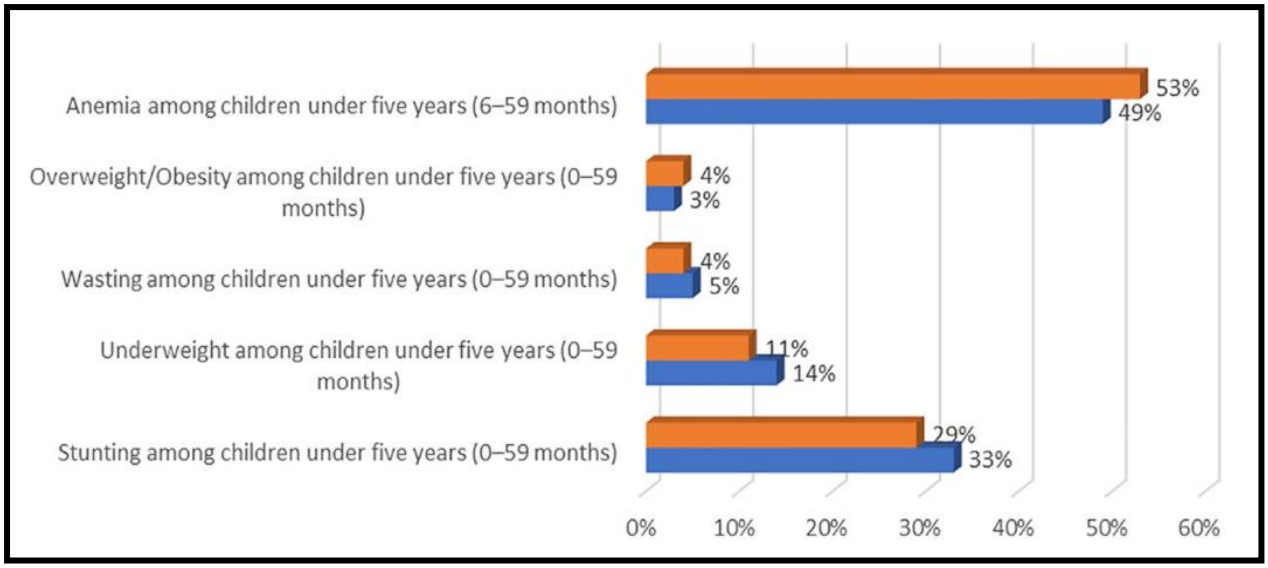


Figure 13 Comparison of Demographic and Health Survey Data for Malnutrition in Children (Source: DHS 2011, DHS 2016)

4.2 Stunted children

Stunting rates remain high and continues to pose a serious challenge to the health and productivity of Uganda's future workforce if more is not done to correct the situation. Uganda's child stunting rate is 28.9% and its child wasting rate is 3.6%, down from 33% (2011) and 29% (2016) (UDHS, 2016). Stunting increases with age, peaking at 37% among children 18-35 months. Stunting is greater among children in rural areas (30%) than urban areas (2%) with some regional variations. Stunting ranges from a high of 41% in Tooro sub-region to a low of 14% in Teso sub-region (UBOS & ICF, 2018).[4]

Uganda's child mortality rate is 5.3%, down from 17% in 2000. Uganda's Second National Development Plan (NDPII, 2015/16– 2019/20) highlights the country's commitment to "end hunger, achieve food security and improved nutrition" (GoU 2015). It includes a target for reducing stunting to 25% by 2019/2020 and eliminating all stunting by 2040. A study in rural Uganda, Ankole region, found that the main predictors of stunting were low access to appropriate complementary diets, the sex of the child (with boys more likely to be stunted than girls), food insecurity, low knowledge about stunting by the primary caregiver, and poor socioeconomic status (Bukusuba, Kaaya, & Atukwase 2017).

[4] Undernourishment values refer to the prevalence of undernourishment for the country's population as a whole.

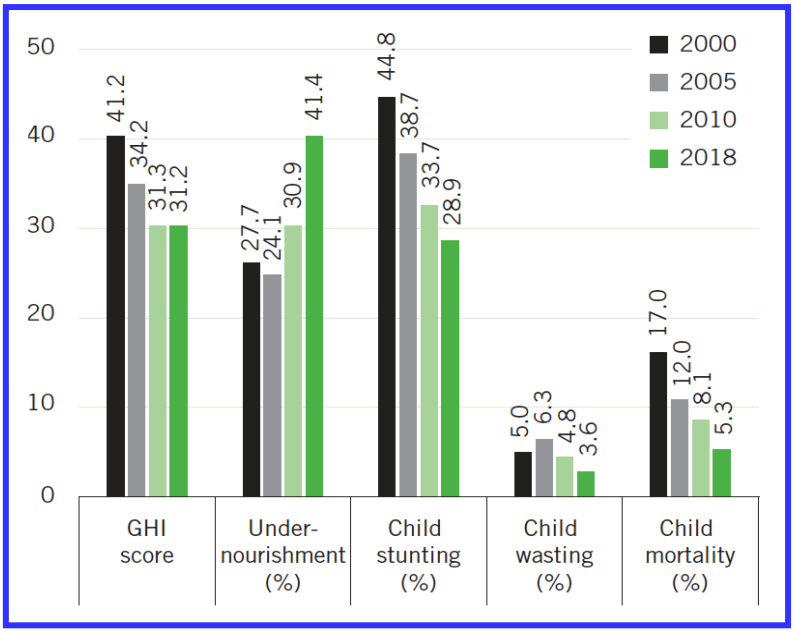


Figure 14 Uganda's Global Hunger Index Scores and Indicator Values for 2000, 2005, 2010, and 2018

The prevalence of stunting decreases with increasing levels of the mother's education. About 4 in 10 children born to mothers with no education (37%) are stunted compared with 1 in 10 (10%) of children born to mothers with more than a secondary education. Similarly, stunting decreases with increasing wealth quintiles, from 32% among children in the lowest wealth quintile to 17% of children in the highest wealth quintile. Prevalence of wasting (low weight-for-height) nationally is 4% but in the regions of Karamoja and West Nile prevalence is 10%. Anemia, which reflects several micronutrient deficiencies, infections and, even genetic traits in malaria-endemic areas, affects more than half of children under 5 years and 1 in 3 women. Regional differences in anemia prevalence among women range from 17% in Kigezi sub-region to 47% in Acholi sub-region (UBOS and ICF 2018). Moreover, even though coverage of iron supplementation for pregnant women (for at least 90 days) increased from 4% in 2011 to 23% in 2016, anemia prevalence has increased in women from 23% in 2011 to 32% in 2016.

At the regional level, there is substantial variation in children's nutritional status. The highest regional stunting rate, at 40.6%, is in Tooro region in the west of the country, and the highest regional wasting rates—10.4% in West Nile and 10.0% in Karamoja—are in the north. Karamoja's high wasting rate can be explained at least in part by its high levels of poverty, food insecurity, and childhood diseases, while the high wasting rate in West Nile may be influenced by its large refugee population, which has high rates of child undernutrition (Buzigi 2018).

The prevalence of acute malnutrition (wasting) in Uganda among children 6 to 59 months of age is 4% and 10% for West Nile sub region, in refugee humanitarian settings, where refugees from South Sudan and Congo are harboured. The condition varies with different regions, highest in the western region particularly Tooro sub region with 41% and lowest in the Teso sub region with 14%. This is higher than the World Health Assembly's target to reduce and maintain the prevalence of wasting in children to less than 5% by 2025. Underweight was also mostly recorded in the rural areas particularly the Karamoja where the percentage was the highest (26%). The possible reason for this in Karamoja is that it is a war zone which can affect

food circulation, transportation, and cultivation. The nomadic lifestyle in the region could also be a possible contributing factor.

4.3 Malnutrition

In low- and middle-income countries, both under nutrition and a growing problem with overweight and obesity are mainly due to maternal and child malnutrition. Poor nutrition of women at the time of conception and during pregnancy along with nutritional status of children from 0 to 24 months are important determinants of both undernutrition in childhood, obesity, and related diseases in adulthood (Robert et al., 2013). The highest proportion of World's Iron deficiency Anemia (IDA) in pregnant women is in Africa followed by Asia. Collectively, fetal growth restriction, stunting, wasting, and deficiencies of vitamin A and zinc along with suboptimum breastfeeding is a cause of 3.1 million child deaths annually or 45% of all child deaths in 2011 (Robert et al., 2013). Agriculture, nutrition, and health are highly interconnected and intervention in one has enormous effect on the other. Therefore, interventions that integrate knowledge in agriculture and nutrition have a crucial impact to address the determinants of community nutrition in sub-Saharan Africa.

Farmers also have inadequate knowledge on food post- harvest handling which hinders availability of food and the consumption of nutritious foods necessary for healthy and active lives. Most households suffer from food insecurity since the food produced is stored in the rural storage facilities where tremendous deterioration, mould growth and food losses occur during rainy season. Seasonality, poor handling, and processing technologies of perishables results in loss after harvesting.

In terms of malnutrition, the 2016 Uganda Demographic and Health Surveys (UDHS) showed that stunting levels, an indication of chronic undernutrition in children 6-59 months old affect 29% of this vulnerable population equivalent to nearly 2 million children. As indicated in the figure below, while stunting is decreasing, the reduction is slow, and the country might not meet the SDG 2 targets on stunting, anaemia and breastfeeding unless there is accelerated progress. This comes with consequences on health, education, and development.

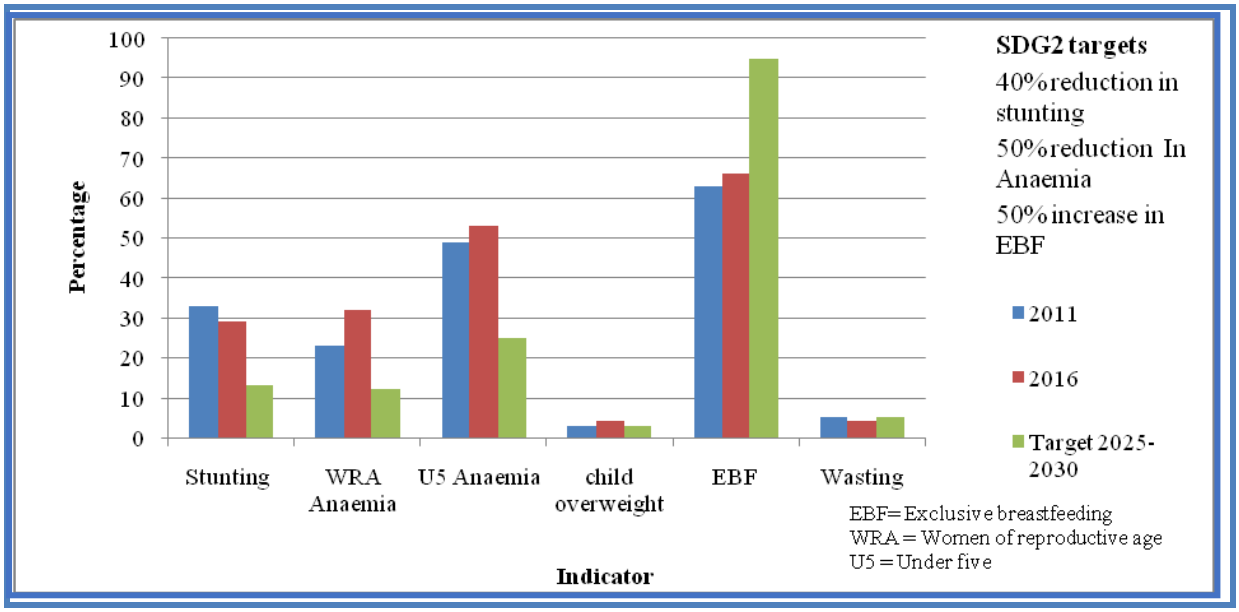


Figure 15 Uganda's Nutritional Status Indicators and SDG2 Targets (UBOS and ICF 2018)

On the other hand, 24% of Uganda's women and 9% of men aged 15-49 are overweight or obese, as indicated below.

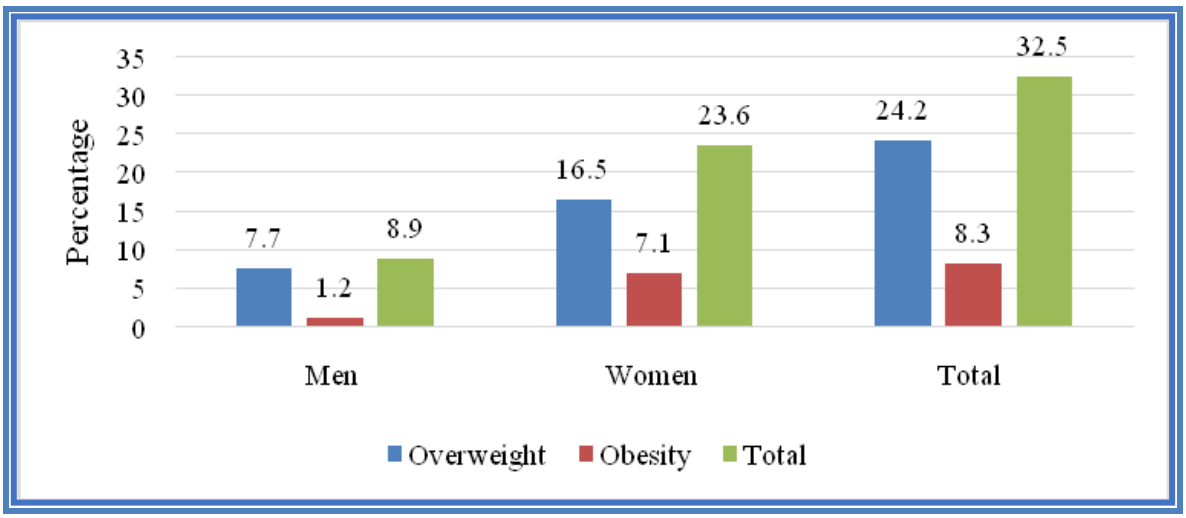


Figure 16 Overweight and Obesity in Ugandan Adults (UBOS and ICF 2018)

5. Food and agricultural sector

The agricultural sector has been the backbone of the Uganda's economy for decades, employing over 80% of the rural population and about 64.3% of the working population. Agriculture is a source of food, raw materials for industries and foreign exchange. The Ministry of Agriculture, Animal industry and Fisheries (MAAIF) has developed the Agriculture Sector Strategic plan (ASSP, 2020), a flagship plan for investment and development of the agricultural sector, in line with the National Development Plan to be implemented through a multi-sector approach involving the Government of Uganda, Ministries, Departments and Agencies of Government, District Local Governments, Development Partners, Civil Society Organizations

and the private sector. The Strategic Plan is for the period from Financial Year 2015/16 to Financial Year 2019/20.

The ASSP was developed following the comprehensive review of the sector from 2010 to 2015. With this plan, 12 priority commodities, namely: bananas, beans, maize, rice, cassava, tea, coffee, fruits and vegetables, dairy, fish, livestock (meat), and four strategic commodities, namely, cocoa, cotton, oil seeds, and oil palm were emphasised, and interventions were to be implemented for each commodity.

Before the ASSP was developed, the growth in agricultural sector declined from 2.6% in 2010 to -0.2% in 2012, before recovering to 3.6% in 2013 and 2.9% in 2014. It was lower than the average annual GDP growth rate of 5.2% and the average annual population growth rate of 3% over the same period. The contribution of the agricultural sector to GDP declined from 25.4% in 2010 to 23% in 2014. Of the agricultural sub-sectors GDP, the average contribution for the different sub-sectors was 1.7% of GDP for cash crops, 12.7% of GDP for food crops, 4.2% of GDP for livestock, 0.03% of GDP for Agriculture Support Services, 4.0% of GDP for Forestry and 1.2% of GDP for fisheries. In 2020, agriculture contributed around 24.03% to the GDP of Uganda, 26.18% came from the industry, and 43.01% from the services sector. Food crop growing activities registered a growth of 4.3% in 2019/2020 when compared to the 1.5% growth in 2018/19. Livestock growing activities grew by 7.7% in 2019/2020 compared to 7.3% in 2018/19. In terms of sector contribution to overall GDP, agriculture contributed 23.7% in 2019/20 compared to 23.1% in the FY 2018/19, which is a 0.6 percentage point increase in the share to GDP.

5.1 What is the strategic direction of the agricultural sector in Uganda?

Investment towards agriculture is drawn from the Public Investment Plan (PIP), FY2020/21-2022/23 funded by the Government of Uganda. Sector investment over the medium term will be channelled to strategic commodities across their entire value chains focusing on research, extension, pests, vector and disease control, provision of inputs, promoting sustainable land use and soil management, post-harvest handling, improving markets access, and value addition. The investment strategy targets four objectives:

1. Increasing agricultural production and productivity.
2. Increasing access to critical farm inputs.
3. Improving agricultural markets and value addition.
4. Improving service delivery through strengthening the institutional capacity of MAAIF and its agencies.

However, investment in agricultural related activities has remained low as can be seen from figure below:

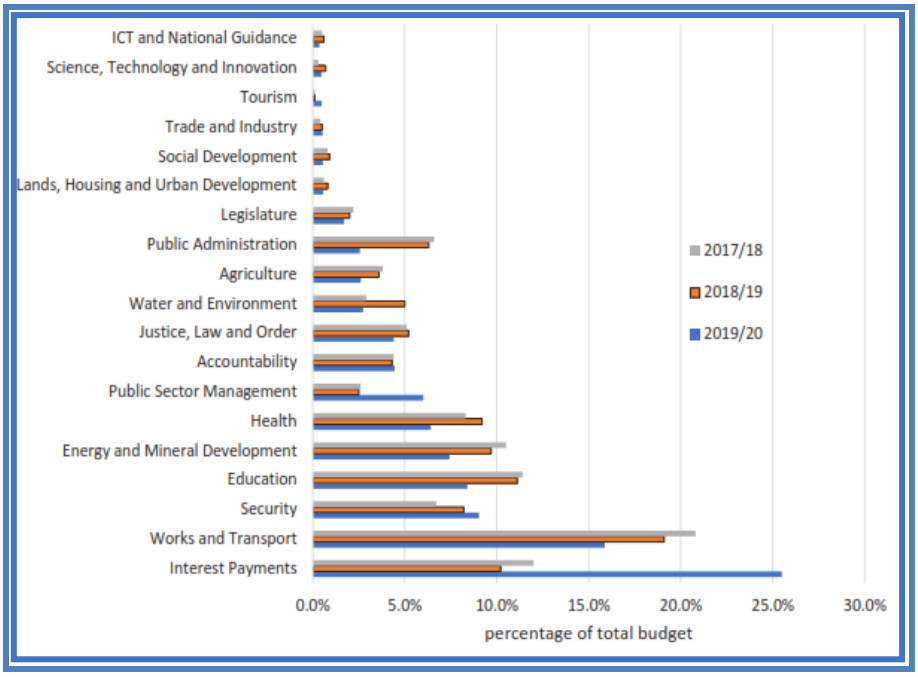


Figure 17 Budget Allocation/Investments in Different Ugandan Sectors (MoFPED, Background to the budget, 2018/19, 2019/20)

5.2 Uganda commitment to transform its food systems

The government of Uganda made a commitment while responding to UN Secretary-General to transform food systems. Uganda went ahead and organized national, regional, and stakeholder-based dialogues to produce a common understanding. The Commitment to Action is based on the country analysis of the food systems based on evidence and voices form the relevant actors during the dialogue process, identification of bottlenecks, opportunities, and game-changing solutions to transforming food systems for sustainable development in Uganda.

Uganda committed to put forth the following enablers to be able to deliver the country pathway of food systems transformation: industrialization especially in the agri-food sector, infrastructure improvement especially efficient transport networks and power supply, technology development, research and development, increasing the mobilization, equitable access and utilization of agricultural finance, market systems improvement, standardization of trade, consumer protection, healthy food environment and safe water access among others. These levers will provide an enabling environment for the delivery of the transformative interventions to make food systems accelerate Uganda in achieving the 2030 Agenda.

Some of the government policies are indicated in Table 1 below:

Table 1 Uganda key policies/strategies and their impact on food system

Key policies/Government strategies	Impact on food system
The Uganda Food and Nutrition Policy, 2003	1. Provides a framework for funding nutrition related projects. 2. Emphasizes the need for monitoring food on Uganda markets for safety and nutritional content. 3. Provides room for fortification of commonly consumed products like salt.
National Coffee Policy, 2013	1. Provides for government to support stakeholders to improve coffee business along the chain by provision of seedlings, drying facilities, loan facilities for exporters and quality monitoring services 2. Provides for research aimed at improving production and productivity of coffee These efforts enhance stakeholder incomes and improved food security.
The National Coffee Bill, 2018	The Bill suggests giving UCDA full authority to control every node of the value chain, and the power to register, de-register and arrest actors along the chain if they default on quality. Coffee sector is mainly operated by small scale farmers especially at the point of production. The threat therefore to arrest, de-register and fine farmers will discourage many actors.
Public Investment Plan (PIP); FY2020/21-2022/23	The PIP gives strategic direction to government towards investment in agriculture sector, medical, transport system, etc. Currently in Uganda, efforts are being made to improve investment in agriculture with provision of insurance scheme for commercial farming, and provision of robust transport system and marketing channels. These are being achieved through the PIP.
National Development Plan (NDP III): 2020/21-2024/25	NDP III focuses government investment. Now all government sectors operate under Programmes, thus duplication of activities is reduced. The key strategic objective of NDPIII is agro-processing. This has enabled government to give budget priority to agricultural industrialization and value addition. Thus, strengthening the food availability, access, and affordability.

6. Incomes

Agriculture is one of the main sectors of the Ugandan economy and includes most of the working population mainly on a subsistence basis (UBOS, 2020). Almost 80% of Ugandans rely directly on land, agriculture, and fishing for their livelihood. The primary livelihood strategy for most of the population is subsistence agriculture as there are high levels of poverty (Betram de BooiJ et al., 2020). According to the Uganda National Household Survey (UBOS 2017), the share of Ugandans living in poverty increased from 19.7% in 2012/13 to 21.4% in 2016/17. Using the international poverty threshold of $3.20 per day, nearly three quarters of Ugandans would be categorised as poor. Therefore, many families are unable to provide the minimum care, nourishment, education, and health for their children. Gaps in uptake of

education and health continue to get in the way of improvements in outcomes, especially among poorer consumption deciles.

According to UBOS (2020):

- There was a 0.7% decrease in the monthly household consumption expenditure from 328,200 Ugshs (91.2 USD) to 325,800 Ugshs (90.5 USD) in 2016/17.
- The Northern region registered the highest growth in per capita consumption expenditure at 21.3%.
- The proportion of the poor population increased from 19.7% to 21.4% corresponding to about 8 million people.
- 45.5% of the household expenditure was on food and non-alcoholic beverages.
- Nationally, on average, income inequality increased from 0.40 to 0.42% between 2012/13 and 2016/17.

6.1 Employment

According to 2016/17 UNHS,

- Uganda's working age population stood at 19,104,000 of which 78.8% were working.
- The proportion of employed females was 44.4% (UNHS 2016/17).
- In 2016/17 43.2% of the working population was engaged in the subsistence agriculture sector only.
- Almost 62.9% of the employed persons had completed at least secondary school.

- By 2018, Uganda had 19 million people who were of working age but 4 million of these were not working (either unemployed or outside the labor force). Fifteen (15) million people were working (9 million employed and 6 million working with subsistence agriculture).
- The proportion of persons in paid employment was higher for males compared to the females and the biggest numbers were urban residents. Youth aged 18-30 were more in paid employment compared to other age groups.
- The working age population is growing very fast. By 2030 the working age population will increase by 13 million.
- Uganda must increase average labour productivity faster, in addition to creating more jobs for new workers. With most workers in agriculture, raising the agricultural productivity must be the cornerstone of a strategy for jobs and economic transformation. This should be coupled with faster movement of young workers from agriculture employment into higher productivity industry and service jobs.
- Government should be ready to invest in and support human resource development in small, medium, and large businesses.

6.1.1 Policy context relevant for rural youth employment in Uganda

- National Development Plan (NDP) II (2016–2020) prioritizes employment and investment in agriculture, and promotes decent employment, with youth and women as target groups.

- National Employment Policy (2011) sets the rural and agricultural sectors among its main action areas. National Youth Policy (2016) makes specific commitments for the agricultural sector, for example, in terms of finance for agriculture.
- National Agriculture Policy (2013) commits to employment generation and improved working conditions in the sector.
- Agriculture Sector Strategic Plan (ASSP) (2016–2020) adopts gender and youth as crosscutting issues and plans for a wide range of activities aimed at enhancing productive engagement by youth and women, including training, funding, and empowerment. Under measure 3.2.4.2.8, a dedicated youth communication campaign is planned, via social media platforms, blogs, and SMS.
- National Agriculture Extension Policy (2016) includes specific youth/gender provisions (Policy area 4.2).
- National Fisheries and Aquaculture Policy (2018) makes a commitment to address the needs of women and men, youth, children, the elderly and Persons with Disabilities (PWD).
- National Financial Inclusion Strategy (NFIS) (2017–2022) focuses on three priority areas: women; youth above 15 years old; and the rural populations (p. 25).
- Uganda Green Growth Development Strategy (2017–2030) commits to decent green jobs creation in selected focus areas, including: sustainable agriculture production and value chains, and natural capital management and development, which focuses on tourism development, sustainable forestry, wetlands and optimal water resources management.
- The National Strategy for Youth Employment in Agriculture (NSYEA) (2017), under the overall coordination of the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), prioritizes the following intervention areas: 1. strengthening the enabling environment for the youth employment; 2. supporting youth–oriented agricultural extension; 3. improving youth education and learning; 4. supporting youth entrepreneurship; 5. adaptation to and mitigation of agribusiness risks and uncertainties.

Source: Multiple policy documents[5]

7. Food security and nutrition outcomes

7.1 Food utilization, food access, food availability

Food availability is not a limiting factor in most regions of Uganda except in Karamoja, East Central and West Nile where production and productivity, frequent dry spells and lack of extension services affect production.

- Though food is largely available, food access and utilization are major limiting factors in three regions and minor limiting factors in other regions. This has been attributed to low level of incomes, storage, inadequate nutritional awareness, cultural food preferences, poor sanitary and food preparation practices, and wastage of food during harvest periods due to festivities.

5 Public policy documents retrieved from FAO DRE database at http://www.fao.org/rural-employment/policies/results/en/

- 89% of the population in Uganda is food secure. This population still has normal access to food from own production and in the market following average harvests from first season of the year. Food prices in the market are affordable. They have acceptable food consumption score; can afford at least three meals per day of a diversified diet. They also have adequate energy intake.
- 12% of the total population in the country is chronically food insecure. These are scattered in Karamoja, Teso and Acholi regions. This has been attributed to poor rainfall performance characterized by long dry spells.
- Consumption of crops produced on-farm contribute most to food availability for households with limited food availability, yet most of these households are not food self-sufficient. Off-farm and market-oriented on-farm activities are more important for households with greater food availability.

8. Environmental outcomes

8.1 Climate change

The climate change studies and predictions were conducted by USGS and USAID, 2012.

- Projected annual rainfall is expected to differ little from what is presently experienced, with projected changes within a range of less than plus or minus 10% from present rainfall. However, less rainfall is expected to occur over most of Uganda, with slightly wetter conditions over the west and north-west. Rainfall totals might drop significantly over Lake Victoria (where Kampala city is situated) - (to about 20% from the present). What is significant on a seasonal time scale is the projected increase in seasonal rainfall for the DJF season (up to 100% from present), which is indicative of a longer wet season that extends from SON towards DJF.
- Temperatures are expected to rise more during the March to May (MAM) and June to August (JJA) seasons in comparison to the December to February (DJF) and September to November (SON) seasons. A lower temperature increase of about 1°C is expected for Lake Victoria.
- The decrease in rainfall in most of Uganda, combined with a significantly wetter DJF season, will result in significantly drier conditions for the rest of the year. This will also combine with significant temperature increases, especially during the MAM and JJA seasons.

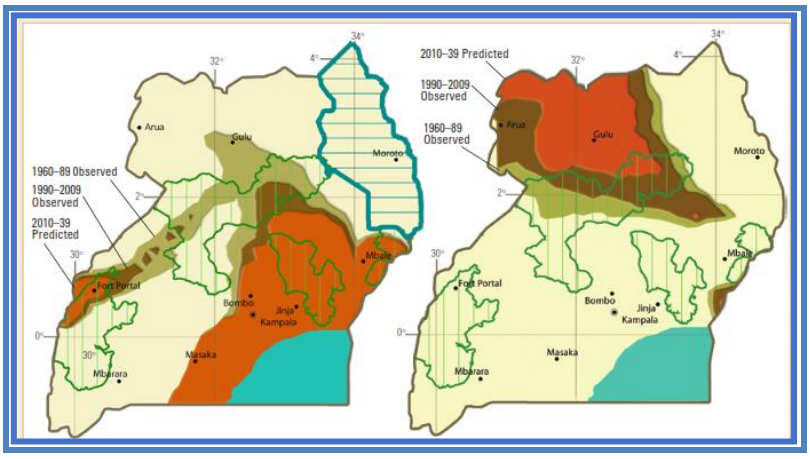


Figure 18 Climate Change in Uganda (USGS and USAID 2012)

Note: The map on the left shows the average location of March-June 500mm rainfall isohyets for 1960 1989 (light brown).1990-2009 (dark brown), and 2010-2093 predicted, orange). The green polygons in the foreground show main maize surplus region, these areas produced most of Uganda' maize. The blue polygons in the upper–right show Karamoja region. The map on the right displays analogues for the June-September 500mm rainfall isohyets.

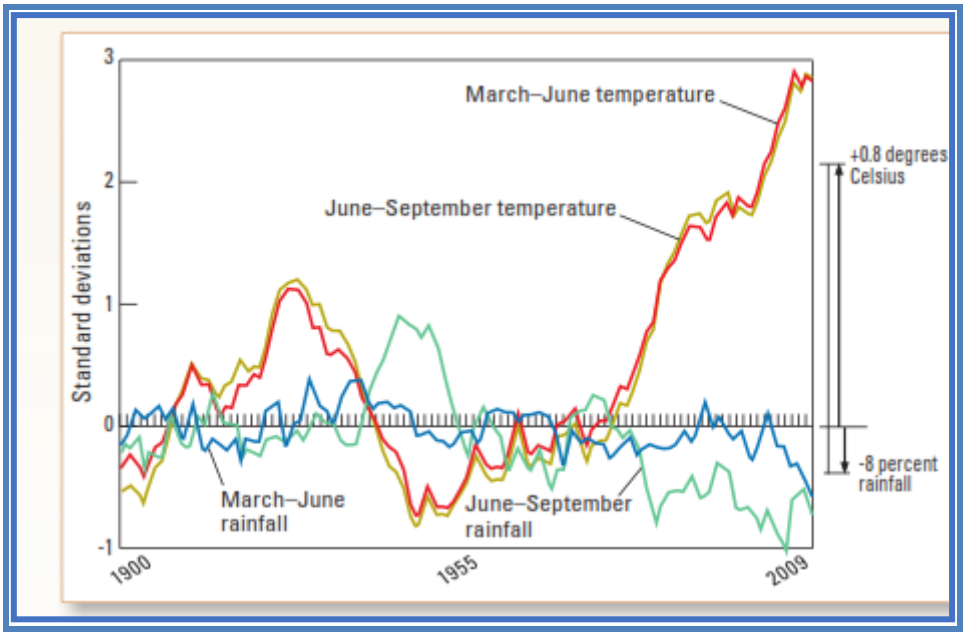


Figure 19 Smoothed 1900-2009 March-June and June-September Rainfall and Air Temperature Series for Crop Growing Areas (USGS and USAID 2012)

8.3 Water availability

Water remains the most critical factor of agricultural production in Uganda. The agricultural production systems are largely rainfed. The availability of water for crops and livestock, especially, in the semi-arid cattle corridor is being affected by climate change and variability, and this is expected to continue in the coming years with severe consequences on rural livelihoods.

Lakes in Uganda cover one fifth of the total area of the country. Water resources comprise open water bodies, ground water and rain harvest. NEMA (1996) indicates that on a regional basis, 39.1% of water bodies are found in central, 30.3% in eastern, 3% in northern and 8% in western regions. The whole of Uganda lies in the upper Nile catchment consisting of numerous rivers and streams flowing into principal lakes such as Victoria, Kyoga, Edward, and Albert and eventually into the River Nile.

There is a paucity of data on the quality of the country's surface and ground water. The Water Action Plan 1995 and Water Statute 1995 are the cornerstones of water resources management. The major areas of concern are poor watershed management, inadequate water accessibility and quantity, poor water quality, inadequate institutional capacity, and international water rights. Issues pertaining to the fisheries subsector are sustainability of the fisheries resources, the impact of the introduction of alien species, high post-harvest losses, pollution of the fisheries, impact of the activities of the fisher-folk communities on fisheries

resources and inadequate institutional and administrative structures (NEMA, 1996).

Uganda has an abundance of water resources. Rivers, lakes and wetlands cover about 20% of the total surface area. Uganda has eight significant river basins: Lake Victoria, Lake Edward, Lake Albert, Victoria Nile, Albert Nile, Aswa, Kidepo, and Lake Kyoga. Lake Victoria, one of the world's largest lakes (69,000 square kilometers) is the basis for all existing and planned major hydropower schemes, and provides water to Kampala, Entebbe, and Jinja (Garduño 1999). There are an estimated 200,000 protected and unprotected springs. Annual rainfall is in the range of 600–2500 millimeters (Syngellakis and Arudo 2006).

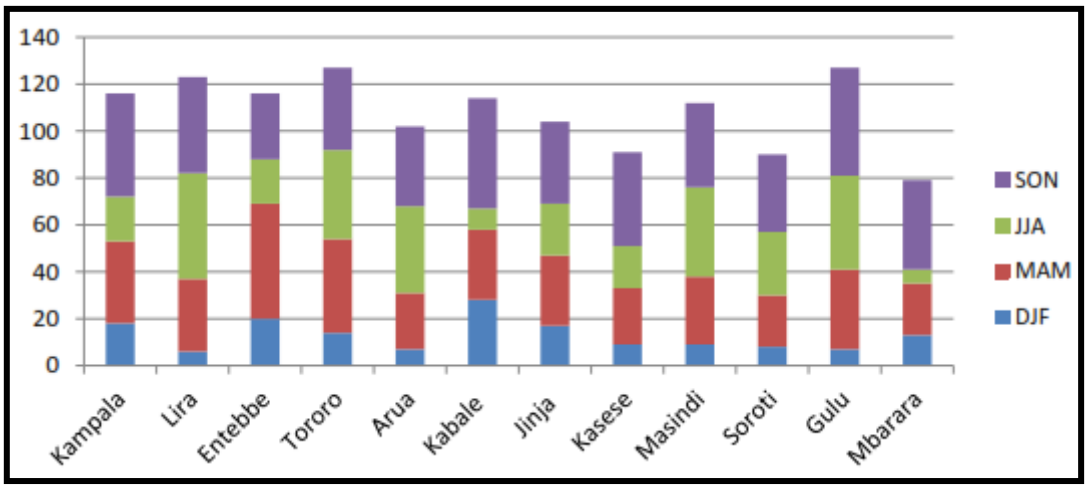


Figure 20 Monthly Distribution of Rain-Days in Selected Centres in 2017 (NEMA 2017)

The country has opportunity to stimulate social economic transformation through development and utilization of water resources. These opportunities include irrigation, livestock rearing, fisheries and aquaculture, hydro power generation, domestic water consumption, industrial development, and water transport. Water related activities are expected to generate revenue. Currently on 0.5% of Ugandan land is irrigated.

8.4 Water for Production

Water for Production (WfP) refers to development and utilisation of water resources for productive use in crop irrigation, livestock, aquaculture, rural industries, energy, and other commercial uses. In Uganda, less than 2% of water is used in production but there is a sharp increase in demand primarily due to climate change and degradation of natural resources. The current mandate for WfP facilities in Uganda is shared between MWE and other Ministries. For water for Agricultural development, MWE is responsible for "off-farm" activities, while Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) is responsible for "on-farm" activities. "Off-farm" refers to development of water sources and transmission (bulk transfer to farm gates) and "on-farm" refers to irrigation infrastructure, water use and management. Water for energy, MWE works with Ministry of Energy and Mineral Development, Water for Industry, MWE produces water to the Industries premises while Ministry of Trade, Industry and Cooperatives is responsible for water use and management in the Industries. (Uganda Water and Environment Sector Performance Report 2020)

Water for Production facilities constructed in FY 2019/20

Photo 8- 1: *Mabira earth dam in Mbarara District*

Photo 8- 2: *Adonia Small Scale Irrigation Scheme in Budaka District*

Photo 8- 3: *Olweny Irrigation scheme in Lira District*

Photo 8- 4: *Kicuna Small Scale Irrigation scheme in Kabarole District*

Figure 21 Water Production Facilities (Uganda Water and Environment Sector Performance Report 2020)

8.5 Water quality

Uganda has experienced two decades of economic growth, leading to large population movements from rural areas to informal settlements around urban centres. High population growth has stressed the water and sanitation services that exist. Eight million Ugandans lack access to safe water and 27 million do not have access to improved sanitation facilities. More than 21 million people still do not have clean water. Meanwhile, high demand and poor management lead to shortages of clean groundwater – facilities are under strain in towns and cities, and the springs and wells that rural communities rely on are mostly used. The Ugandan Government is working towards a goal of reaching everyone with clean water by 2040. Further, due to disparities in water access in Uganda, urban people living in poverty pay as much as 22% of their income to access water from water vendors. Spending such a high percentage of earnings on water reduces overall household income, limiting opportunities to build savings and break the cycle of poverty.6

8.5.1 Drinking water quality

The drinking water quality indicator in the national measurement framework is defined as "the percentage of water samples taken at the point of collection that comply with national standards for rural (point water sources) and urban (piped schemes). When E. coli is used as

6 Uganda's Water and Sanitation Crisis: https://water.org/our-impact/where-we-work/uganda/

the parameter, the indicator can be used to report on SDG Goal 6, target 6.1, indicator 6.1.1 which is 'Proportion of population using safely managed drinking water services'. Safely managed drinking water is defined as the use of an improved drinking water source which is located on premises, available when needed and free of fecal coliforms (*E.coli* or thermotolerant coliforms in a 100 mL sample) and priority chemical contamination. Priority chemicals vary by country, but at a global level the priority parameters are arsenic and fluoride

Rural water supply systems, for purposes of reporting water quality, means improved water supply technologies such as deep wells, shallow wells, protected springs, dug wells and rainwater collected for use from a single point (point source). Water safety by technology type indicated 81% of boreholes, 55% of shallow wells and only 37% of protected springs had safe water for drinking based on compliance to bacteriological safety or *E. coli* (Bwire et al., 2020; Twinomucunguzi et al., 2021).

Table 2 categories of water Supply in Uganda by June 2020 (MAAIF, water and environmental sector performance report 2020)

Source of water	Number	No. of persons served	%
Deep Borehole	41,889	12,566,700	44.7%
Shallow Well	21,616	6,484,800	23.1%
Protected Spring	29,214	5,842,800	20.8%
Tap Stands	20,468	3,070,200	10.9%
Rainwater Harvest Tank	20,320	121,920	0.4%
	133,507	28,086,420	100.0%

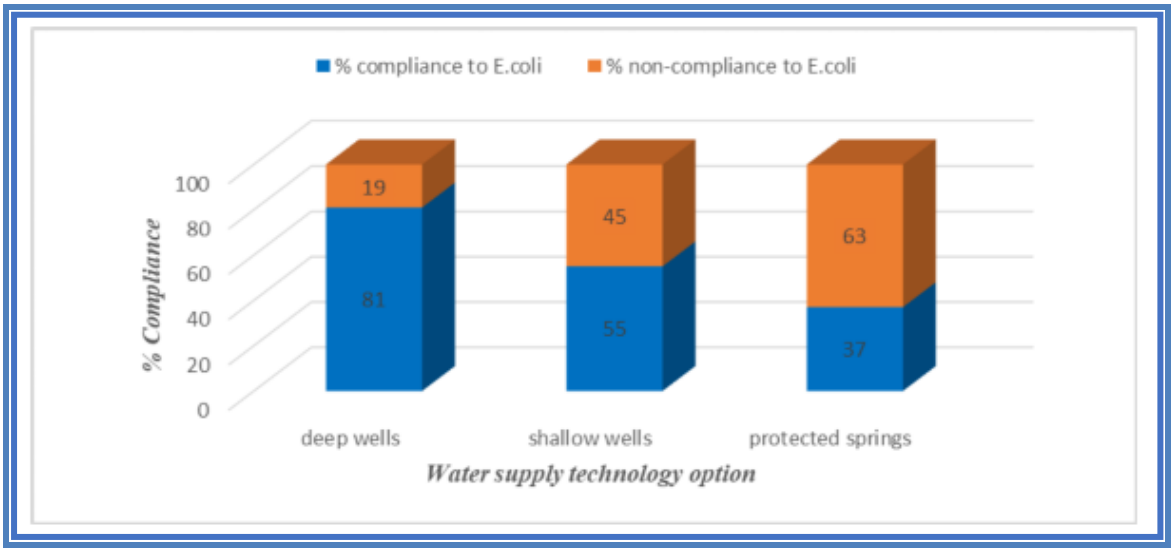


Figure 22 Compliance with E-Coli by Technology (MAAIF, Water and Environmental Sector Performance Report 2020)

Boreholes remain as the most predominant water supply technology in our rural communities

registering an increase from 44.3% in FY 2018/19 to 44.7% in FY 2019/20. The total number of facilities increased from 132,105 in FY 2018/19 to 133,507 in FY 2019/20. Therefore, there was increase by 1,402 from the previous FY and boreholes accounted for 45% of the new facilities constructed

8.5.2 Water pollution

Uganda's 2030 vision to industrialize for economic transformation, recover its economic status lost in the 1970s and attain a middle-income status has presented numerous environmental challenges. Industries are generating volumetric wastes which are discharged without treatment into nearby water bodies, potentially degrading their water quality. Most industries in Uganda use outdated manufacturing technologies and do not have functional effluent treatment plants. Therefore, raw, and harmful wastes are discharged into the surrounding water bodies

As of June 2018, the percentage of Uganda's rural population with access to safe water is estimated to be 70% which has remained unchanged since June 2017. This implies that with the available resources, we just managed to keep up with the population growth. Nevertheless, the total number of villages with at least a safe water source increased from 57,585 (i.e., 64% of all villages) in FY 2016/17 to 57,974 (i.e., 66% of all villages) in FY 2017/18. Access to safe drinking water in the urban water has increased to 74% as of June 2018 (up from 71%). The management of water and sanitation by the National Water & Sewerage Corporation (NWSC) covers a total of 238 towns.

8.5.3 Uganda's water and sanitation crisis

Uganda’s decades of economic growth have led to large population movements from rural areas to informal settlements around urban centres. High population growth stressed the water and sanitation services that exist. 8 million Ugandans lack access to safe water and 27 million do not have access to improved sanitation facilities. In Kampala, the capital city of Uganda, previous studies identified high levels of heavy metals such as lead (Pb), zinc (Zn), iron (Fe), copper (Cu), cadmium (Cd), and chromium (Cr) were detected in drinking water (Kasozi et al., 2019).

Figure 23 Water Source in Uganda (Kasozi et al. 2019)

9. Land

Uganda has an area of 241,550.7 square kilometres (sq.km), of which 44,484.77 sq. km are open water and swamps Wetlands cover 7,620.76 square kilometres, and 197,065.93 sq. km is land. Agricultural land increased from 99,703.1 sq. kms in 2005 to 105,317.2 sq. kms. Built up land area covered 1,360.02 square kilometres. Land area estimates for 2015 by type of cover as updated from the Remote Sensing Survey indicated that agricultural land occupies the largest proportion of land cover area (43.6%), followed by grassland (21.13%) and then water (15.26%) (UBOS, 2018).

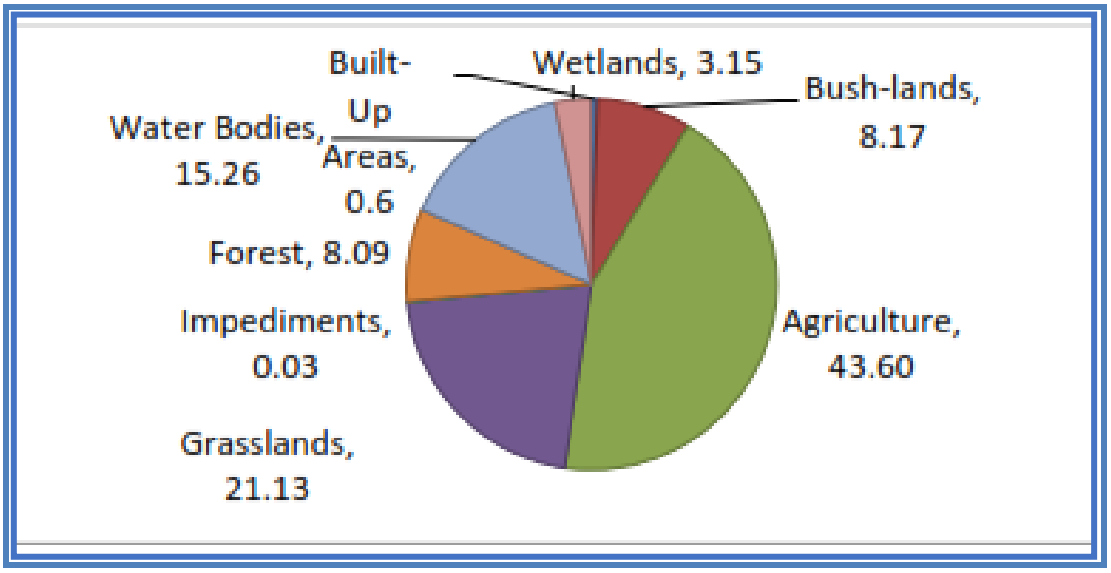


Figure 24 Share of Land Cover by type for Uganda 2015 in sq km (UBOS 2018)

In 1994, wetland coverage on the surface area of Uganda was 15.6%. However, over time this gradually reduced and is currently at 8.9%. This is attributed to expansion in Agriculture, industry, and urbanisation. During the FY 2019/20, a total of 6,642.939 ha of critical wetlands were restored across the country.

Currently, the land holding in Uganda is characterized by multiple land tenure systems and multiple land rights.

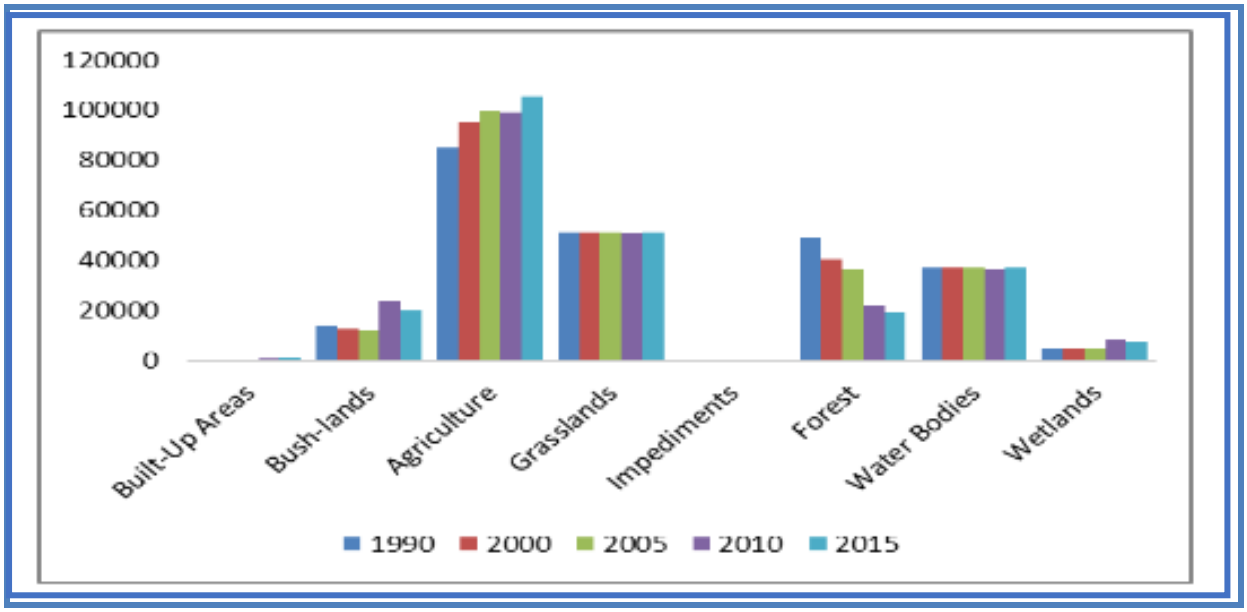
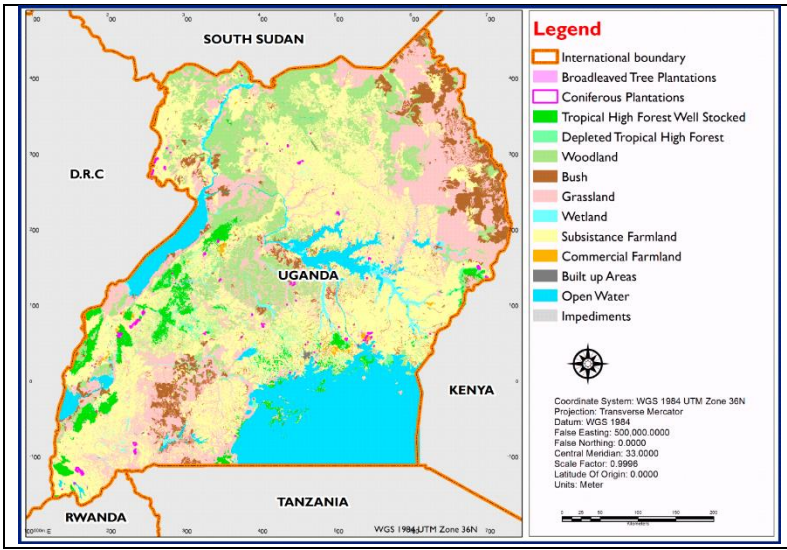


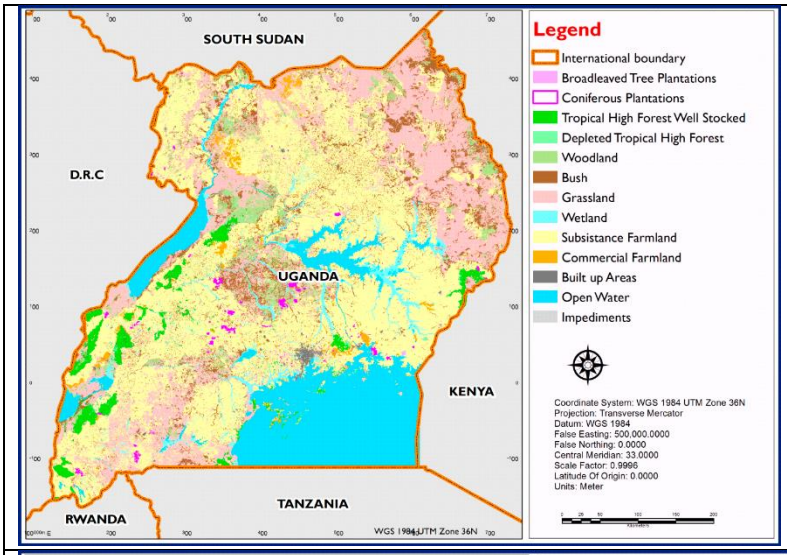
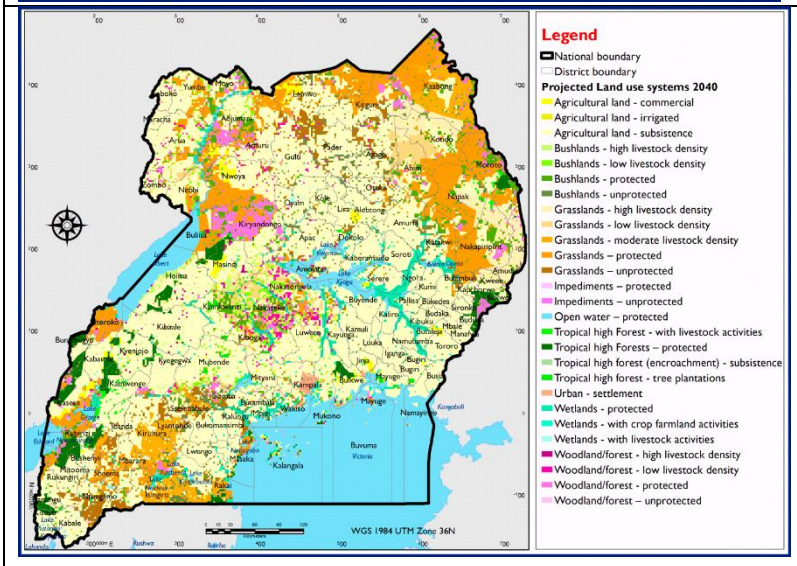
Figure 25 Land cover area by time 1990-2015 in sq. km (UBOS 2018)

9.1 Soils

Uganda soils are classified according to the FAO system. Ferrisols and eutrophic soils are the most productive and are found all over the country. Ferruginous soils are scattered throughout the country but are concentrated in Tororo and Gulu districts. Studies suggest that ferruginous soils are less productive and require careful usage to preserve their poorly developed topsoils, whereas lighter soils unlike heavy soils are more susceptible to leaching. The most dominant soil type in Uganda is ferralitic soil which accounts for about two thirds of the soils found in the country (NEMA, 1996). Figure below shows the change in land use and projections till 2040.

Table 3 Land Use for Uganda (Majaliwa et al. 2018)

	Land use /cover for Uganda for 1990

	Land use /cover for Uganda for 2015
	Projected land use system by 2040

High demand for agricultural and settlement land are mainly responsible for land use systems patchiness. Land degradation and disasters such as landslides, floods, droughts, food shortages occur in the country, causing more deaths and loss of property if the rate at which land use systems are expanding is not closely monitored and regulated in the in the future (Majaliwa et al., 2018).

9.2 Land degradation

Land degradation and low productivity on farms has led to over-exploitation of the land with inadequate soil and water conservation practices. Also, increasing rural population densities with few non-farm income opportunities and little farmer knowledge of improved agricultural technologies caused the soil erosion with insufficient agricultural research and lack of effective agriculture extension that is needed for resource constraints of farmers. About 46% of Uganda's soils are degraded and 10% are extremely degraded. Costs of natural resources degradation in the country are estimated at 17% of GDP per year. Key drivers for land degradation and low productivity on small-scale farms are lack of labour and capital to invest in sustainable land management, poverty and land fragmentation leading to over exploitation of land. Major forms of land degradation are soil erosion, decreasing soil fertility, bush

burning, overgrazing, over cultivation, soil mining, landslides, agrochemicals pollution and deforestation. 7 Land degradation effects are expressed via declining yields, rural poverty, food insecurity, high cost of food, etc. In Uganda most of the wetlands have been turned in to farmland and residential areas. This has led to frequent flooding in Kampala City.

Even though Uganda has a large percentage of arable land, soil degradation is a substantial problem in the country. The worst affected areas include highland areas in the southwest and some dryland districts. Percentages of land affected by land degradation range from 90% in Kabale to 20% in Masindi.

The most common physical component of land degradation is soil erosion. The NEAP of 1995 and subsequent reports have stated that most of the country has been affected by erosion. Even the relatively flat areas have experienced severe sheet and rill erosion, and the nutrient loss associated with soil erosion is identified as the cause of steady losses in soil productivity (NEAP 1995).

Table 4 Examples of Land Degradation in Uganda[8]

Degradation in the cattle corridor

Degradation of terraces in western Uganda

7 Report on the African Soil Partnership Workshop, Global Soil Partnership. 2015. Available at: https://www.fao.org/3/bc428e/bc428e.pdf

[8] Priorities for sustainable soil management in Uganda, Muyaka, Z., 2015. Available at: https://www.slideshare.net/FAOoftheUN/uganda-53017277

Indiscriminate burning in Uganda

9. 2.1 Policy environment to address soil degradation

Development of enabling environment for proper land use and management include: The National Land Use Policy, 2006; The Land Policy,2013; The Draft National Soils Policy for Uganda, 1999; The Prohibition of the Burning of Grass Act, 2000; Cattle Grazing Act, 2000; The National Environment Management Policy for Uganda ,1994;The National Environment (Minimum Standards for Management of Soil Quality) Regulations, 2001; National Forestry and Tree Planting Act, 2003; Regulations on Mountainous and Hilly Areas, 2000);and Regulations on Wetlands, Riverbanks and Lakeshores, 2000**.**

10. Forest

In 2015, Uganda had a total of 1.9 million hectares of forest land compared to 4.9 million hectares in 1990. This is a reduction of 60% over a period of 25 years. In 1990, forests covered 20.4% of the land area of the country compared to less than 10% in 2015. Deforestation has led to decline of forest cover from 24% in 1990 to 10% in 2017.

Forest reserves constitute around 7% of the area of the country with 700,000 hectares in tropical high forests, 632,000 hectares in savanna forests and 24,300 ha in plantation forest. Tropical high forests are found in western Uganda around Lake Victoria and on Mt. Elgon in the east. They include rare plants and animals and unique ecological systems. Over the years, these forests have been cleared, and from coverage of 12.7% of the country's land area at the start of the century, tropical high forests now account for only 3% of Uganda's land area (Working Paper 2002).

11. GHG Emissions

In Uganda, GHG emissions are estimated in 36.5 million tonnes of carbon dioxide per year, accounting for about 0.01% of global emissions. On a per-capita basis, GHG emissions are estimated at 1.39 tonnes of carbon dioxide, far below the global per capita average of 7.99 tonnes of carbon dioxide. GHG emissions are projected to rise to approximately 77.3 MtCO2 by 2030 and will also be affected by the coming growth and transformation of livestock, which currently contribute about 19% to the national GHG emissions (MWE, 2015).

12. Biodiversity loss associated with agriculture

Human activities, especially the conversion and degradation of habitats, are causing global biodiversity declines. Notable activities include the cutting down of trees, charcoal burning and poor farming methods, which undermine the functionality of ecosystems. The rapid conversion of natural vegetation to farmlands, could be attributed to farming techniques and agronomic approaches that aim at modern agricultural intensification. Presently, the diversity of conversions of natural ecosystems to land use systems is a critical challenge in Uganda. This is driven by the need to meet the livelihoods of smallholders, high demand for forest products, urban expansions, and infrastructural developments (such as the construction of highways, hydropower dams, and industrial parks, among others). As a result, the country has witnessed massive losses of natural vegetation and intensification of human activities. This condition is worsened by the overexploitation of resources, use of unsustainable harvesting and agronomic practices, and changes in climate. Some of the threatened ecosystems include Mt Elgon in Eastern Uganda, the Mabira Central Forest Reserve, the Lubigi wetland system, and Lake Victoria, among others. As a result, the country is faced with several environmental problems such as frequent landslides and floods that cause deaths and loss of property, loss of biodiversity, low agricultural output, and reduced forest and wetland goods and services, among others. The biggest concern is the water in Lake Victoria, which supplies most of the fresh water in Uganda, is threatened by toxic industrial pollutants, agricultural activities around the lake, and mining activity.

Biodiversity sustainability is very important for national development. The value of biodiversity is well recognised in national planning processes such as Uganda Vision 2040 of the National Planning Authority and the National Biodiversity Strategy and Action Plan of the National Environmental Management Authority.

13. Consumption

Food consumption in East Africa is projected to rise approximately 2.5-fold under a middle-of-the-road scenario by 2050 compared to 2020 (Tabeau, 2019). This will primarily be driven by population growth (Tabeau, 2019), but changing per capita consumption due to higher incomes and urbanisation will also affect what people like to eat, which will depend in turn on economic development and distribution.

Uganda has experienced relatively high economic growth rates averaging 5.5% between the years 1990 and 2000. A general rise in incomes has lowered the poverty rates and impacted food consumption patterns in Uganda. However, when different regions of the country are scrutinized, the monthly shares of food expenditures as a proportion of food expenditures range from 35% in Kampala to 49%, 55%, 59%, and 55% in Central, Eastern, Northern, and Western regions respectively. These regional consumption patterns are influenced by factors such as incomes, prices, household demographics, changes in lifestyles such as urbanization. In addition, Kenya, Uganda, and Tanzania decided to restore a previous trading alliance, called the East African Community (EAC), in January 2001, aiming to promote free trade within the region. When trade is liberalized, the impact is usually first felt in a country's border markets.

The most important impact may be on the distribution of commodity prices, so border effects will be examined as a possible determinant for consumption patterns (Warema 2015).

13.1 Food consumption patterns, food safety, food loss and food waste

Rising incomes have lowered poverty rates and influenced food consumption patterns in Uganda. Changes in lifestyles, such as urbanization, home-production and other factors, shape consumption by location. The 2020 Uganda Food Balance Sheet (FBS) showed that whereas Dietary Energy Supply (DES) has averaged at slightly below the emergency threshold of 2100 kcals per capita, with the most recent DES of 2018 having been lowest at 2083 Kcals per capita. The food insecurity situation is largely driven by low incomes, poverty, low productivity, and crop failure linked to changing weather and climate change patterns. There is also a problem of low value-added exports, declining land for food production, reducing household stocks and rising food prices. The resurgence of crop and livestock pests and diseases has also contributed to the reduction in production over the years.

Poor post-harvest handling results in up to 30-40% food loss in grains and 30-80% for vegetables and fruits. The consumption of fast food in Uganda is becoming an increasingly important component of the food market as more of the working class choose to dine out rather than preparing meals at home. The shift to fast food is seen as an easy solution to consumers' busy schedules and limited meal preparation time, availability of a disposable income, rapid urbanization, which reduces agricultural land is leaving the urban poor to purchase the cheaper unhealthy foods. Diets are typically becoming higher in salt, fat and sugar and are, in general, more energy dense. There has also been an increase of diet-related health conditions including obesity, diabetes, cardio-vascular disease, coronary heart disease, and cancer.

Expenditures in urban and rural areas show that high-income and low-income households differ widely in the proportion of income they allocate to their food budgets; low-income households spend over 60% of their income on food, while higher-income households spend slightly less than one-half of their income on food, as is the case for urban areas in Uganda (Warema, 2015). The highest food expenditure group comprised meat products at 14.1%, followed by fish products at 10.1%. Expenditures on maize constituted 9.2%, while 9.1% was spent on sugar products, 8.1% on rice, 7.6% on other foods, 6.5% on dairy products, and 5.7% was spent on matooke and pulses, respectively. Finally, 4.4% of the expenditure was on cereals, 4.2% was spent on fats and oils, 4.1% on fruits and vegetables, and 2.0% on soft beverages.

Meanwhile, food safety remains a very big issue in Uganda that requires ongoing effort to address. Food is contaminated with along the food chain by foreign materials like stones, pests, veterinary drugs, pesticides, aflatoxins; and during cooking when unhygienic facilities or supplies are used among others. Multiple but limited small food-borne infectious disease outbreaks have been reported in the country in the recent past.
Uganda is battling with a triple burden of malnutrition with women and children disproportionately affected.

13.2 Food waste in Uganda

In Uganda, food loss and waste are one of the biggest challenges, for growth of the agriculture sector because it threatens household incomes, food security and nutrition. Over 17% of 2.8

million tons of maize produced in Uganda annually is lost or wasted during harvest or post handling services. It is estimated 12.4 % of the 214,000 tons of millet is lost or wasted in Uganda annually. The government of Uganda has put in place enabling policy frameworks for food loss reduction and these include the constitution of republic of Uganda objective 12 which compels the state to take appropriate steps to grow and store adequate food, vision 2040 which underscores the need to reduce food loss and wastage and improve food safety among others. 9

13.3 Food consumption and Coronavirus Disease 19 (COVID-19) pandemic

The Coronavirus Disease 19 (COVID-19) pandemic affected the household income and food security in Uganda. The pandemic has changed the way food is produced and traded. Food security and dietary quality worsened, as measured by the food insecurity experience scale and the frequency of consumption of nutritionally rich foods. The regular consumption of fruits decreased by about 30% during this COVID-19 pandemic, compared to a normal period (before the pandemic). As result, income-poor households and those dependent on labour income were more vulnerable to income shock and poorer food consumption during the COVID-19 pandemic. Farmer households were less likely to experience worsened food security compared to other households who depended to a great extent on market sources for food (Kansiime et al, 2021). The impacts of COVID-19 may also cause people to move back to the rural regions that they came from if food prices increase and employment opportunities for non-skilled migrants decrease.

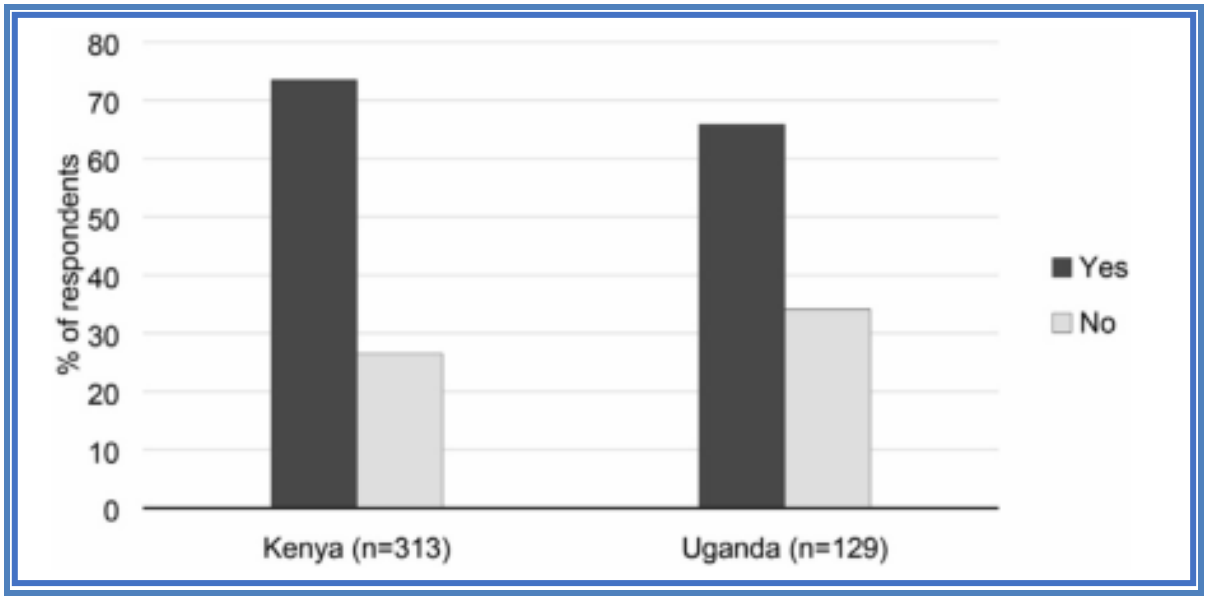


Figure 26 COVID-19's Impact on Income Generating Activities in Kenya and Uganda (Kansiime et al. 2021)

9 Food Loss and Wastage, a New Challenge for Ugandans, The Independent, 2020. Available at: https://www.independent.co.ug/food-loss-and-wastage-a-new-challenge-for-ugandans/

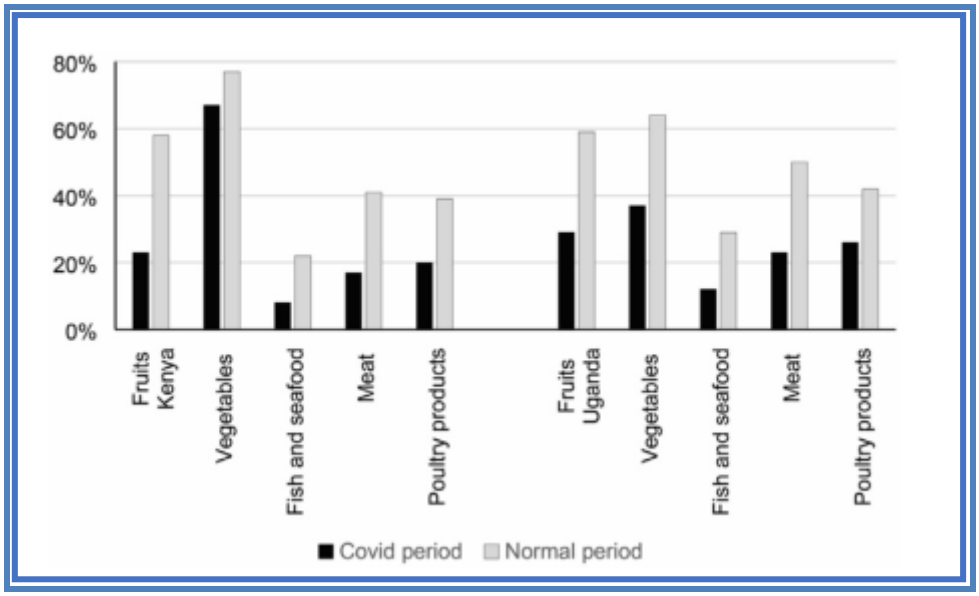


Figure 27 Food Group Consumption by Respondents before and after COVID-19 (Kansiime et al. 2021)

14. Uganda population

According to 2014 National Population and Housing Census (UNHS) results, Uganda's population has continued to grow over time. Uganda has a fast-growing population and is expected to exceed 100 million by 2050 (UN DESA Population Division 2017). The population increased from 9.5 million in 1969 to 34.6 million in 2014. Between 2002 and 2014 the population increased from 24.2 million to 34.6 million representing an average annual growth rate of 3.0%. It is projected to be 39 million in mid-2018. Figure below shows the population growth and projected increase during the 1980-2040 period.

14.1 Characteristics of Ugandan Population

- Uganda 2020 population is estimated at 45,741,007 people.
- Uganda population is equivalent to 0.59% of the total world population.
- Uganda ranks number 31 in the list of countries (and dependencies) by population.
- The population density in Uganda is 229 per km2.
- 25.7 % of the population is urban (11,775,012 people in 2020).
- The median age in Uganda is 16.7 years.

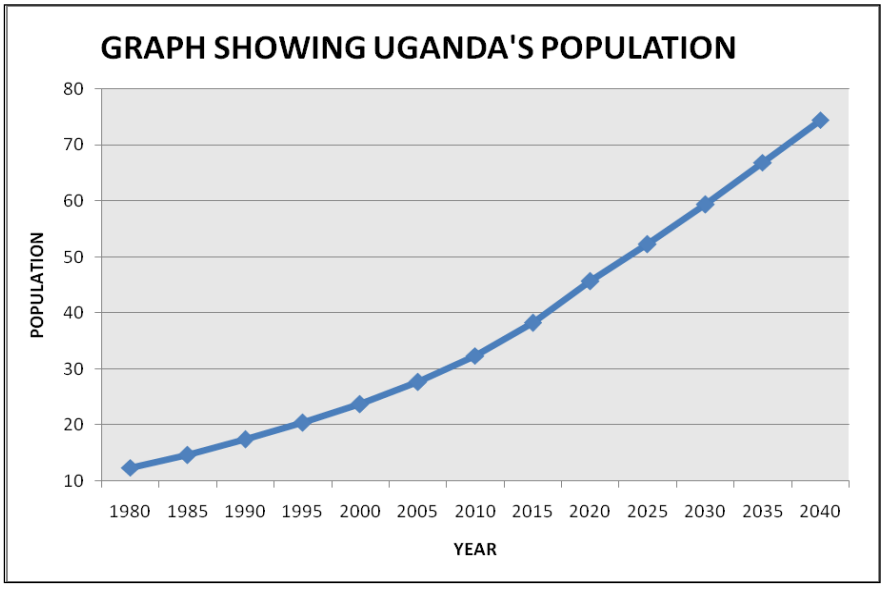


Figure 28 Population Trends (Author Developed, Using Worldometer data)

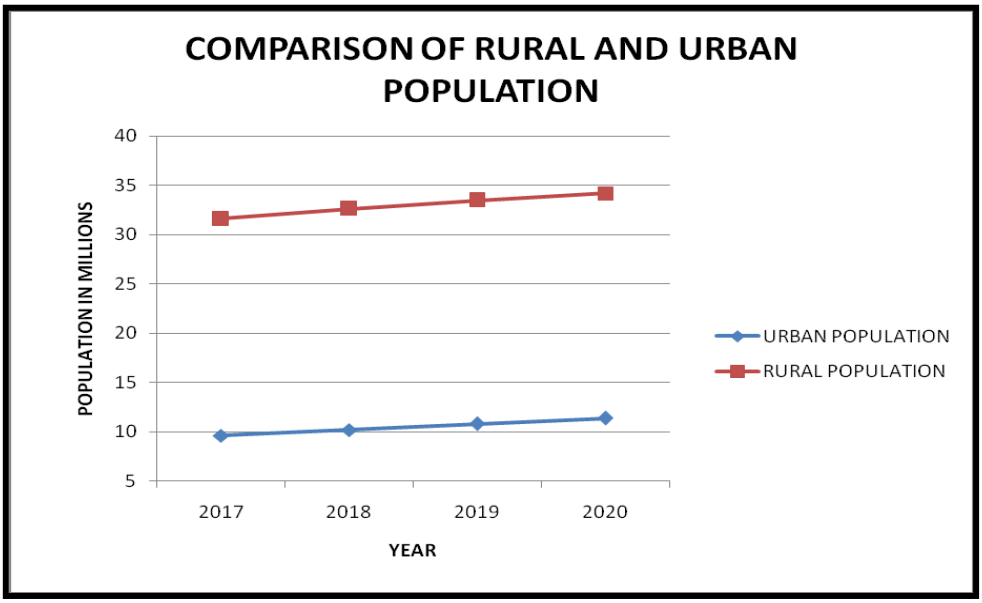
Population dynamics are the underlying drivers of development and environmental change in Kampala. The population of Kampala like that of other urban centres in the country has been increasing. This has mainly been due to high fertility, natural increase, decline in mortality, internal and international migrations (UBOS 1991; UBOS 2002). Kampala has continued to be a primary city and a hub of economic, social, commercial, industrial, and political activities that attract both internal and external migrants. Migrants are both temporary and permanent and that is why Kampala's resident population form almost half of the day population (KCC 1997, UBOS 2002, KCC 2003).

- Uganda urban population for 2020 was 11,414,209, a 5.84% increase from 2019.
- Uganda urban population for 2019 was 10,784,514, a 6.16% increase from 2018.
- Uganda urban population for 2018 was 10,158,400, a 6.38% increase from 2017.
- Uganda urban population for 2017 was 9,549,002, a 6.45% increase from 2016.

The rapid population growth in Kampala could stimulate development through provision of labour and market for the goods and services provided by the industrial and tertiary sectors. Unfortunately, the bulk of the labour is untrainable, unskilled, semi-skilled and therefore unemployed and the few who are employed earn low wages/salaries and cannot avail a ready market for the goods and services. Due to the low consumption rates, industries produce below capacity making production costs to be high and there is preference of cheap imported goods. Kampala is a centre of imported goods and Uganda a consumer economy which has contributed to the low rates of economic development.

- Uganda rural population for 2020 was 34,326,791, a 2.51% increase from 2019.
- Uganda rural population for 2019 was 33,485,073, a 2.81% increase from 2018.
- Uganda rural population for 2018 was 32,570,632, a 3.01% increase from 2017.

Figure below shows the difference between the population trend in urban and rural areas



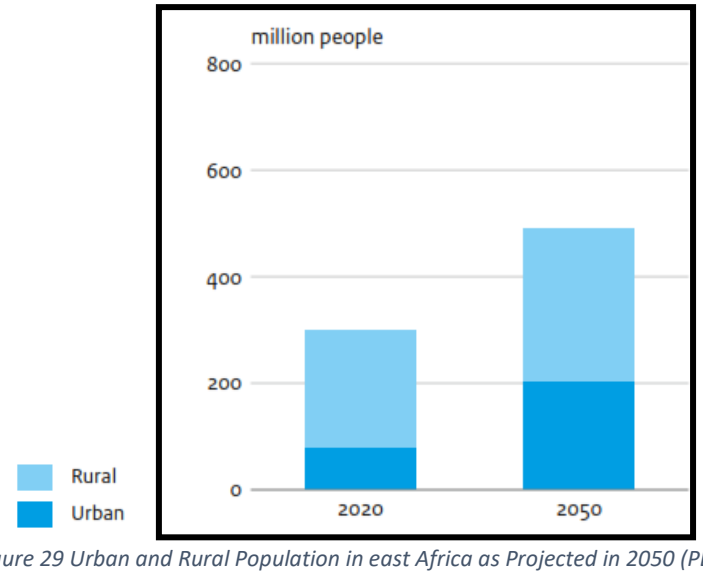


Figure 29 Urban and Rural Population in east Africa as Projected in 2050 (PBL)

14.3 Population growth rate and unemployment level

Uganda has an average growth rate of 3.5% per annum and is one of the largest recipients of refugees in the world topping the charts in Africa with a refugee population of 1.4 million people (World Bank, 2020). Thus, the demand for food in the country has outstripped the supply; there is increased encroachment on land for agriculture in favor of housing, environmental degradation including wetlands and land fragmentation. Furthermore, according to World Bank (2020), "While about 700,000 young people reach working age every year in Uganda, only 75,000 jobs are created each year leaving more than 70% of Ugandans thriving on agriculture mainly at a subsistence level. The situation is exacerbated by the fact that the country has a high percentage (78%) of the population being youth, below 30 years of age majority of whom (38%) are not employed."

14.4 Age Structure

The age structure is skewed towards the younger generations with 48.47% of the Uganda is population being in the 0-14 year-old age group. After that, 28.34% of the population of Uganda is in the 25-64 year age group. Lastly, 21.16% of the total population is dominated by the 15–24-year age group. Just 2.04% of the population is 65 or older (UNBOS 2020).

Table 5 Demographic Characteristics of Ugandan Population

Age range	Population size
0-14 years	48.21% (male 10,548,913/female 10,304,876)
15-24 years	20.25% (male 4,236,231/female 4,521,698)
25-54 years	26.24% (male 5,202,570/female 6,147,304)
55-64 years	2.91% (male 579,110/female 681,052)
65 years and over	2.38% (male 442,159/female 589,053) (2020 est.

Table 6 Percentage Distribution of Population by Age Categories for the Census (1964-2014 and projections) (UBOS 2020)

Age Category	Census Period				Projections		
	1969	1991	2002	2014	2018	2019	2020
6 – 12 Years	22.7	22.3	21.9	21.3	20.2	19.9	19.7
10 – 24 Years	27.8	33.3	34.2	31.7	35.2	35.2	35.1
13 – 19 Years	12.9	15.8	16.3	17.1	17.3	17.3	17.2
15 – 24 Years	16.2	20.0	19.9	20.6	21.5	21.6	21.7
18 – 30 Years	21.7	23.6	22.3	22.5	22.9	23.2	23.5
Less than 18 Years	51.4	53.8	56.1	55.0	53.6	53.1	52.6
60 Years or More	5.8	5.0	4.6	4.1	3.7	3.7	4.0

15. Urbanization and food systems

Kampala's urban population is nearing 1.7 million people and is growing at rate higher than the natural population growth, suggesting migration into the city as well as expansion of the urbanised areas surrounding the delimited district. However major urban centres are not the usual primary destination in these migrations. Rural residents, when migrating, will typically first find their ways to a large regional town or city, only after this step might they eventually move on to a larger area, in this case, Kampala (Stites & Akabwai 2012).

2019 was marked by the decision of the Ugandan government to create nine cities by upgrading some municipalities to this status. This is the first ever creation of cities in Uganda's independent history. To be implemented in a phased manner, the process saw five cities (Arua, Gulu, Jinja, Fort Portal, and Mbarara) becoming effective on 1 July 2020, another two (Hoima and Mbale) on 1 July 2021 and two more (Lira and Entebbe) officially were also launched. This development is grounded in a government's long-term development blueprint called Vision 2040, which envisages establishment of four regional cities (Gulu, Mbale, Mbarara and Arua) and five strategic cities Hoima (oil), Nakasongola (industrial), Fort Portal (tourism), Moroto (mining), and Jinja (industrial). But this decision is also an important recognition of Uganda's progressive urbanisation, its opportunities, and challenges as well as the urgent requirement for effective urban management, particularly at the level of secondary cities (all newly created cities have population below 250,000), to leverage those opportunities and deal with the challenges.

Yet another interesting observation is a dramatic change in the GDP share of cities, which jumped from 19.6 to 43.3%. This is however more a classification issue than a reality. Four urban areas (all of them in the Greater Kampala Metropolitan Area, GKMA) have exceeded the threshold of 250,000 since 2005 and can be formally classified as cities. The peak in the

GDP share of cities is an accounting transfer from secondary cities. The share of Kampala City is much more modest, 22.5%, a slight increase from 2005.

In addition, secondary cities are becoming somewhat more industrialized and less agriculture- and service-oriented. The government is actively promoting local economic development through industrialization, manufacturing, and agro-processing, and this may be an indication that these efforts are bearing fruit. Large cities, on the other hand, appear to be turning more towards services at the expense of the industrial sector. This may be a sign of future urban specialization where larger cities develop services while towns focus on industrial facilities.

Currently, about 70% of Ugandan urbanites live in secondary cities. At the present rate of growth (even considering some deceleration due to the demographic transition), the population of secondary cities is due to increase to about 35 million people by 2050, over 30% of the country's total population. The growth of secondary cities is an important factor in the development of dispersed patterns of urbanization. Secondary cities, which include both small to medium-sized cities (<300,000 inhabitants) and towns, contribute to a more balanced spread of off-farm employment opportunities and more inclusive economic development (Christiaensen, 2014).

15.1 Impact of urbanization of food systems

34.5% of Ugandans produce their own food. However, with the high population associated with the establishment of more urban centres in Uganda, agricultural areas are reducing food production. The most important changes that urbanization drives in food systems are the rising food demand and changing food preferences. Although diets differ widely depending on cultural and geographical differences, there is also a difference between rural and urban diets. Urbanization introduces to people to new food systems and food environment. People move away from own food production to supermarkets. Processed foods become dominant in the urban food system and result into health issues associated with obesity. The major source of food in urbanized areas is mostly supermarkets which promote the consumption of processed foods.

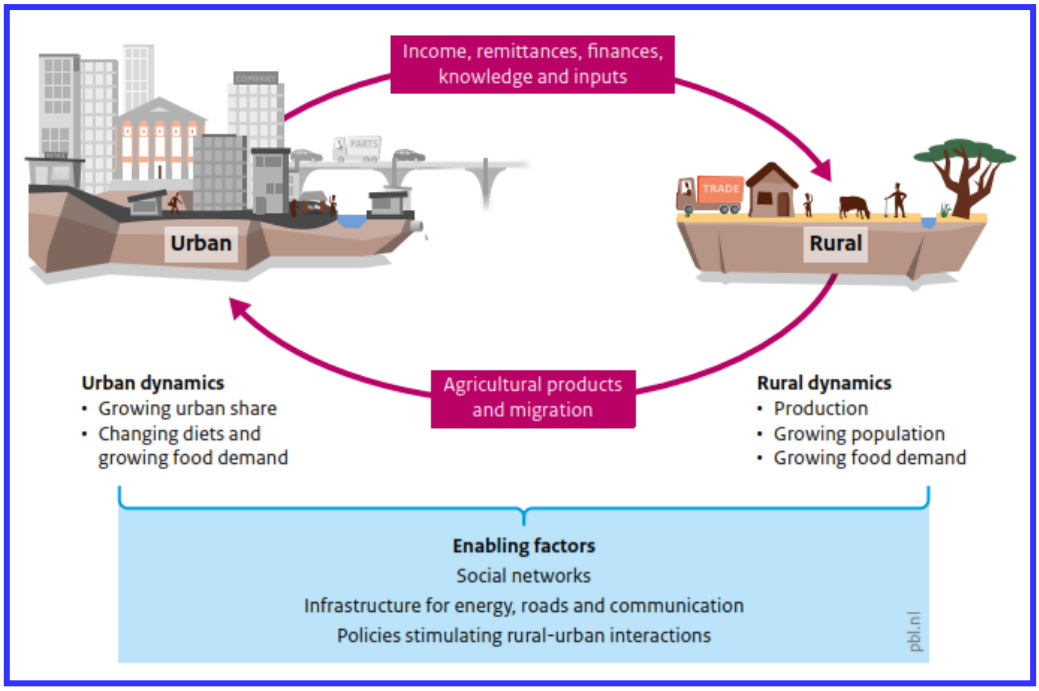


Figure 30 Urban and Rural Dynamics (IFPRI 2019)

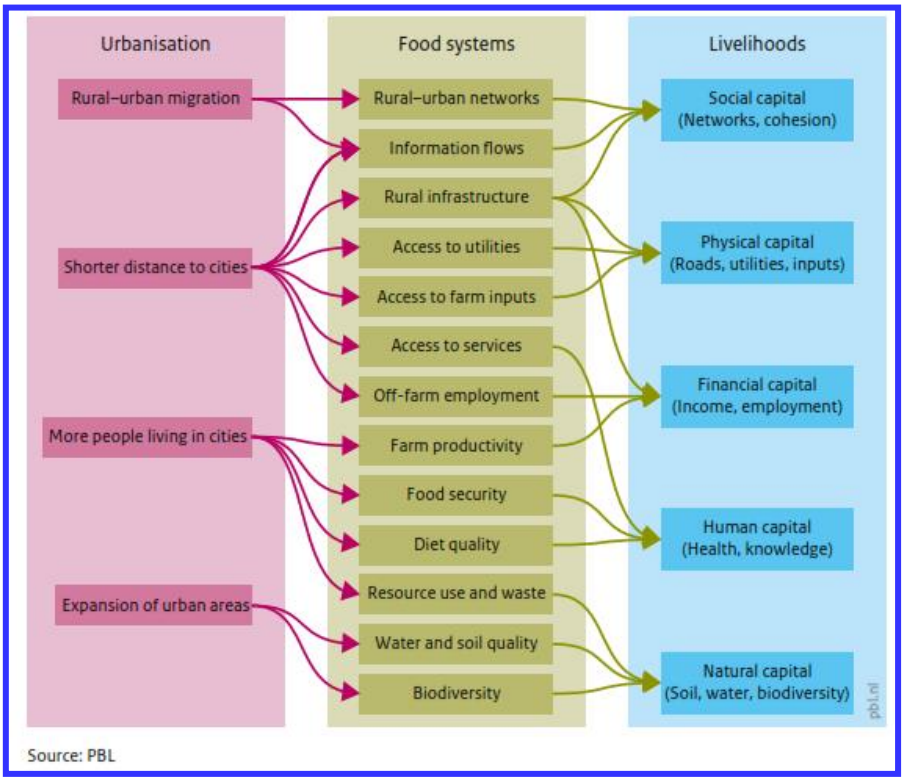


Figure 31 Linking urbanization, food systems, and Livelihoods (IFPRI 2019)

15.2 Linking urbanization, food system and livelihoods

Urbanizations can have three major impacts on social capital via the enabling factors of food systems. First, urbanization can strengthen social networks between cities and rural areas, connecting relatives, friends, and businesses. Second, it can improve the flow of information between cities and rural areas regarding employment opportunities, access to markets, services, and new technologies. Third, improved rural infrastructure, are contributing to the quality and accessibility of network. When people live in or close to cities, their food preferences, and diets change. Since they have more access to supermarkets, food vendors and restaurants, they consume more animal products, processed foods, sugar, fats, oils, and refined grains. These changes in diet cause higher levels of obesity, overweight, heart disease and diabetes.

Urbanization can decrease the distance between rural areas and cities, providing better access to education and healthcare services. This leads to higher knowledge levels and the better health of rural dwellers, in turn boosting productivity and income. Urbanizing food systems can contribute to financial capital for rural livelihoods in three ways; first, rural development can take place through increased connectivity between rural and urban areas. Second, the decreasing distance between rural and urban areas makes it easier for rural dwellers to start a business or access off-farm employment, thereby generating more income. Third, increased urban demand provides an incentive to improve rural food production and boost farm productivity.

Urbanizing food systems can have three negative impacts on natural capital. First, urban expansion leads to the direct and indirect loss of natural areas and biodiversity. Second, urban expansion into rural areas can lead to increased water and soil pollution and waste management issues. Third, urban diets require more industrialized supply chains and intensive production practices, which consume more water and energy and produce more waste and pollution. As cities grow, nature and farmland are converted into roads, residential areas, or industrial areas, negatively affecting rural livelihoods and available farmland. This in Uganda can be noted from the conversion of wetlands into industrial parks. Urbanizing food systems can have a positive impact on physical capital in three ways, first, more urbanized food systems can offer better infrastructure and communication networks between rural and urban areas. Second, urbanized food systems can result in broader access to electricity and tap water services. Finally, the urbanization of food systems can result in the better access of rural producers to agricultural inputs and services. The figure below shows urbanization and food system and linkages.

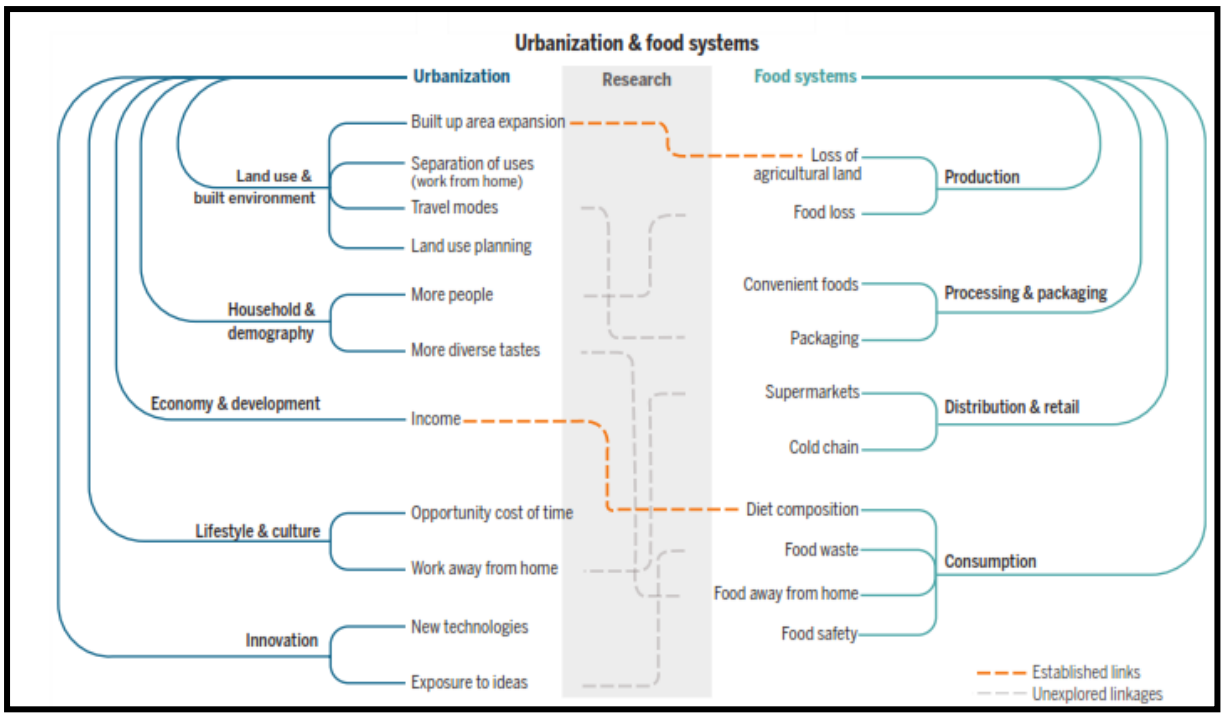


Figure 32 Established and Unexplored Linkages between Urbanization and Food Systems (Karen et al. 2016)

16. Trade

Over the period 1985-2000, Uganda's total agricultural exports have exceeded its total agricultural imports, resulting in a net export surplus. A review of the growth of agricultural exports relative to agricultural imports by period reveals that only in 1990-1994 did export growth exceed import growth, while in the other two periods, the reverse happened. The net agricultural export balance peaked at US$29.8 million in 1985-1989, then dropped to US$17.5 million in 1990-1994 but rose later to US$28.2 million in 1995-2000. The share of agricultural imports to agricultural exports has grown from 10% in 1985-1989 to 31% in 1995-2000. This persistent growth of agricultural imports, as compared with agricultural exports, could worsen Uganda's trade position over time. Exports in Uganda decreased to 426.56 USD million in April from 444.08 USD million in March of 2021.

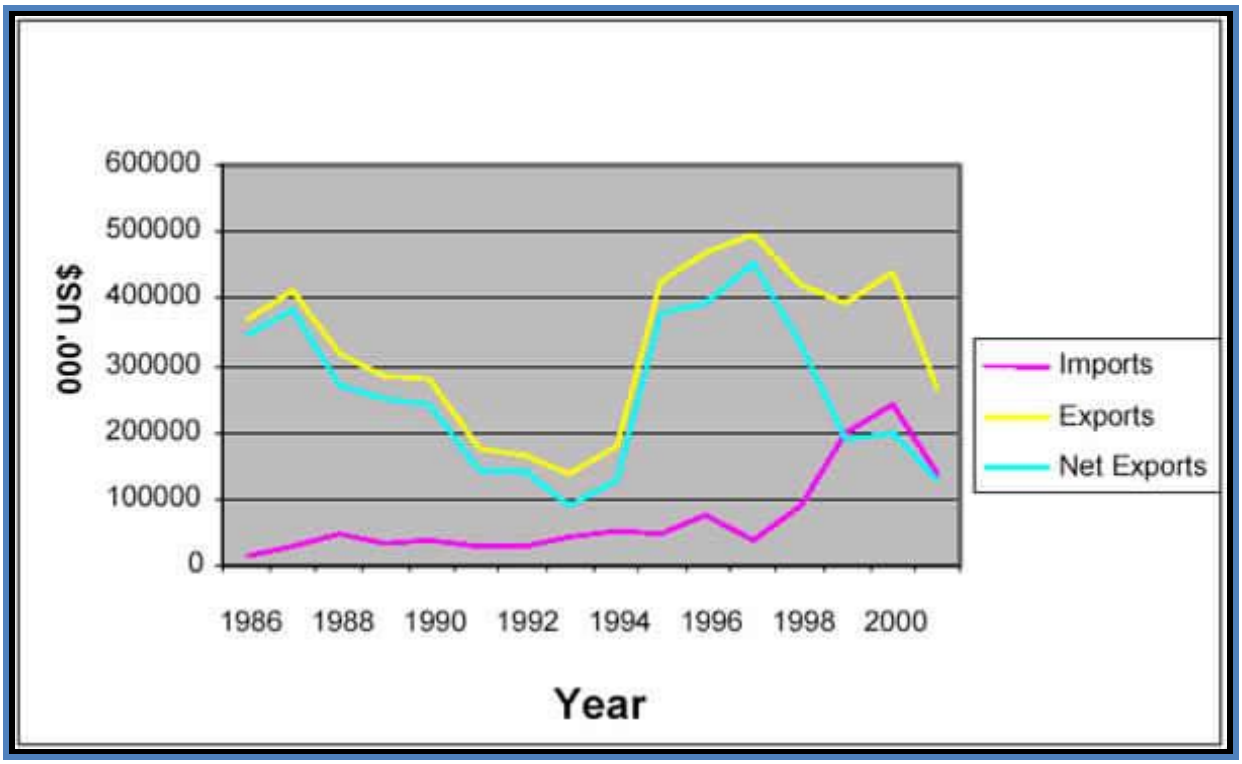


Figure 33 Uganda's Agricultural Trade (1986- 2000) (FAO 2000)

Uganda's economy registered growth of 4.8% in FY2015/16 with the major driver being the services sector that grew by 6.5%. The country's underdeveloped transportation and electricity networks, low agricultural productivity, regulatory challenges and lack of transparency and corruption keep business costs high and hinder investment, economic growth, and job creation. As a landlocked country, the destination of most Uganda's exports is the East African Community, with 2016 exports worth U.S. $88.68 million through August 2016. Uganda accounts for 72% of the region's staple food commodity exports in general. However, the volume of exports to the region decreased over the past year largely due to the conflict in South Sudan, which is a major importer of Uganda's products.

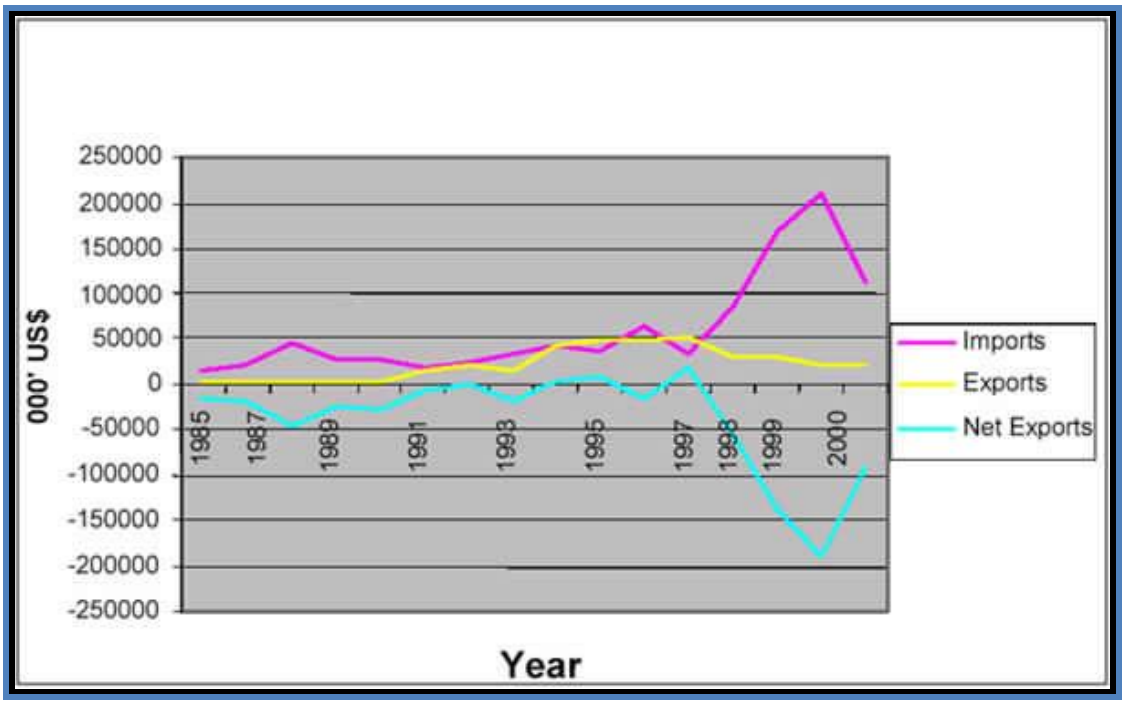


Figure 34 Ugandan Food Trade (1986-2000) (FAO 2000)

16.1 Commodity prices

Producers of food commodities generally received incentives in recent years. Prior to 2007, producers of food commodities such as maize and cassava received prices lower than reference prices, although the wholesale prices of maize in Uganda were generally higher than export prices to neighbouring countries. With the onset of the world food crisis in 2007–2008, producers began to receive price incentives translated into a domestic price above the reference price. Although quite variable, the incentives appear to be related to the high export prices during the world food crisis. As the maize market in Uganda is highly liberalized, these changes in incentives cannot be attributed to policy measures; they are related to the functioning of the domestic maize market. There appears to be weak price transmission even between domestic markets. To realize a vibrant domestic and export market it will be necessary to develop efficient marketing mechanisms to facilitate price transmission to producers, which will enable smallholder farmers to benefit from possible high produce prices in regional and international markets.

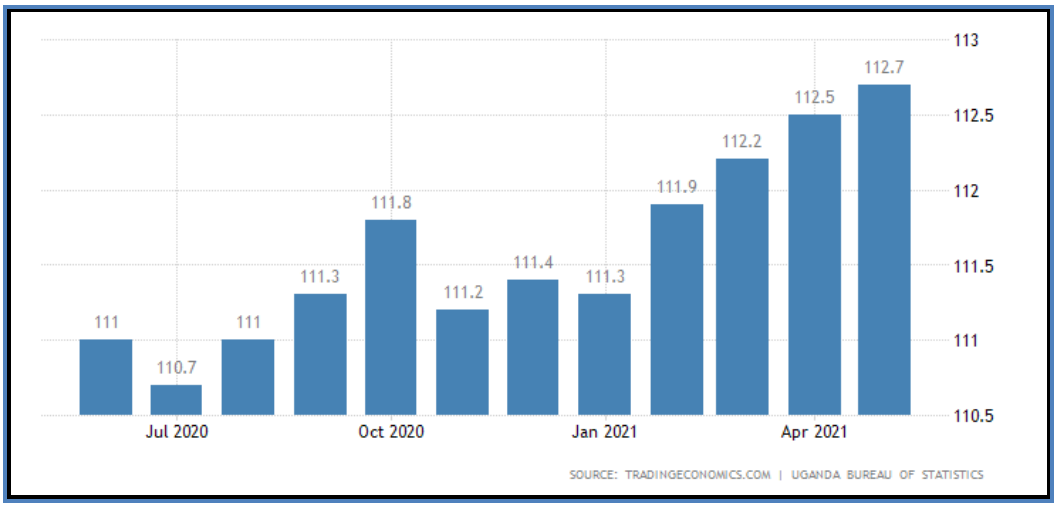


Figure 35 Ugandan Consumer Price Index

17. Cultural and Religious: food habits, taboos around food

In Uganda women were not supposed to eat poultry, poultry products, and pork. This can lead to a shortage of adequate supplies of essential nutrients especially in the most vulnerable groups of the rural population. In Busoga district, females, and female children over 6 years were forbidden to consume eggs, poultry, mutton, pork and certain kind of fish. In the Bukedi district, females were forbidden to eat eggs, chicken, and pork. There is a need to address detrimental food taboos and norms that impair the nutrition of women, infants, and young children. This can be achieved through increased knowledge on the impact of detrimental food taboos and norms that impair nutrition, change in negative attitudes, beliefs, and practices related to nutrition and increased intake of culturally prohibited foods (Uganda Nutrition Action Plan, 2011).

18. Food packaging

Food packaging in Uganda includes traditional material such as fibres, banana leaves, woven baskets, and modern materials such as plastics, metal cans, glass, and various laminated paper packages. The packaging manufacturing sector is its infancy and mainly produces polyethylene films and polyethylene terephthalate (PET) bottles and boxes. Packaging material such as tetra packs and glass are obtained from outside the country.

Regarding the labelling/marking requirements, the following information must be clearly marked on imports and exports: importer/exporter name, consignee, flight/vehicle details, place of discharge, number of packages, container identity, description of goods, air waybill number/bill of lading, and country of origin/destination. Uganda requires labels for all food products. Uganda's regulatory framework is predominantly government-driven, although the government often consults with stakeholders. Standards are drafted and enforced by the Uganda National Bureau of Standards (UNBS), which is supervised by the Ministry of Trade, Industry and Cooperatives. Uganda is a member of the International Organization for Standardization, the African Regional Organization for Standardization, the East African

Standards Committee, COMESA, the FAO/World Health Organization Codex Alimentarius Commission on International Food Standards, and the World Trade Organization (WTO).

19. Logistics

Distribution and logistics have been important features of industrial and economic life for many years. Physical distribution is the collective term for the range of activities involved in the movement of goods from points of production to final points of sale and consumption. It must ensure that the mobility requirements of supply chains are entirely met. It includes all the functions of movement and handling of goods, particularly transportation services (trucking, rail, air, inland waterways, marine shipping, and pipelines), trans-shipment and warehousing services (e.g., consignment, storage, inventory management), retail and wholesale. Conventionally, all these activities are assumed to be derived from materials management demands. Transportation of goods and services improves service delivery and prevent customers from going to the next source. Logistics involves a wide set of activities dedicated to the transformation and distribution of goods, from raw material sourcing to final market distribution as well as the related information flows (Gammelgaard, and Larson, 2001). Today it refers to the set of operations required for goods to be made available on markets or to specific locations. Logistics acts as the material and organizational support of globalization, requiring a complex set of decisions to be made concerning an array of issues such as the location of suppliers, the transport modes to be used and the timing and sequencing of deliveries.10

20. Conclusions

There is a need to transform Ugandan system to become resilient in cases of disaster and shocks. The country is a food basket with diverse agro-ecological zones capable of guaranteeing food security through diverse and nutritious indigenous food varieties; however, their capabilities have not been fully harnessed to deliver sustainable food systems and nutrition outcomes. This is not noted from the prevailing hunger and some people going hungry. The growing population will continue to exert pressure on land hence land fragmentation, migration, and urbanisation. The best to transform existing food production systems is by investing in technologies that promote agricultural intensification and efficiency at all points of the value chain. Investments in agriculture sector need to be increased to build a sustainable food system in Uganda, Investments can be targeted to provision of quality inputs mechanization and ICT, Agro-processing, digital markets, and silos for long time storage. Additional investments need to be made in improving food-related infrastructure including roads, water supply, logistics systems shortening of supply chains; implementing trade rules that facilitate improved access to healthy, safe diets from sustainable food systems. While the food systems present vast opportunities for employment, achievement of equitable livelihoods, there is a need to address the drivers of inequality. Food system transformation must also find the balance of food systems that favour and support the local stakeholders and provision of healthy diets in sustainable manner.

10 List of logistic companies in Uganda can be found at https://www.yellow.ug/category/logistics/4

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Annex 3.2: Uganda Workshop Report

Summary of Proceedings:

Food Systems and Foresight Training in Uganda

4 & 7 May 2021

Background

The Foresight Capability for Food System Transformation in Ghana and Uganda project is focused on consolidating food systems foresight capability in Ghana and Uganda to strengthen the basis of transformation planning towards more sustainable and resilient food systems. Funded by the Open Society Foundation (OSF) and developed in partnership with the FARA Africa Foresight Academy, the project is working closely with local institutions to contribute to national strategy on food systems foresight. Building on earlier OSF-funded and ongoing SENTINEL research in Ghana, and on the OSF-funded IFSTAL projects in Ghana and Uganda, the project will develop a methodology for national-level foresight for food systems transformation and an associated foresight toolkit. In this regard, the project has designed two sets of 2-part training workshops for each country to gather information on food systems and explore food system futures. This document reports on the proceedings from the first set of food systems training workshops conducted for Uganda. See Appendix A for the agenda for Sessions 1 and 2, and Appendix B for a list of workshop participants. Appendix C presents the outputs from the drivers activities for each breakout group.

Session 1: Food Systems

The workshop kicked off with a welcome and introduction by **Professor Charles Muyanja** (Makerere University) and **Dr John Ingram** (ECI, Food Systems Group). An outline for the day and the project's overall objectives were presented.

The welcome session was followed by a presentation on food systems thinking and the value of the food systems approach by **Dr John Ingram** (see Figure 1 below). The issues raised in the presentation prompted questions from the audience around the representation of stability (as related to food security) and food safety in the conceptualization of food systems, how health is considered in food system discussions, and the interactions of food system drivers.

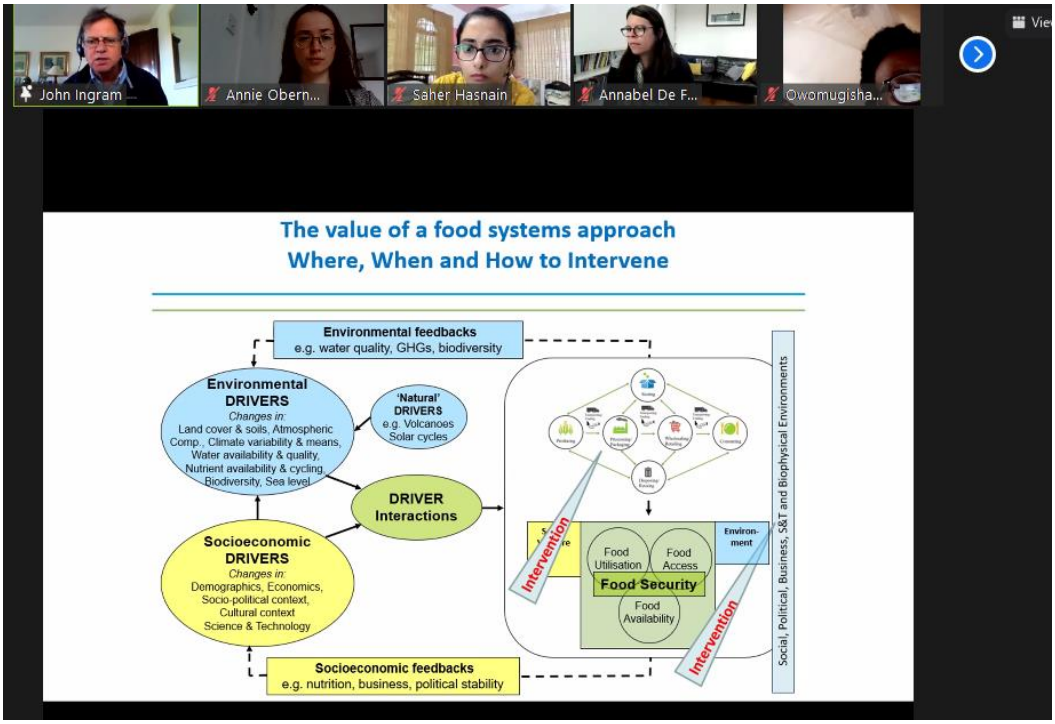
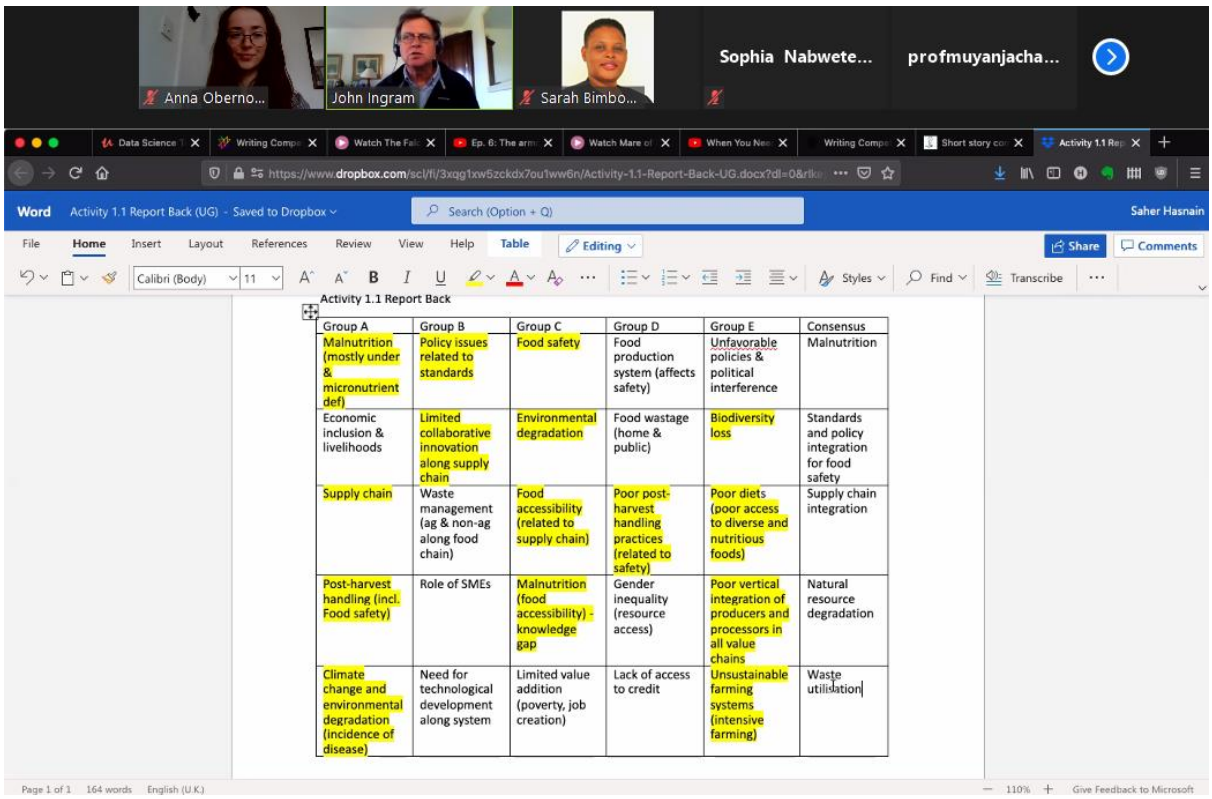


Figure 36 Dr John Ingram presenting on the value of a food system approach.

The presentation concluded by describing the first interactive session of the workshop. The facilitated breakout session was focused on the collaborative identification of big issues in the Ugandan food system. The discussions in each group were captured and shared in plenary (see Figure 2 below).



Group A	Group B	Group C	Group D	Group E	Consensus
Malnutrition (mostly under & micronutrient def)	Policy issues related to standards	Food safety	Food production system (affects safety)	Unfavorable policies & political interference	Malnutrition
Economic inclusion & livelihoods	Limited collaborative innovation along supply chain	Environmental degradation	Food wastage (home & public)	Biodiversity loss	Standards and policy integration for food safety
Supply chain	Waste management (ag & non-ag along food chain)	Food accessibility (related to supply chain)	Poor post-harvest handling practices (related to safety)	Poor diets (poor access to diverse and nutritious foods)	Supply chain integration
Post-harvest handling (incl. Food safety)	Role of SMEs	Malnutrition (food accessibility) - knowledge gap	Gender inequality (resource access)	Poor vertical integration of producers and processors in all value chains	Natural resource degradation
Climate change and environmental degradation (incidence of disease)	Need for technological development along system	Limited value addition (poverty, job creation)	Lack of access to credit	Unsustainable farming systems (intensive farming)	Waste utilisation

Figure 37 Reporting and capturing results from the interactive sessions.

Discussions in the plenary sessions tried to cluster and identify the key issues emerging from the groups:

1. Issues related to malnutrition are complex and inter-related and include economics, education, and behavioural change.
2. Climate change adaptation is a big and complex issue in food systems.
3. Increasing specialization can lead to concerns with cross-sectoral discussions and awareness of complex and large issues.
4. Cross-cutting concerns like education and gender should be considered in all major food system problems.
5. Sustainable livelihoods are a significant concern.
6. Issues such as food waste may be different in scope and importance particularly in comparison with the Global North.

Dr Annabel de Frece (IFSTAL) shared a presentation on framings, boundaries, and systems mapping. The presentation focused on the value of seeing issues from different perspectives and being mindful of how knowledge is used and created (see Figure 3 below).

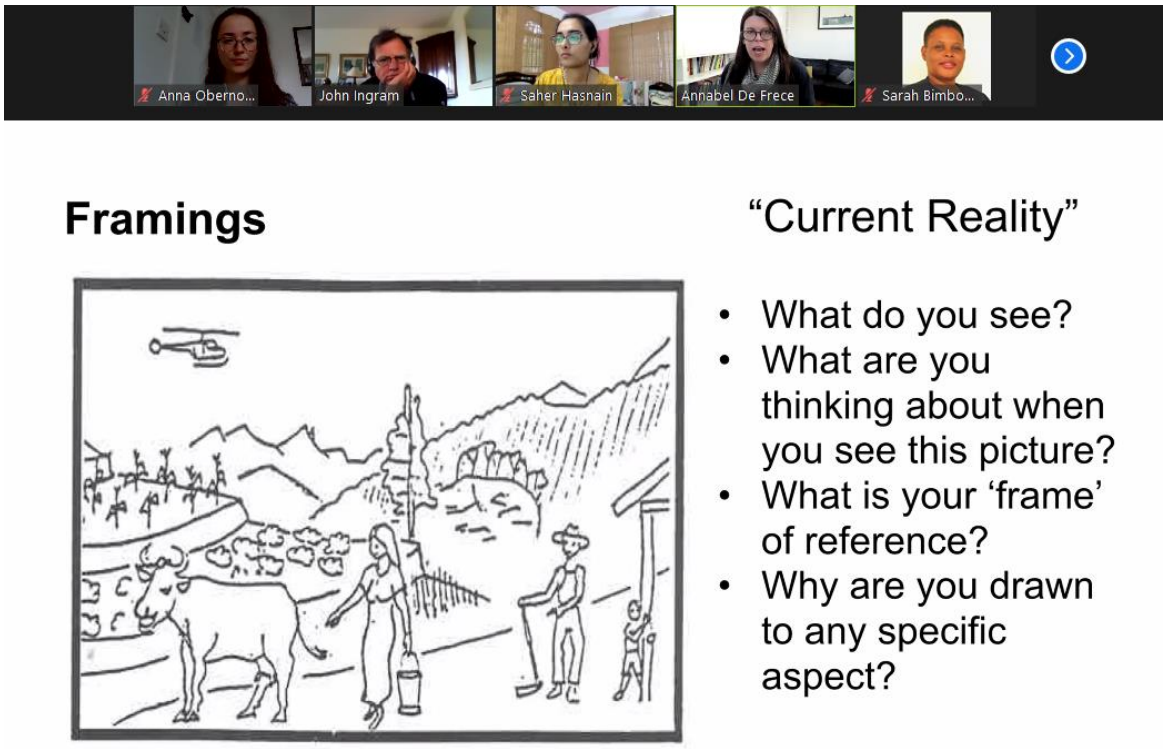


Figure 38 Dr Annabel de Frece presenting on 'framings' in systems thinking.

The presentation was followed by the second interactive session of the day, focused on developing a 'rich picture' of the key issues identified earlier (see Figure 4 below). This activity was carried out on Miro, an online interactive collaborative tool. Each group developed a rich picture on their assigned issue, focusing on the key elements of its system, boundaries, and relationships.

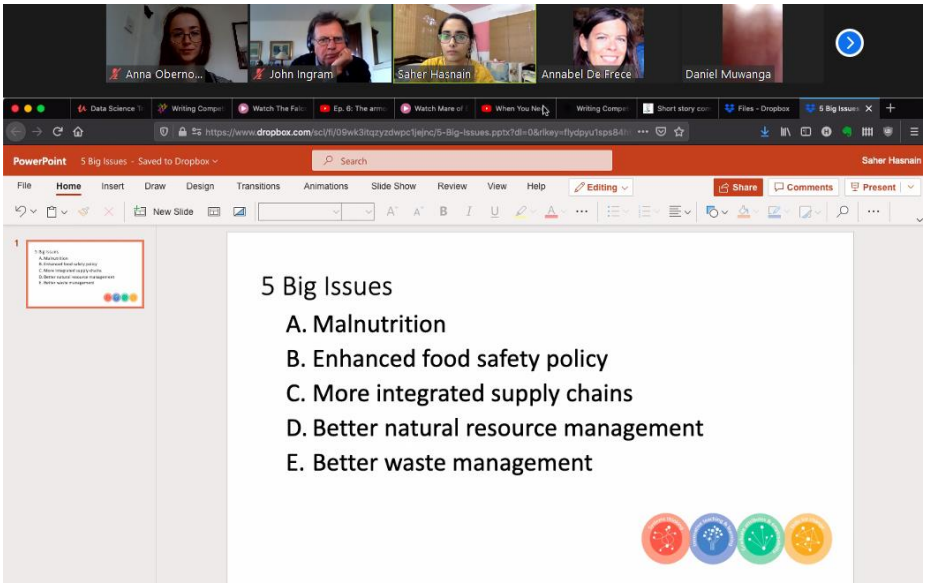


Figure 39 Big issues in the Ugandan food system as identified by the workshop participants

Technical difficulties were experienced in using the Miro tool with concerns about using it over different types of devices and limited time for familiarization. Key outcomes from the groups are noted below:

- Malnutrition: Disease, inadequate dietary intake, and the enabling environment contribute to malnutrition. While national strategies on fortification are present, they can be better implemented. There are significant issues with accessing food for different population groups (see Figure 5 below).
- Enhanced food safety policy: The central government holds responsibility for developing and implementing standards at policy level. Key stakeholders are the Ugandan Manufacturing Association (UMA), PSFU, Ministry of Health, and Ministry of Agriculture.
- More integrated supply chains: There is inadequate coordination and connection between actors in the food system, with unequal decision-making power and concerns on accessibility.
- Better natural resource management: It is important to include actors that can influence resource management and local communities in decision-making in this area.
- Better waste management: More connections and innovations are needed to improve value chain processes and it is necessary to work closely with service providers and the general population to influence behaviour change and communication.

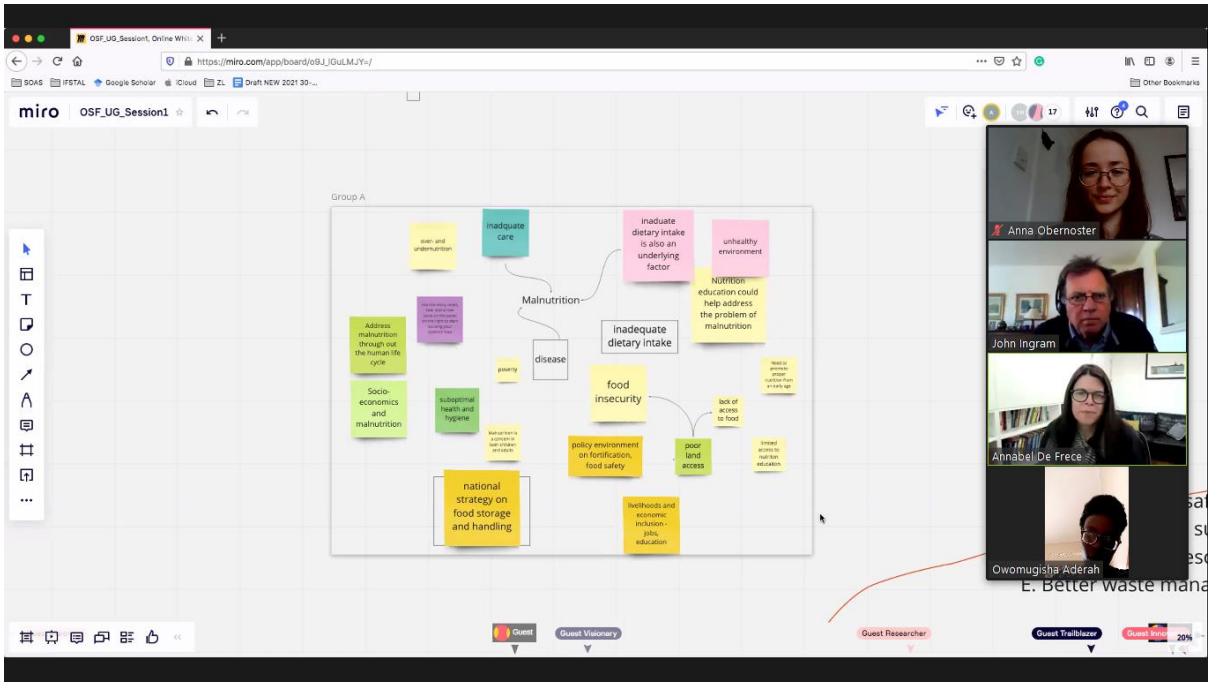


Figure 40 Miro board for the malnutrition issue.

The reporting back and discussion from the interactive session was followed by a presentation on stakeholders and stakeholder mapping by **Dr John Ingram**. This presentation set up the foundation for the final interactive session of the day where the participants were asked to examine the impact and power of the stakeholders discussed in the previous breakout session.

The event was closed by **Dr Annabel de Frece** with a summary of the day's activities and an outline of the second session.

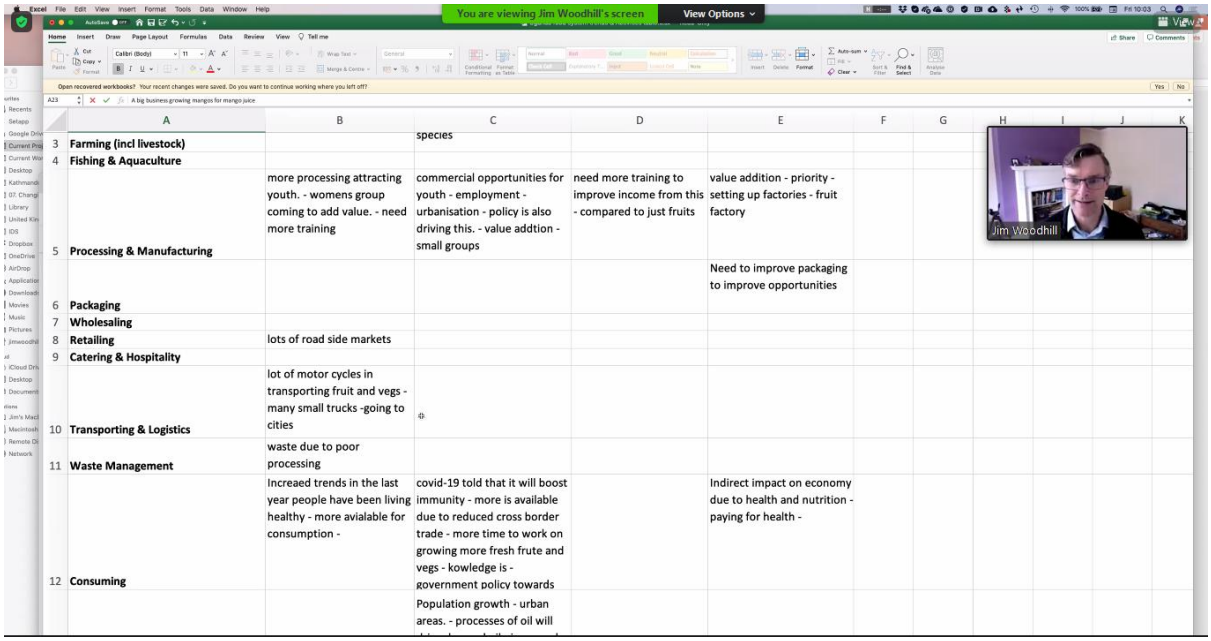
Session 2: Food System Trends and Drivers

The second session started with an introduction to main issues in the food systems, the role of the UN Food Systems Summit and an overview of foresight concepts by **Dr Jim Woodhill** (Foresight4Food). This was followed by **Professor Charles Muyanja** exploring the relevance of this project and the food systems concept to Uganda. Professor Muyanja discussed how the national dialogue on food systems will be important for the country's activities and the necessity of bringing together diverse stakeholders around key issues. These introductory statements were followed by the first breakout session of the day. This focused on examining how the workshop participants consider food systems thinking in relation to their own work and their organizations. This resulted in the following messages:

- Food systems approach can allow many organizations to work better.
- Better standards and regulations are needed, particularly in relation to food hygiene and food safety.
- Academia and research can benefit with a better application of systems thinking, foresight, and recognizing and working with institutional set ups which may make it difficult to work in an integrated manner.
- Traceability in food systems is a key challenge particularly in terms of chemicals, food quality, and current limited control.
- It is necessary to understand stakeholder mindsets and improve awareness across stakeholder groups of various issues.
- Food preparation in commercial settings needs greater attention.

- Climate change necessitates greater innovation in areas related to water, pests, soil management, funding, and dominant mindsets.

The breakout session was followed by a brief presentation on food system drivers by **Dr Monika Zurek** (ECI, Food Systems Group). The presentation discussed examples of drivers in food systems, labelling drivers, and the uncertainty and importance of different drivers in a system. This was followed by an activity on food system trends and drivers for Uganda. Given the challenges with using the Miro tool in Session 1, this activity was facilitated by a project team member with insights being captured real-time on Excel (see Figure 6 below). See Appendix C for each group's table.



	A	B	C	D	E
3	**Farming (incl livestock)**		species		
4	**Fishing & Aquaculture**				
5	**Processing & Manufacturing**	more processing attracting youth. - womens group coming to add value. - need more training	commercial opportunities for youth - employment - urbanisation - policy is also driving this. - value addtion - small groups	need more training to improve income from this - compared to just fruits	value addition - priority - setting up factories - fruit factory
6	**Packaging**				Need to improve packaging to improve opportunities
7	**Wholesaling**				
8	**Retailing**	lots of road side markets			
9	**Catering & Hospitality**				
10	**Transporting & Logistics**	lot of motor cycles in transporting fruit and vegs - many small trucks -going to cities			
11	**Waste Management**	waste due to poor processing			
12	**Consuming**	Increased trends in the last year people have been living healthy - more avialable for consumption -	covid-19 told that it will boost immunity - more is available due to reduced cross border trade - more time to work on growing more fresh frute and vegs - kowledge is - government policy towards		Indirect impact on economy due to health and nutrition - paying for health -
			Population growth - urban areas. - processes of oil will		

Figure 41 Feedback on group discussions on fresh fruit and vegetables in Uganda

Key messages emerging from this session are:

1. Importance of growing sectors to livelihoods.
2. Growing concerns of pests and diseases in production sectors.
3. The horticulture sector is a dynamic sector with great implications for health and development.
4. There are difficulties around availability and affordability of high-quality crop inputs.
5. The 'middle' of the food system is important but stagnating for commodities such as maize.
6. Poor governance is an on-going concern in the food system.
7. Quality control in food sectors needs improvement with regards to standard implementation and inspection.

The event was closed with a summary of the course and an introduction to the second set of workshops around scenario development.

Session 3: Scenario Development (1 pm Uganda time)

The session began with a recap to the first two sessions in May, with an exploration on key issues for the future, such as lifestyle changes, health issues, and looking at different options for food systems

change. The key issues for the Ugandan food system from the first workshop were reiterated, with some relevant observations:

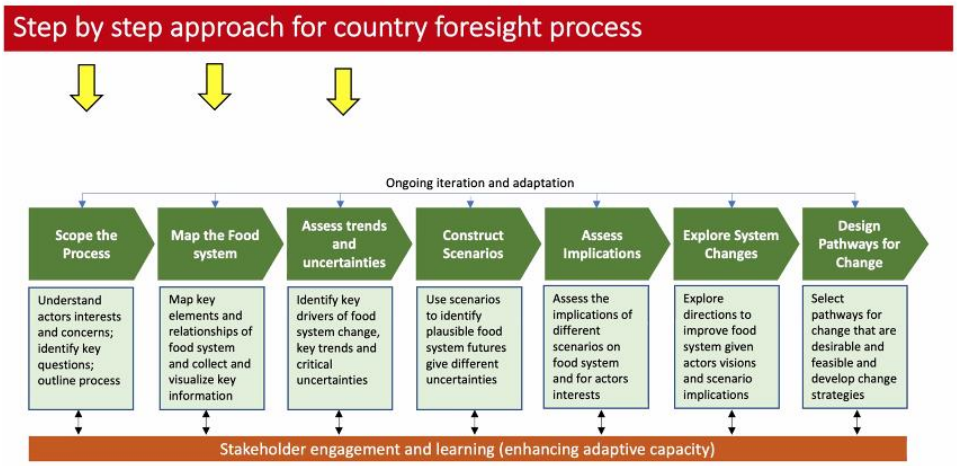
Main issues in the Ugandan food system:

- Malnutrition
- Enhanced food safety policy
- More integrated supply chains
- Better natural resource management
- Better waste management

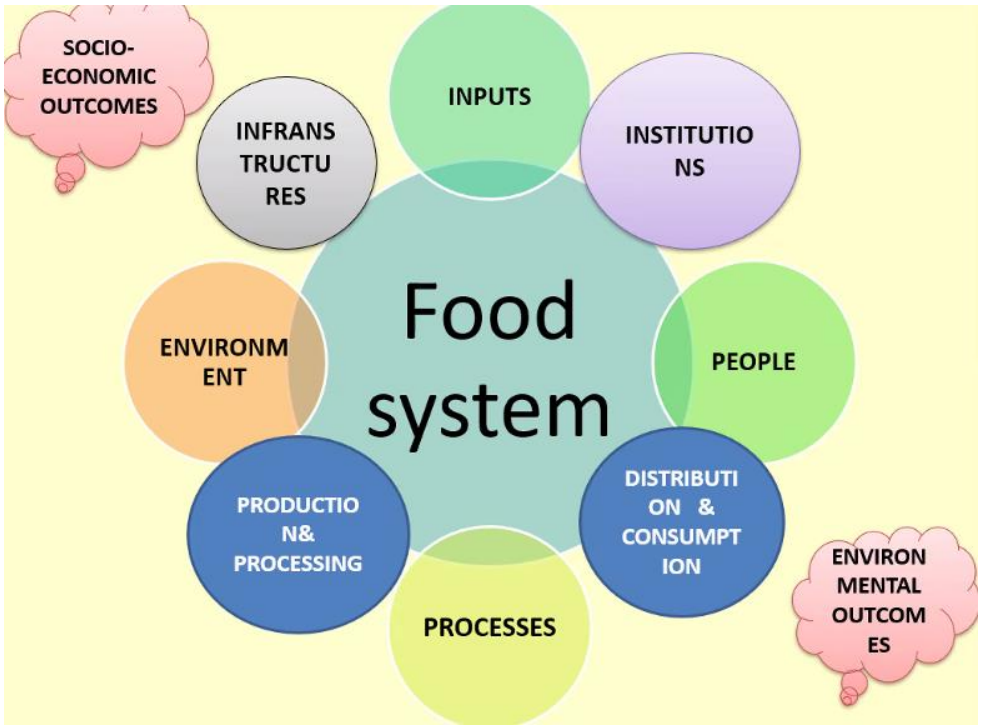
Key observations:

- The importance of the growing sector to livelihoods.
- Growing concerns of pests and diseases in production sectors.
- The horticulture sector is a dynamic sector with great implications for health and development.
- There are difficulties around availability and affordability of high-quality crop inputs.
- The 'middle' of the food system is important but stagnating for commodities such as maize.
- Poor governance is an on-going concern in the food system.
- Quality control in food sectors needs improvement with regards to standard implementation and inspection.

This was followed by a presentation from **Jim Woodhill** on the introduction to food systems foresight and the foresight and scenario process to be employed in the workshop. The 'green boxes' approach, that takes participants through a step-by-step approach for developing a country foresight process was discussed.



Professor Charles Muyanja then provided an overview of the Ugandan food system and highlighted the biggest problems and the various factors that interact to result in a range of outcomes in the food system (see Figure below):



In the breakout rooms, participants explored key issues from the perspective of different stakeholders in the food system (e.g. consumers, farmers, and value chain businesses) in terms of concerns, interests, and conflicts. The following common concerns and interests were highlighted:

- Standards across the food system
- Connection between consumers and market actors
- Higher value and more nutritious crops
- Quality culture
- Regional and global market integration
- Getting the finance right
- Climate response
- Better communication across policy-practice-research
- Enforcement / policy implementation
- Upgrading technology

Potential conflicts between stakeholders over:

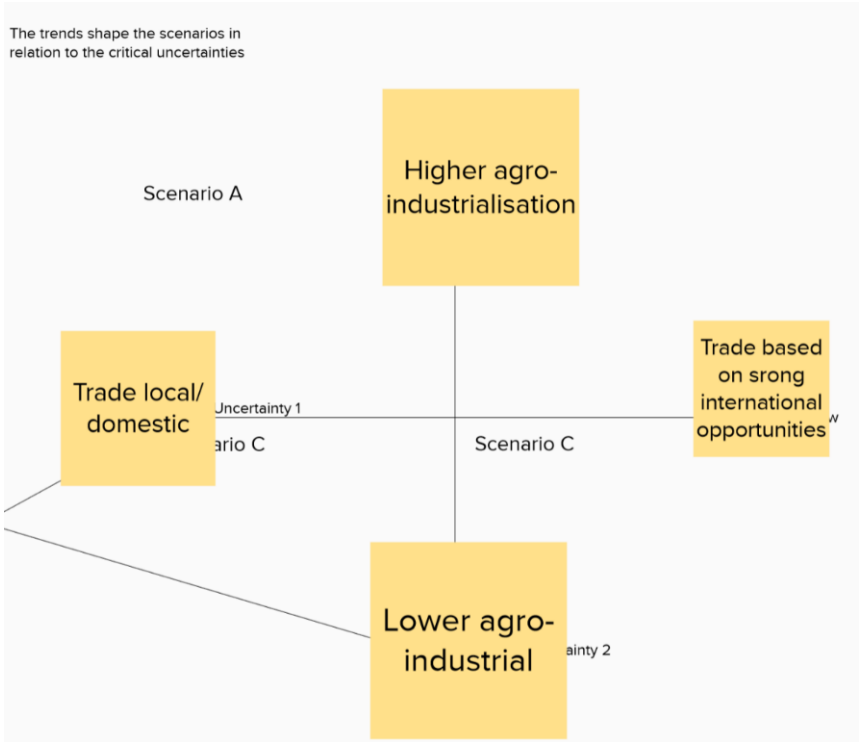
- Standard vs control / freedom / cost
- Price of food vs environmental and nutritional quality
- Land tenure
- Use of government subsidies
- Opportunities for small vs large operators in the value chain

Main issues identified in breakout sessions in Mural (building on the key concerns from the previous workshops):

- Hunger and malnutrition, especially in children.

- Obesity, linked with changing eating habits and lifestyles.
- Land use / land cover, with a decrease in forest cover.
- Greenhouse gas emissions, with a particular focus on agriculture.
- Increasing water withdrawals.
- Land degradation driven by lack of labour in capital in sustainable production methods.
- No changing contribution of agriculture to the GDP.
- Rising urbanization and its implications for food retails.
- Decrease in government spending on agriculture.
- Decrease in trade over the last two decades.

A prioritisation exercise resulted in the following axes for the scenario development:



Session 4: Scenario Development (1 pm, Uganda time)

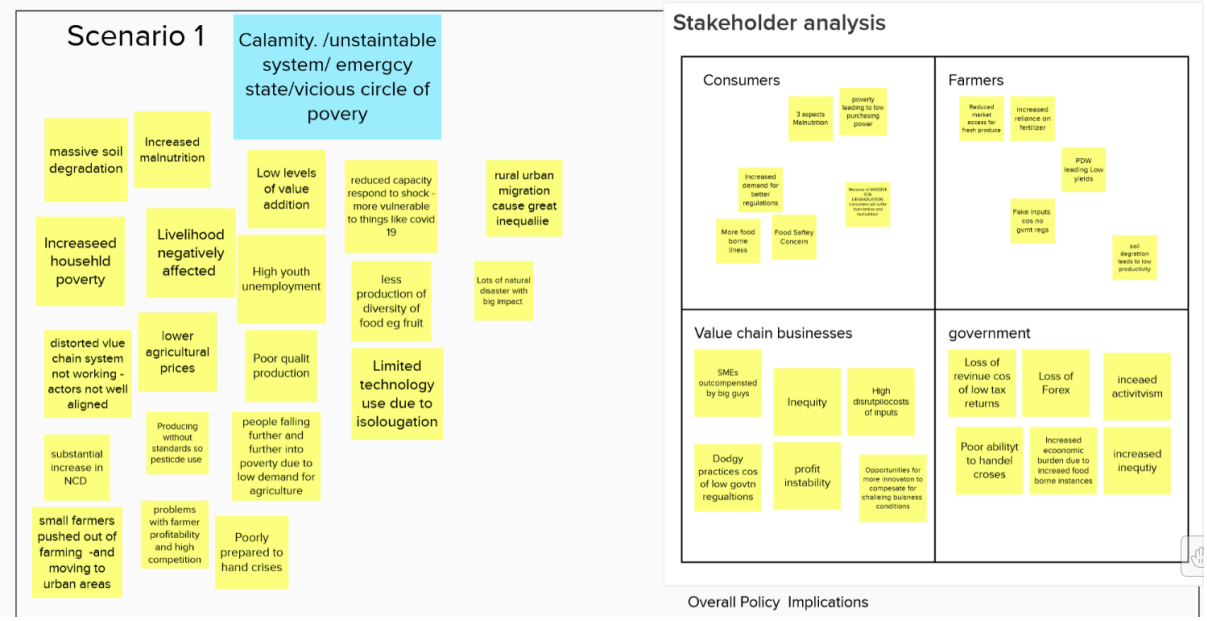
The second session, led by **Monika Zurek** and **Jim Woodhill** focused on developing the scenarios according to the uncertainties identified in Session 3. The participants were guided by the following questions for the Ugandan food system in 2035: what will you eat? What do you see when you look out of your window? How will the major drivers and their trends from Day 1 change to bring you from today into the world of 2035? This was guided by a presentation on what 'good scenarios' look like in terms of plausibility, consistency and coherence, rigour, and objectives.

The participants were reminded of the shared concerns and conflicts of the various stakeholders from the previous session and the key uncertainties to discuss for each scenario were presented:

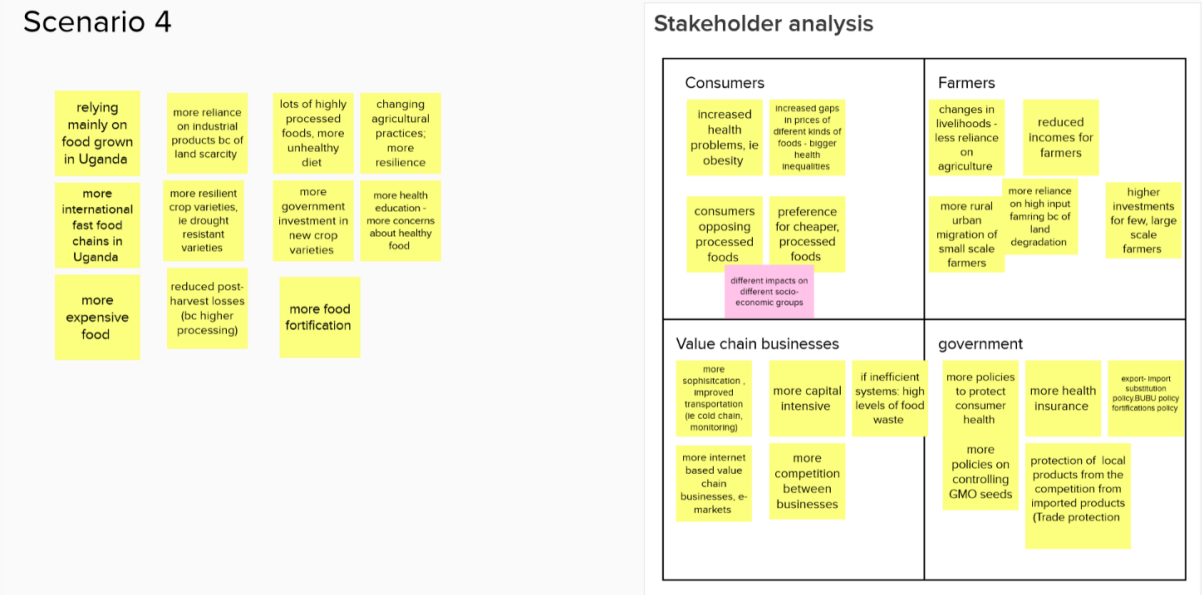
Four scenarios for the Ugandan Food System

Uncertainty	Scenario 1	Scenario 2	Scenario 3	Scenario 4
NAME	???	???	???	???
Trade integration	low	high	low	high
Agro-food system development (incl. role of private sector)	low	high	high	low
Inclusive and healthy oriented food policy	low	low	high	high
Resilience to environmental change	low	low	high	low

The scenario development took place in facilitated breakouts in Mural. Scenarios 1 and 4 are presented below as an example. The detailed scenarios can be found in the Scenario Report (attached in this document)



Scenario 4



The session closed with an analysis of the four scenarios:

- Scenario 3 necessitated farmers adopting new technologies, with protection from outside forces
- All scenarios had a poor outlook for small scale farmers, resulting in higher unemployment and poverty. Policies for actively bringing in small scale farmers would be necessary.
- More cooperation between different smallholder farmers and with large-scale farmers
    - Important: nobody should be left out, find ways on how farmers can cooperate
    - Important to implement policies counteracting this
- Credits and land tenure systems impact social groups differently, which presents a significant challenge
- A cooperative approach linking farmers from unions at district and regional levels will be needed for effective engagement
- Gender disparity and youth engagement is a big concern in all scenarios
- Government is a major catalyst in several aspects, and is needed to implement regulatory frameworks and policies. Low investment in operationalization, the need of credit, and making businesses competitive on regional markets is a main concern.

The workshop closed with thanks to the participants.

Appendix A

Session 1 Food Systems: Tuesday 4 May 13:30 – 18:00 Kampala time

13:30 Start up, Welcome and Introductions (John)

13:45 **Presentation 1.1 Food systems thinking and the value of the food system approach** (John)

14:15 Activity 1.1 breakout rooms: Identify 5 major Food System issues (outcomes) for the country (John)

14:45 Group Feedback and discussion => agreed list of issues (John)

15:30 Break

16.00 **Presentation 1.2 Framings, Boundaries and System Mapping** (Annabel)

16:30 Activity 1.2 breakout rooms: Rich Picture (1 major issue per Group) (MIRO) (Annabel)

17:00 Group Feedback => set of Rich Pictures of major issues

17:20 **Presentation 1.3 Stakeholders and Stakeholder Mapping** (John)

17:30 Activity 1.3 breakout rooms: Stakeholder Mapping of major issues for Group's issue

17:55 Summary of Day 1 and prep work for Day 2 (Annabel)

18:00 Close

Session 2 Food System Trends and Drivers: Friday 7 May 09:30 – 13:00 Kampala time

09:30 Start up and Welcome (John)

09:40 Overview of Project and link to Food System Summit (Jim)

09:45 Relevance to Uganda (Charles)

09:40 Breakouts #1: food system issues in relation to your work (Anna, Annabel, Jim, John)

10:20 Breakout feedbacks: 3 - 4 points / group (John)

10:35 Nature of drivers (Monika)

10:45 Breakouts #2: food system trends and drivers (with intro to table; John)

11:30 Break

12:00 Breakout feedbacks

12:30 Breakouts #3: Identify data sources (add to table)

12:50 Summary of Course (John)

12:55 Next steps: Scenarios Workshop (Monika)

13.00 Close

Appendix B: Participant List

Session 1:

1. Muniirah Mbazi
2. Isaac UNHCR
3. Lovin Kobusingye
4. Owomugisha Aderah
5. Rumanzi Mao Mark
6. Irene
7. Robert Fungo
8. Joweria Nambo
9. Rachel Byarugaba
10. Hakim UNBS
11. Jacent
12. Yiga Dennis Nandy
13. Charles Mukuma
14. Pamela Akwai

15. John Kiwagalo
16. Sophia Nabwete
17. Mukalazi Francis
18. Kimera Henry Richard
19. Docus Alowo
20. Joseph Mulindwa
21. Nshimirama…
22. Mabior Chol Jacob
23. Abdulrazak Ibrahim
24. Sarah Bimbona
25. James Lukenge
26. Duncan Ongeng
27. Enid Katungi

Session 2:

1. Yiga Dennis Nandy
2. Catherine Nankinga
3. Enid Katungi
4. Isaac UNHCR
5. Jacent
6. James Lukenge
7. John Bosco Muhumza
8. John Kiwagalo
9. Joweria Nambo
10. Julius
11. Kimera Henry Richard
12. Lovin Kobusingye
13. Mukalazi Francis
14. Muniirah Mbazi
15. Naiyiga
16. Owomugisha Aderah
17. Philip Musoke
18. Prossy
19. Rachel Byarugaba
20. Pamela Akwai
21. Sarah Bimbona
22. Kabazzi [screen name]
23. Dr Denis Male
24. Shirley Kansabe
25. Vincent Ssekajja
26. Rumanzi Mao Mark
27. Jacqueline Acaa,
28. Daniel Muwanga
29. Joseph Mulindwa

Session 3:

1. Enid Katungi
2. Sarah Bimbona
3. Dismus Abaho
4. John Kiwagalo

5. Phillip Musoke
6. Rachel Byarugaba
7. Robert Kambugu
8. Robert Muzira (NARO)
9. Rumanzi Mao Mark
10. James Lukenge
11. Owomugisha Aderah
12. Vincent Ssekkajja
13. David Ekepu (RUFORUM)
14. Dr Ntakyo Renzaho Proscovia
15. John Bosco Muhumuza
16. Robert Kajobe
17. Duncan Ongeng
18. Hakim Mufumbiro (UNBS)
19. Anthony Egeru (RUFORUM)
20. Kabazzi
21. Kimera Henry
22. Yiga Dennis Naads
23. Julius
24. Joweria Nambooze
25. Muniirah Mbabazi
26. Asiimwe Kamuntu Jacent
27. Roger Sykes
28. Jim Woodhill
29. John Ingram
30. Anna Obernoster
31. Monika Zurek
32. Saher Hasnain
33. Professor Charles Muyanja
34. Catherine Nankinga

Session 4:

1. Dismus Abaho
2. John Bosco Muhumuza
3. Paul Gibson
4. Kasiita Gerald – info@vibrantgenerationuganda.org kasiita12gerald@gmail.com
5. Muniirah Mbabazi
6. Enid Katungi
7. Yiga Dennis Naads
8. Owomugisha Aderah
9. John Kiwagalo - Slow Food Uganda
10. Rumanzi Mao Mark
11. Dr Ntakyo Renzaho Proscovia
12. Robert Kambugu
13. Pamela Akwap
14. Phionah Natwijuka
15. James Lukenge
16. Shamim Nalubega

17. Isaac Kabbazi
18. Kimera Henry
19. Julius
20. Mulakazi Francis – MoTIC
21. Hellen Acham
22. Rachel Byarugaba
23. SSali Reagan
24. Vincent Ssekajja
25. Charles Lugaaju
26. Edgar
27. Robert Muzira (NARO)
28. Sodagar Singh
29. Tecno Camon 16S
30. Alowo Docus
31. Mulord Archiles
32. Tukamushaba Silver
33. Joseph Wasswa
34. Jonathan
35. Phillip Musoke
36. Patrick Musinguzi
37. John Walakira
38. Joweria's phone
39. Awany Isaac
40. Okot Francis
41. Kimera Henry
42. Jim Woodhill
43. John Ingram
44. Anna Obernoster
45. Monika Zurek
46. Saher Hasnain
47. Professor Charles Muyanja
48. Catherine Nankinga

Appendix C: Trends and Activities Table

Group 1: Fresh fruit and vegetables

- Fruits are a key priority area for Uganda.
- An overall driver is the effort to diversify the economy beyond coffee ('buy Uganda, sell Uganda').
- There are a lot of imports of fruits and fruit juices.
- There is rising urban farming and housewives producing for home consumption.
- Lack of good data on what is really being traded and consumed.
- It is easy to make money in a fairly short production time in this sector.
- Globalization is increasing awareness on fruits and vegetables.
- A big business is in growing mangoes for mango juice.

Table 7 Drivers for fresh fruit and vegetables in Uganda

Fresh fruit and vegetables	Trend(s)	Driver(s)	Importance to l/hoods	Importance to economy	Sources of Information
Use these Rows as appropriate					
Farming (incl livestock)	increased over time - high cost of inputs	Population growth - urban areas. - processes of oil will drive demand oil - increased pests and diseases. - big issue related to land degradation - new systems and technologies to improve production and species	Lots of people make money - big livelihood	not important to the economy - Huge potential - export opportunity regiona and overseas	world vision - CRS - national agricultural advisory services - uganda farmers federation - associiation of fruits and vegetables production - uganda traders association
Fishing & Aquaculture					
Processing & Manufacturing	more processing attracting youth. - womens group coming to add value. - need more training	commercial opportunities for youth - employment - urbanisation - policy is also driving this. - value addtion - small groups	need more training to improve income from this - compared to just fruits	value addition - priority - setting up factories - fruit factory	ministry of trade - bureau of standards and statistics - uganda expor promotion board
Packaging				Need to improve packaging to improve opportunities	
Wholesaling					
Retailing	lots of road side markets				
Catering & Hospitality					
Transporting & Logistics	lot of motor cycles in transporting fruit and vegs - many small trucks -going to cities				
Waste Management	waste due to poor processing				
Consuming	Increaed trends in the last year people have been living healthy - more avialable for consumption -	covid-19 told that it will boost immunity - more is available due to reduced cross border trade - more time to work on growing more fresh frute and vegs - kowledge is -		Indirect impact on economy due to health and nutrition - paying for health -	
		Population growth - urban areas. - processes of oil will drive demand oil - increased pests and diseases. - big issue related to land degradation			

Group 2: Mango juice

Table 8 Drivers for Mango Juice Sector in Uganda

Mango juice (Philip Musoke)	Trend(s)	Driver(s)	Importance to l/hoods	Importance to economy	
Use these Rows as appropriate			*: slight, **: medium, ***: major		Data sources
Farming (incl livestock)	Increase in production, increased pesticide (mis-)use	Increased demand and government subsidy (giving free seedlings etc.), pests	***	**	MAAIF - only district or sub-country level - data in terms of production (only primary production data)
Fishing & Aquaculture					
Processing & Manufacturing	more people making their own juice	worries about safety/quality issues, high quality standards (UNBS), health concerns about processed, artificial juices	***	**	UMA - private body association, Ministry of Trade, Uganda Revenue Authority
Packaging	More pre-packed foods	Increasing middle class/ urbanisation: demand for pre-packed and convenient foods			UNBS (data base: who uses what kind of packaging, info on different standards)
Wholesaling	Increasing structurally - most important			***	Uganda export promotions, evtl media, URSB
Retailing	Increase, but not much	customers wanting to buy directly			Private sector foundation, Trader's association, Uganda Manufacturers Association (UMA), Uganda Export Bureau
Catering & Hospitality	higher demand for juice making machines	health concern from customers: higher demand for "unprocessed" juice, concern about sugar content of processed juices			Ministry of Tourism, Uganda Hoteliers Association (UHA) (also has data on small restaurants) - lots of "grey literature"
Transporting & Logistics	Increasing industry - distributors paying more taxes, need for more awareness and better infrastructure	increased geographical demand - towns distributed over large distances, demand in neighbouring countries (ie Rwanda)	***	***	URA (Uganda Revenue Authority), Uganda Transporters' Association, Ministry of Transport
Waste Management	Increased waste (ie skins, stones), unutilised fruits, waste like PET bottles, increased litter - costly, causing lots of envrionmental issues	high variation in seasons for fruit harvest (ie surpluses in different regions) - esp N vs S, driver of waste issue: higher consumption of packed foods		***	cities and districts, NEMA
Consuming	Increased consumption	higher demand& desire for natural foods			Uganda demographic and health survey (but only focusing on children under 5 and women in reproductive ages), Uganda bureau of statistics

Group 3: Maize

Table 9 Drivers for Maize value chain in Uganda

Maize	Trend(s)	Driver(s)	Importance to l/hoods	Importance to economy	Sources of information
Use these Rows as appropriate			*: slight, **: medium, ***: major		
Farming (incl livestock)	poor quality inputs (seeds), plant protection products, good agri practices, pests & diseases	socio-political env. @ Policy level, availability and affordability of good quality inputs	***	***	Ministry of Ag. & Fisheries
Trading	handling-related to food safety, Price fluctuations affecting farmers getting fair prices	socio-economic, moral values (role in the system not considered- people acting independently and for own interests)	***	***	
Storage, transportation	farmer-factory is poor and causes losses and contamination	driven by a lack of compliance- coming from social political factors- mainly poor governance— both provision of inspection and adherence to standards by processors and manufacturers- COMMUNICATION			
Processing & Manufacturing	post harvest handling causing safety problems and losses in processing.	Socio-political - poor governance and compliance			
Application of Standards and compliance	lack of compliance - there are trends of small improvements esp. at the end of the value chain	demand for high quality maize down the value chain [national and international/regional] has driven improvements but this is not widespread enough. **COMMUNICATION - lack of resources to implement policy.**	*** nutrition and links to health-Poor quality maize affects the whole system right down the value chain [national and international/regional]	*** poor quality produce	UBS Uganda Bureau of Standards- Fee - Ministry of Ag.
Packaging	poor food safety standards	Socio-political - poor governance and compliance, accessibility to quality			
Wholesaling	fluctuation affecting farmers- buyer power making farmers weak				
Retailing					
Catering & Hospitality					
Waste Management					
Consuming	Increasing consumption of maize in households h/h consumer level BUT despite being a widely farmed staple maize contributes a small amount of nutrition, people are consuming more maize due to affordability	covid-19 has affected people's income	* there are other foods that can contribute more nutritionally, however maize provides a cheap food choice for those who have low income		