Uganda Final Country Report

Foresight for Food System Transformation (FoSTr) Programme

Foresight4Food

Contents

Foresight4Food

1. Policy Summary

1.1 Introduction

Transforming Uganda's food systems is essential to address interconnected challenges of food insecurity, malnutrition, environmental degradation, and rural poverty. Uganda's current food systems, central to health, economy, and the environment, are failing to ensure equitable access to healthy diets, with persistent child undernutrition, rising adult obesity, and mounting ecological stress.

In the FoSTr programme, foresight and futures thinking were applied to anticipate and shape long-term change, enabling stakeholders to plan resilient strategies rather than react to crises. The foresight process brought together diverse actors to analyse trends, identify uncertainties, and construct scenarios to support the Ugandan food system transformation agenda.

The process was tailored for Uganda to support emerging policy discussions, strengthen decision-making, and inform a national plan of action for food system transformation, building on momentum from national food systems dialogues and transformation pathways developed in the wake of the UN Food Systems Summit in 2021.

1.2 The foresight process

The Uganda foresight process consisted of four iterative, participatory steps:

- **Scoping the process:** Partnerships were established with government and research actors, ensuring the process matched priority needs. Workshops engaged stakeholders from diverse backgrounds to set the agenda.

- **Map the system:** Researchers and stakeholders used frameworks like Foresight4Food to analyse food system actors, drivers, outcomes, and feedbacks, combining data reviews with participatory mapping. This established a shared understanding of system complexity, trends, and opportunities for change.

- **Explore future scenarios:** Based on an analysis of key uncertainties that could have a major impact on the Ugandan food system, four qualitative scenarios were developed, built around the uncertainties *governance response to environmental challenges* (reactive vs. proactive) and *income inequality* (low vs. high). In addition, three quantitative scenarios were simulated using the MAGNET model. Each scenario represented alternative pathways and their consequences for food security, poverty, and sustainability. This exercise revealed trade-offs, synergies, and the potential impacts of different policy choices on food system actors

- **Mobilise for systems change:** In the final phase, foresight insights were translated into policy guidance for Uganda's food system transformation. Through participatory exercises such as stress-testing, backcasting, and Theory of Change, stakeholders and the research team identified pathways and conditions for achieving national agri-food goals. The process resulted in an action agenda and policy briefs on key challenges (food loss and waste, climate resilience, and obesity) to inform future policymaking and a guiding document to integrate foresight tools into strategic planning and policy development.

1.3 Key insights & recommendations

The FoSTr programme in Uganda increased awareness among policymakers and stakeholders of current and future food system challenges through participatory foresight tools and data-driven scenarios. It supported policy development, cross-ministry collaboration, and national foresight capacity, while highlighting the risks of inaction on issues such as climate change. The process also helped shift mental models for systems change by encouraging actors to think in terms of interconnections, long-term impacts, and shared responsibility. Stakeholders appreciated the inclusive and evidence-based approach and identified areas for follow-up work, including strengthening food system literacy, engaging more private sector and grassroots actors, enhancing government ownership, and creating a platform to stay engaged between events. To sustain progress, the report recommends continuing and expanding foresight activities, integrating them into research and education, institutionalising foresight thinking and cross-sectoral collaboration, and ensuring policy resilience across future scenarios.

2. Introduction

2.1 The FoSTr programme

The Foresight for Food System Transformation (FoSTr) programme in the period between 2023 and 2025 supported policy makers and other key stakeholders in the food system with scenarios and foresight analysis about the food system of the future. The programme was financed by the Kingdom of the Netherlands, overseen by IFAD and implemented by the University of Oxford's Environmental Change Institute, Wageningen University & Research and national research partners in the international Foresight4Food network. The FoSTr programme was implemented in Uganda, Kenya, Jordan, and Bangladesh.

In Uganda, the FoSTr programme was supported by six researchers and two facilitators from different research organizations. This team implemented the FoSTr programme in close collaboration with national research partners who engaged in training, identifying critical uncertainties, scenario development and response to requests for research and policy inputs. This was to support decision-making in implementing food systems transformation pathways.

2.2 The need to transform food systems

Food systems encompass all activities and processes involved in the production, processing, distribution, consumption, and disposal of food (Figure 1). They are central to a country's health, economy, and environment. A sustainable food system that delivers healthy diets for all is essential to achieving global nutrition targets by 2030 (Schneider et al., 2025). According to WHO and FAO guidance (2019), sustainable healthy diets promote all dimensions of health and wellbeing, exert low environmental impact, and are accessible, affordable, safe, equitable, and culturally acceptable.

Current food systems, however, are failing to meet these goals. Unsustainable agricultural practices lead to biodiversity loss and high greenhouse gas emissions, while uncontrolled food waste depletes valuable resources (FAO, 2022). At the same time, inequitable access to nutritious food drives rising diet-related disorders and compromises health, food security, and economic development. In the face of challenges such as climate change, population growth, and persistent food and nutrition insecurity, transforming food systems is essential. This transformation is needed not only to provide equitable access to healthy diets but also to protect the social, economic, and environmental foundations that underpin food security and nutrition for future generations.

Strategies such as adoption of climate-smart practices, reduction of waste, promotion of biodiversity, adoption of innovative technologies and fair trade policies, can create a resilient food system. A system that ensures sustainable food production, equitable food distribution, mitigates climate change, fosters economic growth, promotes equity and better health outcomes. It is important to note that transforming a country's food system requires a collaborative effort from its government, private sector, civil society, and individuals. Policies meant to transform the food system must target holistic approaches that consider political, economic, environmental, and social needs.

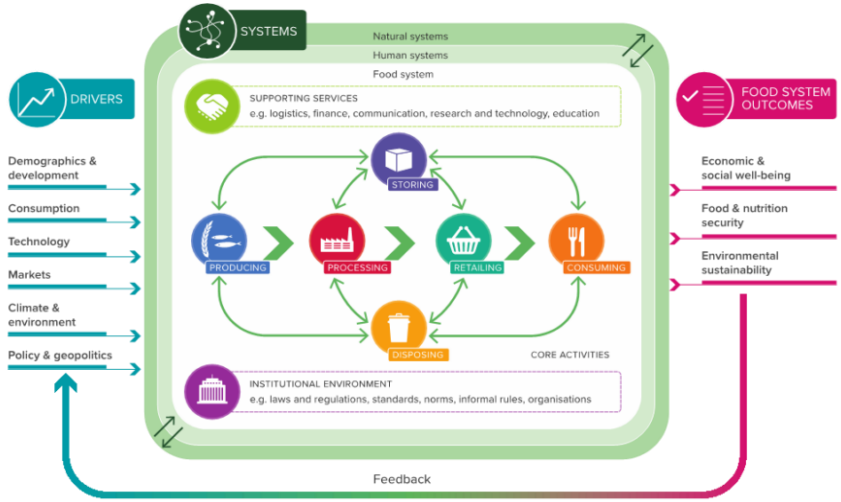


Figure 1. Food systems framework (Foresight4Food, 2019)

2.3 Foresight and futures thinking

Due to rising turbulence and uncertainty, there is a need to enhance the resilience of food systems. To ensure resilience, approaches should be able to cope with future stresses, shocks, and extreme events. To achieve this, foresight analysis and futures thinking are necessary. These are useful approaches for anticipating, preparing for, and shaping future possibilities. They involve analysing trends, identifying uncertainties, opportunities, and risks, and

developing scenarios to anticipate future outcomes. This supports the formulation of resilient and adaptable strategies.

Futures thinking emphasises creative exploration of multiple futures. It complements foresight by fostering the envisioning of transformative possibilities that may not be immediately apparent. Together, they help prepare for an uncertain and dynamic future. For sustainable and resilient food systems, this could include, for example, adopting circular food economies or advanced technologies that manage food waste and enhance productivity. This approach empowers stakeholders to proactively shape desirable futures rather than react to emerging crises. It also considers the consequences of action and inaction, as well as the roles and motivations of key actors in the system.

While transformation of food systems is important, it faces several challenges. Due to many local and global interacting factors, it is difficult to achieve fully resilient and sustainable systems. Transformation requires coordinated efforts of different stakeholders, while the exact opportunities and risks that will emerge remain uncertain. Furthermore, imagining radical futures requires stakeholders to adopt a refined understanding of their food systems, which is not always straightforward. Lastly, effective transformation depends on long-term perspectives, such as strengthening the policy–science–practice interface, building effective knowledge systems, and creating a society-wide urgency for change. However, these are not easily realised in many food systems.

Foresight can support food systems transformation through providing the long-term perspective vital for such a transformation. It tasks stakeholders to appreciate their present situation and the future outcomes, as well as their alternative options and their corresponding outcomes. Additionally, foresight integrates multiple methods and tools to explore the future. For example, horizon scanning, stakeholder analysis, mapping systems, data modelling, scenario analysis, trade-off analysis, visioning and theory of change analysis among others. These can be combined for better outcomes.

2.4 A guiding framework: foresight for food systems change

The use of foresight for food systems change is guided by a framework (Figure 2). The framework shows the different steps in the foresight process. It shows the importance of broad stakeholder engagement and the need to support the foresight process with strong scientific evidence. The initial process involves appreciating the need for foresight, identifying the relevant stakeholders, exploring the concerns, interests and influences. In this step, mechanisms to guide the foresight process are established the stakeholders kept up to date with the entire process. The necessary, financial, knowledge and human resources are also identified. In mapping the system, the boundaries of the food systems being mapped are defined. The stakeholders are involved in understanding the current status and future trends of the food system with regard to the drivers, activities and outcomes. In this step, key relationships in the food system are identified, together with any additional information that may support the foresight process. For the exploration of future scenarios, stakeholders are involved in identifying potential futures given the available food system drivers, trends and uncertainties. With these, different possible scenarios of the future food systems can be constructed. Their implications for different stakeholders, society, strategies and policies are assessed. Lastly, there is need to mobilize for change which entails developing a common vision around the desired future(s). The pathways to achieving the vision are detailed while making sure to identify possible advantage points and challenges for the system change. The action plans should not only include goals but also people responsible, monitoring mechanisms as well as resources to realize the set targets.

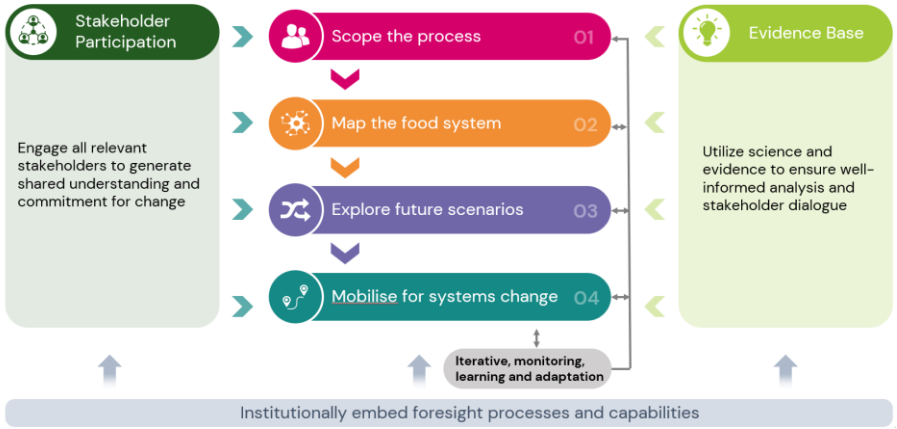


Figure 2. Foresight for food systems guiding framework (Foresight4Food, 2025)

2.5 Scoping the process in Uganda

Aligning with momentum and ongoing policy efforts to support food system transformation

In 2021, Uganda participated in the United Nations Food Systems Summit in New York to identify game changers for transforming its food systems. This was followed by national and subnational discussions with diverse actors to develop strategies aligned with existing frameworks, including the Uganda National Action Plan II (2020–2025), the Zero Hunger Strategy (2020–2030), and the Agro-Industrialisation Plan (2021–2025).

Despite these efforts, progress toward a resilient and sustainable food system has been slow, and food insecurity remains significant (Global Hunger Index, 2025). Recently, Uganda has committed to transforming its food systems through the National Development Plan IV (NDP IV, FY 2025/26-2029/30)) stressing the importance of food systems for economic growth, poverty eradication and sustainable development. In addition, the country has established the National Food Systems Coordination Committee (NFSCC) in 2022, housed in the Office of the Prime Minister, to oversee cross-sectoral coordination.

Nevertheless, implementation challenges persist, including fragmented policies, siloed mandates, limited financing, and capacity constraints. The food systems approach requires multi-sectoral coordination (agriculture, health, environment, local government etc) which demand new governance arrangements and monitoring systems.

Against this background, the Food Systems for the Future (FoSTr) project was launched to support national efforts through foresight and scenario analysis. By aligning closely with ongoing policy processes and existing food system transformation initiatives, FoSTr seeks to build upon Uganda's previous food systems dialogues and the institutional momentum created through the NFSCC. Its aim is to provide a forward-looking perspective that informs strategic planning, strengthens decision-making, and enhances preparedness for future challenges.

Establishing partnerships and project team

At the start of the project in March 2023, The FoSTr team visited and established working partnerships with different government entities including the National Coordinator for Food Systems in the Office of the Prime Minister (OPM), National Planning Authority (NPA), Ministry of Health (MoH), Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) as well as the Ministry of Water and Environment (MWE). These partners were consistently invited to participate in workshops and engaged in separate, targeted meetings throughout the project. This approach ensured that the project remained demand-driven, responsive to the country's priorities, and focused on addressing pressing food system challenges as identified by stakeholders themselves, rather than following a purely pre-defined plan.

Two country facilitators, Charles Muyanja and Stellah Byakika were contracted. These identified the research team by soliciting for curriculum vitae of candidates and vetting them. Six members from Makerere University, National Agricultural Research Organization, the Ministry of Health, Nutrisat Uganda, Africa Innovations Institute and Kyambogo University were selected.

FoSTr Uganda research team

With from left to write Stellah Byakika, Denis Male, Just Dengerink, Muniirah Mbabazi, Charles Muyanja, Joweria Nambooze, Daniel Hendry Ruma, Robert Muzira. Members lacking on this picture include: John Ingram & Martin Mutambuka.

Objectives FoSTr in Uganda

The initial workshop 'The future of food' held in June 2023 in Kampala focused on providing direction and guidance on implementation of the FoSTr programme in Uganda. The workshop brought together key stakeholders from across the Ugandan food system to discuss and explore the opportunities for foresight and scenario analysis to support processes of food system transformation in Uganda.

Participants indicated that foresight can support Uganda's food systems transformation by providing evidence to guide the alignment of national strategies, such as NDP IV, Vision 2040, and agro-industrialization plans, with the food systems agenda, while enhancing coordination and engagement among stakeholders across sectors. It can raise awareness of the food systems transformation agenda and promote mind-set change among consumers and farmers, project future trends, opportunities, and risks to inform strategic planning and decision-making, promote sustainable and climate-smart food production, and strengthen nutrition outcomes through attention to dietary patterns, nutrient-dense foods, and food safety. Foresight also builds capacity by improving access to knowledge, research, and data for policymakers, farmers, and other actors, supports value chains through post-harvest handling, market linkages, and traceability, and facilitates monitoring and evaluation to streamline resource allocation and investment, ensuring sustainable, inclusive outcomes aligned with SDG 1 (No Poverty) and SDG 2 (Zero Hunger).

Based on stakeholder consultations, the following initiatives were proposed to support national food systems transformation in Uganda by providing a forward-looking perspective that helps ensure decision-making is future-proof:

- Facilitating multi-stakeholder involvement in national food system foresight processes including institutions, government agencies and community organizations.
- Offer opportunities for enhancing the capability of research, learning informed by access to data, use of computer modelling and graphic presentation of critical information.
- Provides insights into options and pathways for food system transformation (scoping, code signing, systems mapping, scenario analysis, transformation stages)
- FoSTr supports policy makers and other key stakeholders in the food system with scenarios and foresight analysis about the food system of the future.
- Provides practical methods and tools for facilitating food systems analysis and foresight processes

Timeline of activities held in Uganda

As illustrated in Figure 3, the timeline of FoSTr activities was closely aligned with ongoing national policy processes, while also remaining responsive to emerging country needs and opportunities. While the overall design of FoSTr was partially planned in advance, many activities were also shaped in response to emerging country needs and opportunities. In parallel with the main foresight process, FoSTr supported the development of policy briefs informed by initial consultations and workshops that identified key food system challenges. Six policy briefs were produced by the research team and presented in various settings to validate the findings with stakeholders and discuss their potential use and implications. The briefs focused on three main topics: improving the climate resilience of the Uganda food system, reducing food loss and waste, and preventing overweight, obesity, and diet-related diseases. This approach allowed the project to both advance its planned objectives and adapt to the priorities and gaps expressed by stakeholders, ensuring that foresight outputs were relevant, timely, and actionable within the national policy context.

Figure 3. timeline of FoSTr activities (orange) aligned with ongoing policy processes (blue)

The foresight activities in Uganda were instrumental in supporting the food system transformation process. In particular, the project contributed to the National Development Plan IV (NDPIV) by creating a food systems transformation action agenda to support the creation of the Uganda National Food Systems Transformation Action Plan (NFSTAP) . The concept of the action plan was developed by the Office of the Prime Minister in Uganda in partnership with the National Planning Authority. In the preliminary stages, the FoSTr project in Uganda contributed original ideas in the designing of the action plan. Specifically, it provided suggestions through the "Uganda Food Systems Action Agenda", a document which offered actions areas for the Ugandan food system transformation. However, the progress of the NFSTAP is currently stalled due to financial limitations.

The FoSTr project also strengthened NPA planning through foresight analysis. Specifically, during the formulation of the NDPIV. NPA recognized the importance of food systems to support the realization of the Sustainable Development Goals. The specific areas were foresight applied included agriculture, private sector development, energy, natural resources, water, land and governance.

In the scoping phase, various governmental bodies, such as the National Planning Authority, were consulted to explore how the FoSTr process could best align with their needs and policy processes.

3. Mapping Uganda's Food System

A comprehensive understanding of the food system is essential to identify and assess key drivers, trends, and uncertainties, which form the basis for the development of future scenarios. The first phase of the foresight process therefore focused on mapping the Uganda food system to establish a shared understanding among stakeholders. This phase also involved compiling and visualising relevant data on historical and projected trends, assessing the political economy and power relations, and identifying enabling and constraining factors for change. The resulting synthesis provided clarity on system boundaries, trade-offs, and synergies, and highlighted areas where additional information was needed. Together, these insights laid the foundation for the subsequent stages of the foresight process.

A food system encompasses all activities, processes, and actors involved in the production, processing, distribution, consumption, and disposal of food, with the aim of ensuring food security, safety, and sustainability, while influencing health, the economy, and the environment. These systems are shaped by a wide range of interconnected factors, commonly referred to as drivers of food systems. Bene et al. (2020) define food system drivers as endogenous or exogenous processes that, deliberately or unintentionally, influence a food system over a long period, durably altering its activities and outcomes.

Given the complexity of food systems, mapping them is essential for stakeholders to understand how their components are interconnected and how they interact with one another. Food system mapping reveals relationships and dependencies among actors such as farmers, consumers, retailers, and policymakers, and helps identify local resources, agricultural strengths, and existing infrastructures, including markets and transportation systems, that shape the system. In the Ugandan context, these mapping processes actively engaged diverse stakeholders and applied foresight tools to explore multiple future scenarios, fostering collaboration and creating a shared understanding of the food system.

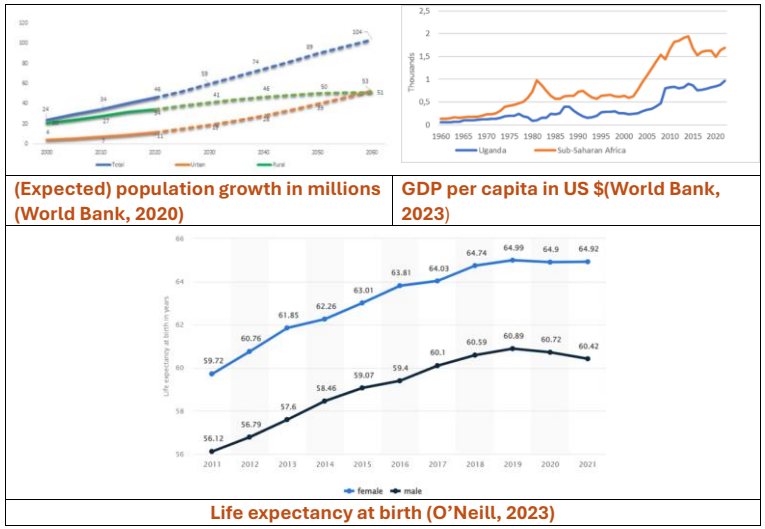
To map the key components of the Ugandan food system, the Foresight4Food food system framework was adopted as indicated in chapter one (Figure 1, see section 2.2). This framework builds on previous work and incorporates elements of the food systems framework developed by Ingram (2011), HLPE (2016) and van Berkum et al. (2018). The framework was used as a basis for describing the food system while customising specific elements to the Ugandan context. It was also used to scan for trends relating to the food system and to detect major drivers behind it. This framework describes the main components of a food system: activities, support systems, drivers and outcomes.

Mapping the Ugandan food system consisted of several sequential steps. First, all activities, actors, outcomes, and drivers of the system were described, drawing on a diversity of data sources to provide a comprehensive picture. Second, this initial mapping was validated with a diverse group of stakeholders, ensuring that multiple perspectives and local knowledge were incorporated. Third, causal relationships, feedback loops, and interlinkages between different components of the system were identified, highlighting how changes in one part of the system could affect others.

Food system analysis report, access via this link

3.1 Gathering food system data

Mapping Uganda's food systems was undertaken by a team of six researchers. The research conducted a food system analysis under five key food system topics which included identifying food system actors and their activities, socioeconomic drivers of the food system, multiple activities leading to foods system outcomes, socio economic outcomes and environmental outcomes. A desk review was undertaken by the research team processing all the literature against topics. The documents reviewed included government documents and technical reports of food systems. Relevant websites such Uganda government website (e,g., UBOS, UDHS) relevant government nutrition and agriculture policies were consulted.



(Expected) population growth in millions (World Bank, 2020)

GDP per capita in US $(World Bank, 2023)

Life expectancy at birth (O'Neill, 2023)

Figure 4. Examples of graphs depicting food system drivers, activities, and outcomes were incorporated into the food system assessment report and presented during the gallery walk

The analysis highlighted that Uganda has high levels of food production, with most people engaged in agriculture. However, the sector's contribution to GDP remains low, reflecting the predominance of subsistence rather than commercial farming. This further explained the rise in food production and processing as one of the key activities in the Ugandan Food system. This translated into the outcome of the employment being high in agriculture although income generated is low and its contribution to the GDP is minimal. This can further be noted where the National Poverty rate is reducing but with regional variation having a great of people still living in poverty in northern Uganda. High agriculture involvement has led to environmental outcome where the use of the fertilizer in not regulated thus contributing to high percentage to carbon emissions.

3.2 Identifying causal linkages between food system elements

Causal loop diagrams are graphical representations used in system thinking. These diagrams can help by identifying leverage points and unintended consequences, enabling policymakers and other stakeholders to design more effective interventions and policies for enhancing food security, sustainability and resilience. Causal loop diagrams (CLD) were developed in a participatory exercise by the research team to understand the complexity of the Ugandan food system and the interaction and feedback mechanisms within the system.

The overall CLD of Uganda's food system is presented Figure 5. This schematic overview consists of two core elements: the variables and the linkages between them that illustrate their interconnectedness. These variables are grouped into three categories: drivers (green), activities and their context (blue), and the outcomes (orange). The arrows represent the links between the various variables. Green arrows indicate positive links, meaning they move in the same direction; when one variable increase, the linked variables increase as well, or when one decreases, the other decreases too. Red arrows illustrate negative links, indicating that the two variables move in the opposite direction; if one decreases, the other variable increases. Dotted lines represent indirect relationships, used when the relationship between variables is not straightforward but influenced by other factors. The CLD can be broadly divided into three domains: variables related to food and nutrition security on the left, socio-economic variables on the upper right, and environmental environments on the lower right.

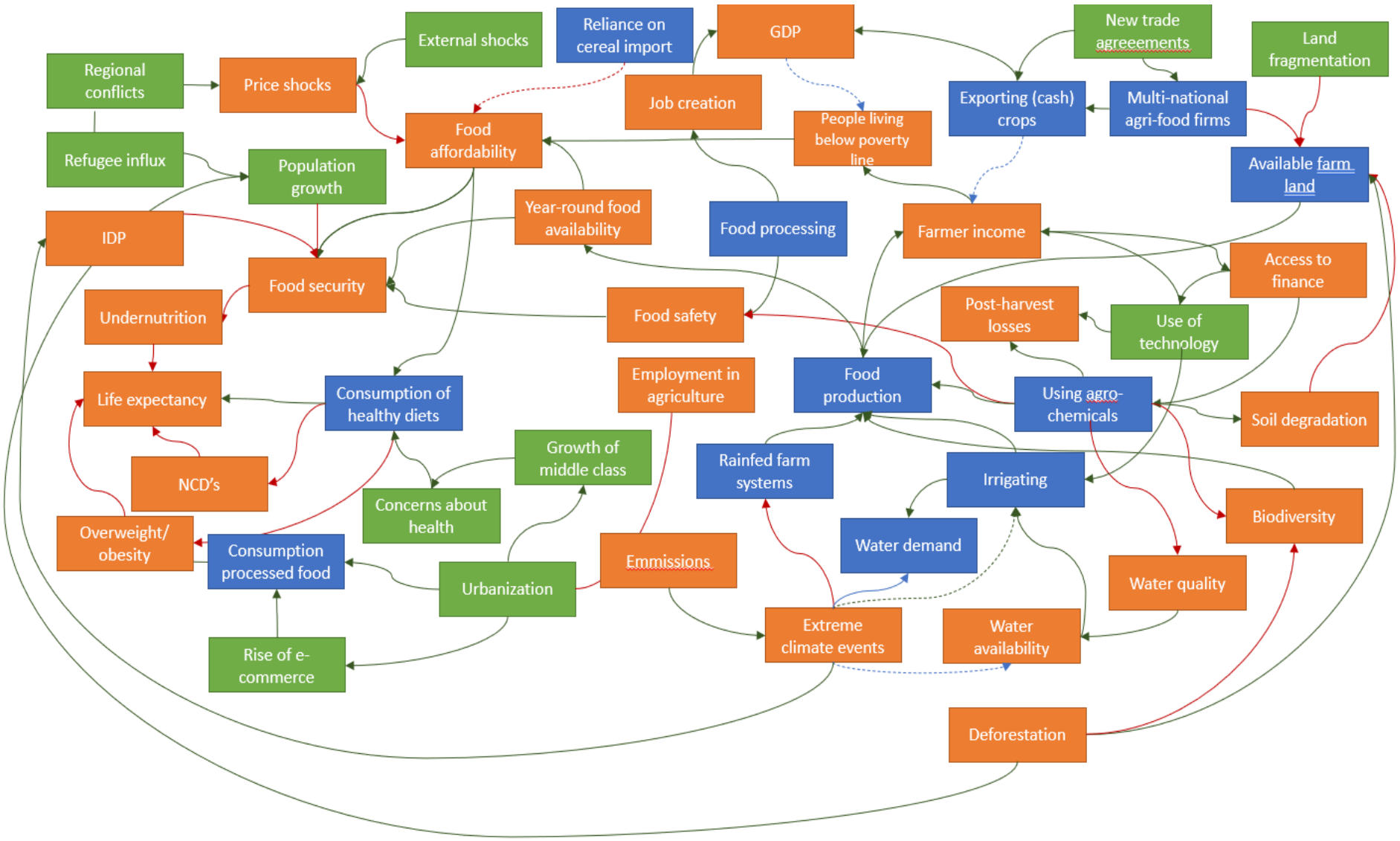


Figure 5. Schematic causal loop diagram of Ugandan Food system
Note: Drivers [green], activities and their context [blue], outcomes [orange]; Positive causality [green arrows], negative causality [red arrows]; direct relationships [solid arrows], indirect relationship [dotted arrows]. Source: own compilation, based on workshop with outputs.

Figure 6 zooms in on a specific section of the overall CLD to illustrate the dynamics around one of the key drivers of the Ugandan food system, Urbanisation. Urbanisation influences multiple factors like food availability, access and utilisation. As urbanisation progresses, food environments undergo notable changes that have implications for food security, dietary patterns and agricultural practices. Urban areas have a higher prevalence of formal food outlets, while rural areas rely more on informal food retail outlets. In most urban food environments with supermarkets, food vendors and restaurants, the availability and diversity of healthy foods is higher, with shops selling fresh fruits, vegetables and animal-based products year-round. To the Ugandan food system, urbanisation is a double-edged sword: on one hand, it is associated with higher consumption of processed and ultra-processed unhealthy foods, leading to more overweight, obesity, and related NCDs. On the other hand, the middle-class, highly educated consumers in cities have higher health concerns and are more likely to consume healthy diets. This illustrates key trade-offs and synergies in the system: while urbanisation can exacerbate diet-related health risks, it also creates opportunities to promote healthier dietary behaviours through improved access to diverse and nutritious foods. Similarly, increased demand for healthy foods can stimulate local agricultural production and supply chains, highlighting potential synergies between urban consumer preferences and sustainable agricultural practices.

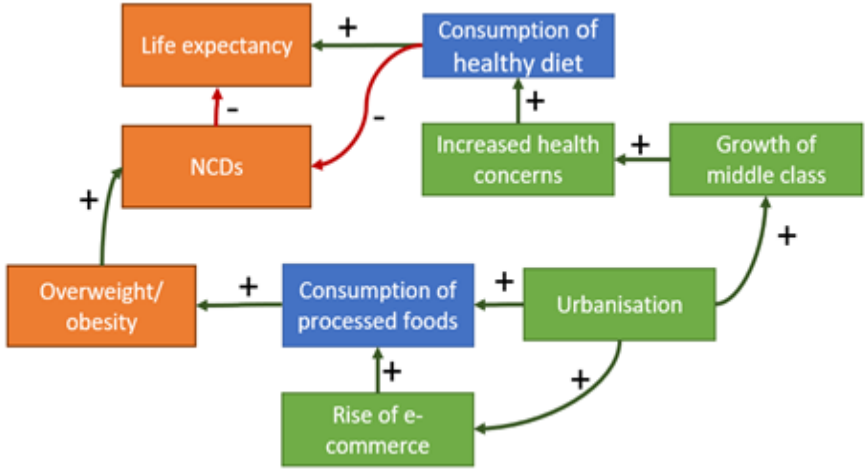


Fig 6. CLD of the interactions between elements related to urbanisation, nutrition and health

3.3. Validating findings with key stakeholders of the Ugandan food system

Foresight4Food integrated a range of approaches and methodologies into an overall foresight process. There were several tools which were used to guide stakeholders through the process. Mapping the food system was multi-actor led foresight process with aim to assist national food systems transformation. Foresight project supported dialogues, analysis and understanding necessary for collaborations and co-creating food systems of the future that are sustainable, healthy, equitable and resilient.

Between 6th and 8th March 2024, FoSTr held a workshop dubbed 'Food System Futures' at Imperial Resort Beach Hotel in Entebbe Uganda. The workshop brought together key stakeholders from across the Ugandan food system to explore the role of foresight and scenario analysis in supporting processes of food system transformation in Uganda. The workshop objectives were: i) presenting and validating the Uganda food systems mapping analysis report by FoSTr research team, ii) engaging stake holders in using foresight tools to explore different futures of the Ugandan food systems and iii) gathering input for the foresight analysis of the Ugandan food system to be developed by the FoSTr team. The feedback and insights of the workshops were used to finalise the food system analysis report referred to as 'an overview of the Ugandan Food system outcome, driver and activities' published in April 2024.

The findings following the literature study were presented during stakeholder's workshop. During the workshops the stakeholders were engaged in a gallery walk, led by the research team, to showcase of the findings from the food system analysis.

Stakeholders during the gallery walk

4. Explore Future Scenarios

Building on the previous phase, which focused on understanding the dynamics of the current food system, step 4 focusses on exploring how the system might evolve under different future conditions. During the workshop 'food in 2040: scenarios for Uganda's Food System Future, organized on the 31th of October 2024 in Kampala, key stakeholders of the Ugandan food system were engaged in assessing a range of plausible futures by identifying the critical uncertainties and key trends that could shape the system's trajectory.

Through this process, participants construct qualitative scenarios that capture different combinations of these uncertainties and trends. By examining the implications of these scenarios for different stakeholder groups, this process encourages reflection on opportunities, risks and trade-offs. This exploration not only supports shared learning and dialogue, but also lays the foundation for identifying desirable futures and the systemic changes required to move towards them.

4.1. Identifying critical uncertainties

The process of identifying critical uncertainties started during the March 2024 workshop, where participants explored the main drivers of change shaping Uganda's food system. Building on insights from previous phase where we mapped the system, these drivers were subsequently classified using the STEEPLE framework. During the October 2024 workshop, this list of drivers was revisited and expanded, see table 1.

Table 1. drivers of the Ugandan food system, identified through desk-study and stakeholder consultations, classified using the STEEPLE framework

Category	Drivers
Social	Access to health care, gender inequalities, food marketing, social media influence, health consciousness, urban migration, population growth rate, age distribution, family dynamics, social behavioural change, religion, physical activity, traditional diet
Technological	Digitalization, growth in AI, R&D activities, protein alternative technology, internet scams, technology incentives. Access to technology, fortification, edible insects, post-harvest technologies
Economical	Household income, access to credit, market concentration, economic disparities, interest rates, private investment, taxes, financial literacy, price fluctuations, local economy promotion, food price, growth in processed foods
Environmental	Degradation of natural resources, risk of natural disaster, pests and diseases, soil nutrient loss, changing temperatures, dangerous chemical use, loss of biodiversity, change in water table, frequency of flood events
Political	Political stability, corruption, foreign trade options, business tax, labour rights laws, trade restrictions, political priority, low policy advocacy, bureaucracy, political interface, subsidies and incentives, business tax
Legal	Environmental regulations, food safety and quality regulations, land laws, big data security, health and safety regulations, corruption, clear mandates, lack of coordination of the legal framework, awareness and enforcement of laws
Ethical	Animal welfare, fair wages, social inequality, fair trade practices, human rights, big data protection, digital info consent, corporate social responsibility, pressure from NGOs, misinformation

To identify from this list the drivers whose future direction or impact remains highly unpredictable yet influential, participants were asked to position the most significant drivers on an uncertainty-impact matrix (figure 7). This process revealed several key uncertainties that formed the basis for developing the plausible future scenarios.

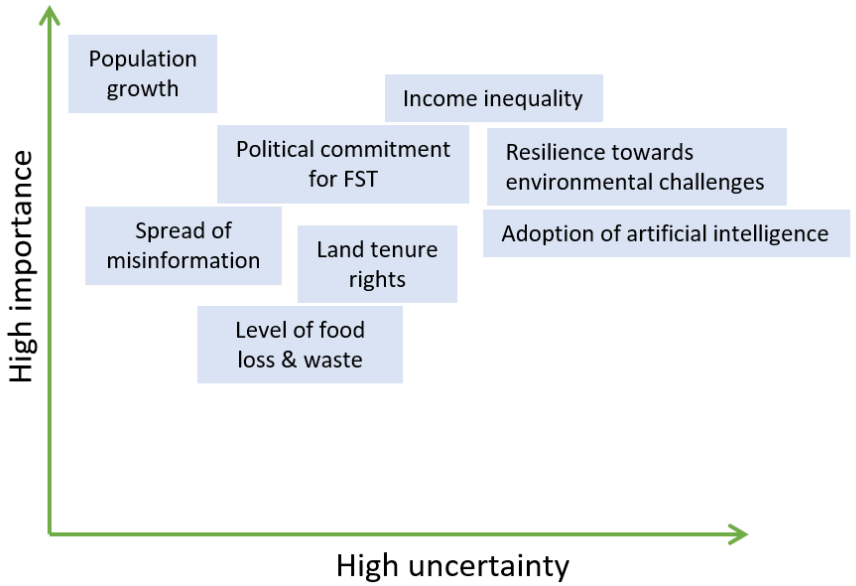


Figure 7. importance -uncertainty matrix constructed by participants

4.2. Constructing qualitative scenarios

From the list of identified key uncertainties, two were selected to form the axes of a 2×2 scenario matrix, resulting in four distinct scenarios. The selection of these axes followed three guiding principles: they should be independent of each other, capture the key challenges of the overall food system, and have clearly opposing states at either end of each axis. Based on these criteria, the two axes chosen were: governance response to environmental challenges (ranging from reactive to proactive) and income inequality (ranging from increased to decreased). Together, these axes define four different quadrants, each representing a plausible future for Uganda's food system, as visualised in Figure 8.

To further explore these futures, participants created storylines for each scenario by imagining themselves living in the year 2040 under the conditions defined by the axes. They examined how these contextual factors could shape key aspects of the food system, including diets, food production, technological innovation, government priorities, and overall system outcomes. This exercise transformed abstract uncertainties into tangible, contextualised narratives, illustrating the potential consequences of different future pathways, which are described in more detail below.

Description of constructed scenarios

In Scenario A (economic distress), governance remains fragmented and reactive, responding to crises rather than anticipating them. Income inequality continues to grow, nutrition outcomes worsen as the availability of and access to healthy food decrease, and environmental degradation accelerates due to unsustainable practices. The food system becomes increasingly fragile, exposing the country to recurring shocks.

In Scenario B (capitalistic and environmentally resilient), environmental issues are addressed through innovation and policy reform, but the benefits mainly reach large agri-businesses. Inequality widens as smallholders struggle to access resources and markets. The food system becomes more resilient to climate shocks but less inclusive and fails to improve health outcomes for all.

Scenario C (fire fighting) is characterised by reactive governance, where the government only responds to climate disasters, lacking long-term strategies. Despite social policies addressing economic inequality and providing support to smallholder farmers, the failure to adopt climate-smart technologies and reliance on intensive farming leads to environmental degradation, food security challenges, and long-term economic difficulties for farmers.

In Scenario D (equitable green growth), the government leads a green transition with inclusive policies that support smallholders and reduce inequality. Environmental sustainability improves through climate-smart practices, while economic opportunities and access to nutritious food increase for all. The food system becomes more resilient, equitable, and healthy. However, this scenario would require significant government investments.

Together, these four scenarios illustrate how different combinations of governance approaches and income distributions can shape the future of Uganda's food system. They highlight the trade-offs and synergies between environmental sustainability, equity, and nutrition outcomes, offering a structured basis for dialogue and policy exploration. By contrasting these plausible futures, the scenarios help identify strategic choices that could steer Uganda towards a more inclusive and sustainable food system.

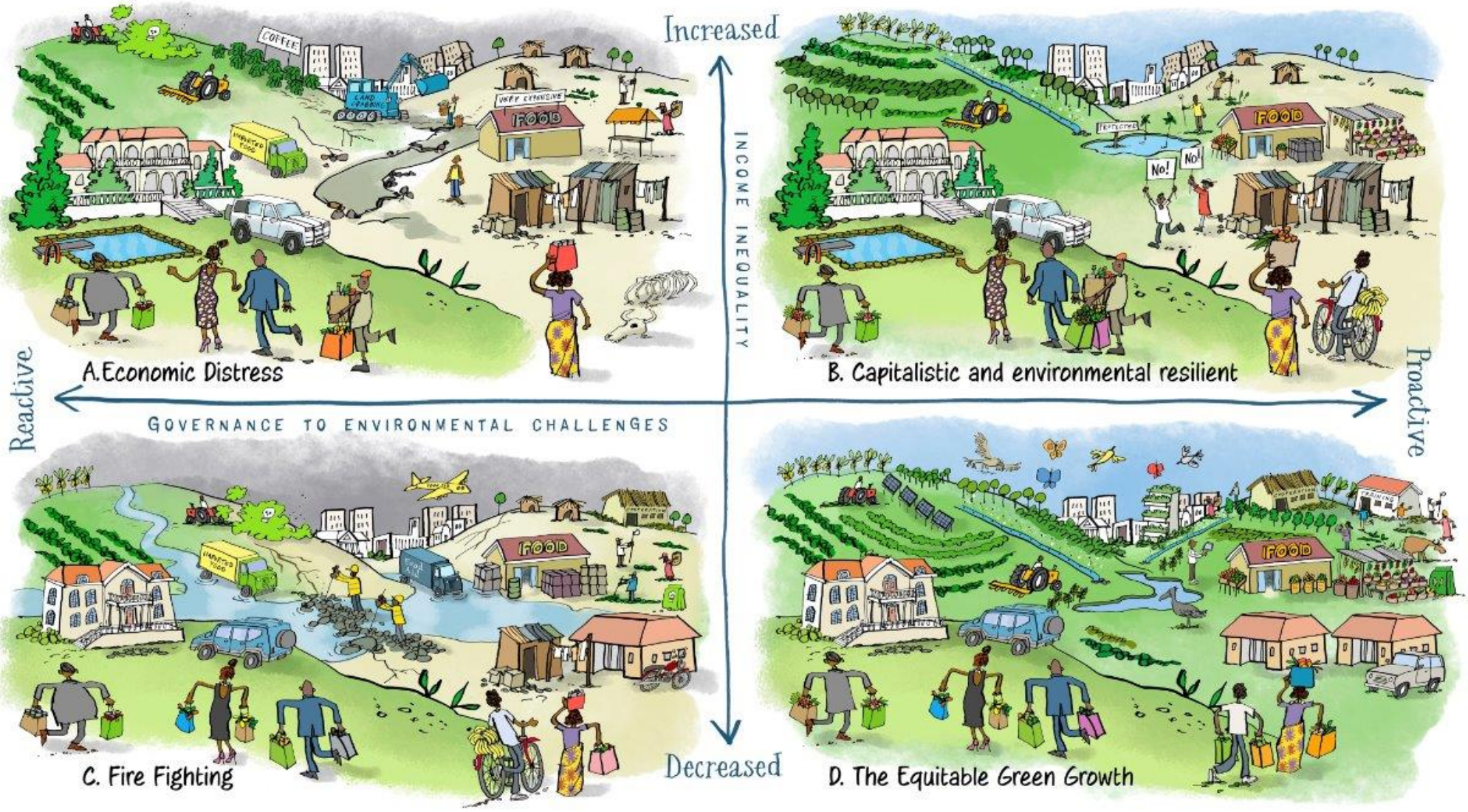


Figure 8. Four future scenarios for Uganda's food system based on the key uncertainties 'governance response to environmental challenges' and 'income inequality', identified through a participatory process

4.3. Stakeholder implications of constructed scenarios

After constructing the scenarios, participants reflected on the potential positive and negative implications of the food system under the different scenarios, considering various food system actors across multiple domains: food security, nutrition and health, livelihoods, economic growth, inequality, and risks and vulnerabilities. These results are presented in figure 9.

This participatory exercise highlighted trade-offs and synergies, showing how interventions can benefit some actors while creating risks for others. Engaging stakeholders directly fostered dialogue, improved understanding of diverse perspectives, and provided insights to inform inclusive and resilient food system strategies.

Scenario A

Smallholder farmer will have low benefit and reliance on handouts. Their livelihoods will not be improved

Food traders have low returns on investment, decreased access to markets and credit

Food processors low scale production,
unsafe and low quality products

Supermarkets Shrinkage of actors, dependence on cheap imported food

Urban Consumers cheap foods, insensitive to environment conservation (e.g. high level of food waste)

Government decreased GDP, excessive borrowing, distortion in budgeting

Scenario B

Smallholder farmer struggling to co-exist with large scale farmers

Food traders cost of business will increase, which will cause them to eventually disappear

Food processors will adopt new technology, improved traceability of food, adherence to food regulations

Supermarkets increased access to locally produced quality products, increased variety of products

Urban Consumers higher purchasing power

Government reduced political stability, accountability pressure, social wrangles

Scenario C

Smallholder farmer reduced in number, joining cooperatives, lower returns for individual produce, high risks

Food traders Increase in number due to urbanization, reduced profit margins

Food processors reduction in small processors, large processors are shriving

Supermarkets more customers due to increased income

Urban Consumers eating more processed and fast foods, increased obesity and NCDs

Government increased health expenditure, reduced corruption, streamlined implementation of policies

Scenario D

Smallholder farmer are empowered and protected, increased competition

Food traders need to adapt, more regulations

Food processors increased competition innovation, access to finance to improve sustainability

Supermarkets increased traceability of products

Urban Consumers will have diverse diet, may also increase UPF

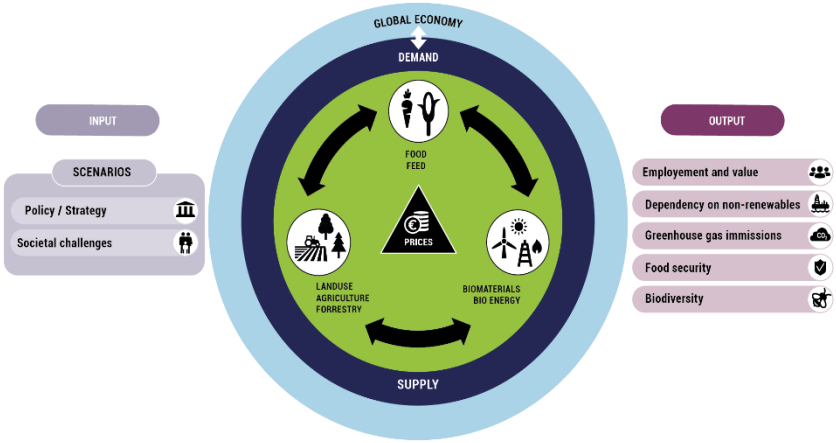
Government pressure for economic growth policies

Figure 9. Impact of scenarios on food system actors

4.4. Exploring quantitative scenarios using MAGNET modelling

In parallel with the qualitative participatory scenario development and analysis, three quantitative diet scenarios were constructed and simulated by colleagues at Wageningen University and Research using the MAGNET model. MAGNET is a macroeconomic equilibrium model that estimates the consequences of different scenarios on food system activities, such as food production, trade, and consumption, as well as related outcomes including nutrition, livelihoods, the national economy, and environmental indicators.

Figure 10. MAGNET model framework



The aim of the modelling exercise was to assess future scenarios for Uganda's society and environment under three different (diet) scenarios:

1. Continuation of existing consumption and production practices (business-as-usual)
2. Adoption of food-based dietary guidelines by the Ugandan population (modelled based on current Kenyan FBDGs).
3. Adoption of a sustainable and healthy diet by the Ugandan population (modelled using the EAT-Lancet diet[1])

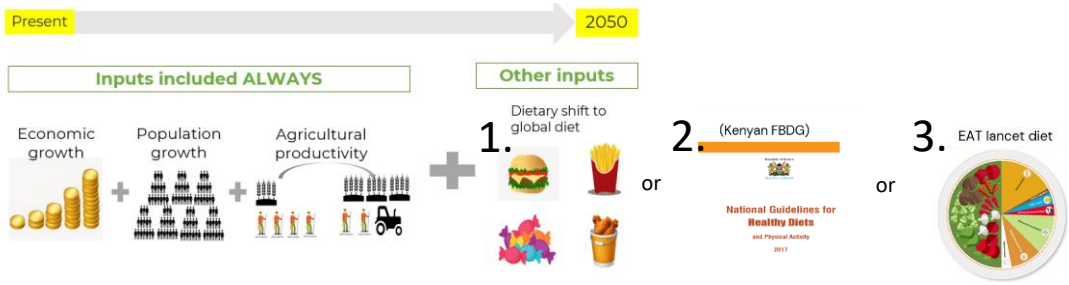
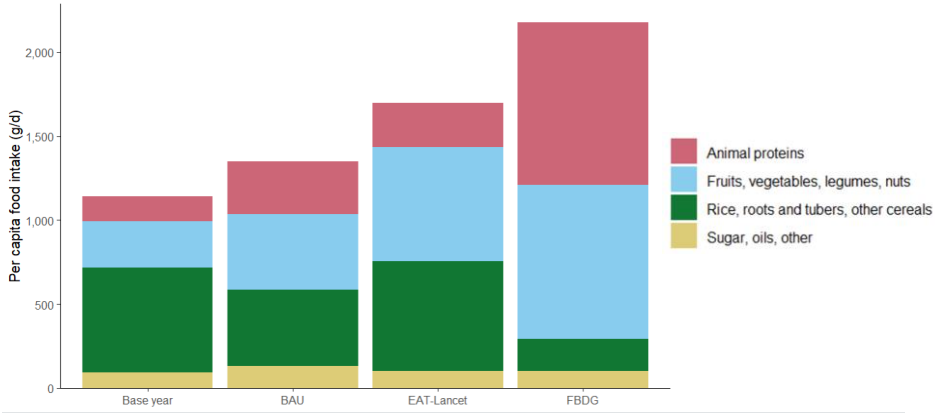


Figure 11 highlights the differences in food consumption across three scenarios compared to the base year diet. The model expects that under the business-as-usual (BAU) scenario, the average Ugandan diet will remain around 2,000 kcal/day, falling short of the recommended 2,500 kcal/day. Consequently, total consumption in grams will be lower than in the other two scenarios. When looking at the relative contribution of food groups, large variations are observed. Across all scenarios, intake of the food group 'fruits, vegetables, legumes' and 'animal proteins' is expected to increase. However, in the EAT-Lancet diet, the contribution of animal proteins is relatively low, as it recommends an increased intake of nuts and legumes as sustainable, healthy protein sources. The high consumption of animal proteins in the FBDG diet is primarily due to the recommended intake of milk in the Kenyan FBDG. If Uganda deviates from the Kenyan FBDG, the results may differ. The consumption of sugar and oil groups appears relatively stable across scenarios, but when examining the subgroups, it is clear that under BAU, sugar intake will rise significantly, while the EAT-Lancet scenario primarily includes healthier fats rather than unhealthy ones.

Figure 11. Intake (grams per capita) per food group for the three scenarios



[1] The EAT-Lancet diet is a reference diet designed to be both healthy for humans and sustainable for the planet, emphasising primarily plant-based foods, limited animal products, and reduced sugar and processed food intake. (Willett et al., 2019)

Results

The three diet scenarios result in varying impacts on food system outcomes, with indicators such as food affordability and labour, health (measured by the Sustainable and Healthy Diet Index (SHDI)), and the environment, including indicators like freshwater use, GHG emissions, land use, and nitrogen and phosphorus use. Figure 12 provide an example of the outcomes of the modelling exercise, showing how the three scenarios affect the self-sufficiency ratio of various food groups over time. For instance, the FBDG scenario, which involves high milk consumption in our modelling, results in a lower self-sufficiency ratio for dairy. This indicates that, to meet the demand, it would be more economically viable to import dairy from neighbouring countries rather than producing (all of) it domestically.

Figure 12. Self-sufficiency for different food groups under the three scenarios

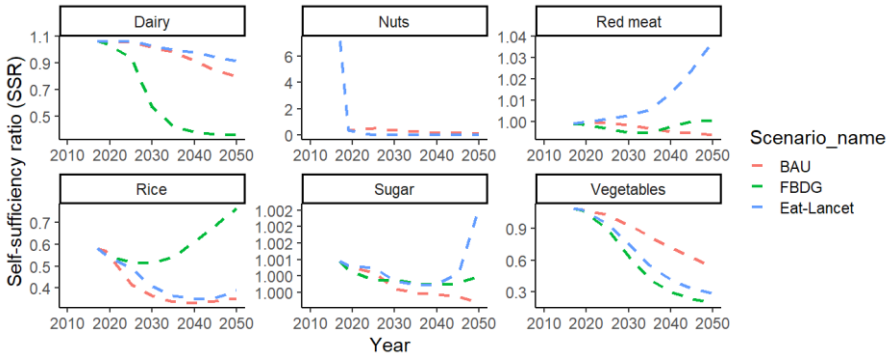
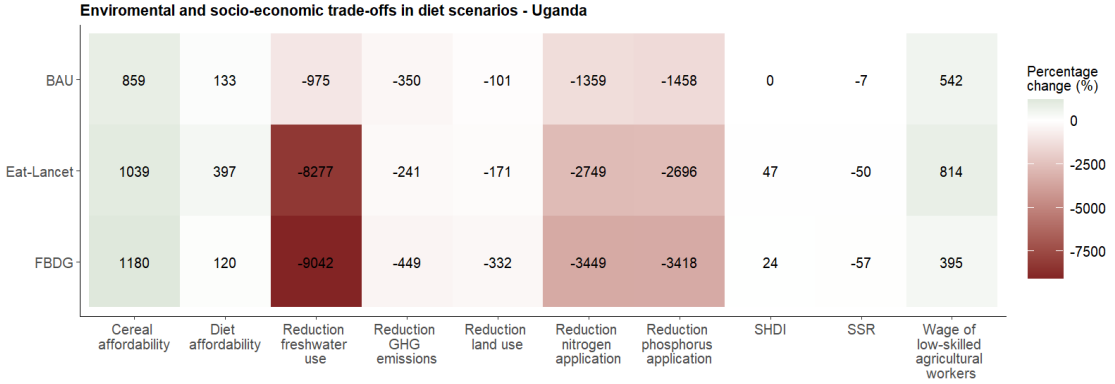


Figure 13 presents an overview of the positive (green) and negative (red) social and environmental impacts of each diet scenario on various indicators. Moving towards a sustainable and healthy diet, such as the EAT-Lancet scenario, can have positive impacts on society by improving health (SHDI) and supporting the economy, while also contributing to the reduction of greenhouse gas emissions. However, there are trade-offs: consumption of healthy products like fruits and nuts increases the demand for resources such as freshwater and fertilizers, as highlighted in the red boxes. In contrast, adopting food-based dietary guidelines (FBDGs) may have negative effects on the environment mainly due to high consumption of animal-based products. Overall, the modelling suggests that promoting a sustainable and healthy diet offers the greatest potential for positive outcomes across health, environment, and economic indicators, but careful consideration of resource requirements is needed.

What can we learn from quantitative modelling insights?

The quantitative analysis helps policymakers explore different futures ("what if…?") by simulating the potential consequences of each dietary shift. It enables a broader understanding of the interconnections within the food system, including health, environmental outcomes, economic effects, and resource requirements for production. By identifying trade-offs and synergies, these analyses highlight win-win opportunities and pinpoint entry points for interventions. They also allow evaluation of the effectiveness of current and potential policies, complementing nutrition modelling and other evidence to inform regulations such as the Ugandan Food-Based Dietary Guidelines. For example, this analysis highlights the importance of taken into account both environmental as health outcomes when developing FBDGs to support a sustainable diet which is both beneficial for the population as the environment. Quantitative scenarios provide clear, data-driven insights that make complex dynamics tangible, help prioritise actions, and support strategic planning for sustainable, health-promoting food policies.

Figure 13. Impact of the three diet scenarios on various food system indicators, compared with current system



5. Mobilise For Systems Change

In this final phase of the project, we aimed to inform Ugandan food systems policy in two ways. First, building on the scenarios developed in the previous phase, we engaged a broad group of food system players in a range of agenda-setting exercises, including stress-testing, back-casting and theories of change, to co-create an action agenda for food system transformation in Uganda. Second, the Ugandan research team developed policy briefs with clear recommendations on key food system challenges in Uganda: growing obesity, food loss & waste and climate resilience.

5.1. Stress-testing of scenarios

In the closing workshop in March 2025, we engaged a broad group of food systems stakeholders in a stress-testing exercise, where we reviewed the ability to achieve agri-food related objectives of the Fourth National Development Plan (NDPIV) under different scenarios (NPA, 2024). This showed that scenario A (Economic Distress) would be the most difficult scenario to achieve each of these objectives, and scenario D (Equitable Green Growth) was the best scenario for achieving many of these objectives. Achieving these outcomes under scenario B and C was more or less challenging, depending on the type of objective. This exercise challenged stakeholders to think about food system transformation strategies to achieve the NDPIV objectives, that could be viable even under more difficult scenarios.

Aspiration for 2050:	Scenario A: Economic Distress	Scenario B: Capitalistic & environ. resilient	Scenario C: Fire Fighting	Scenario D: Equitable Green Growth
Reduce undernutrition among children by 50%	4	3	2	1
Reduce import dependency by 50%	4	2	3	1
Reduce rural people living in poverty by 60%	4	1	3	2
Eliminate food system related deforestation	4	2	3	1

Figure 14. Stress testing of food system aspirations based on Uganda vision 2040 and NDPIV

5.2 Conditions for systems change.

In a second exercise of the final workshop, participants were invited to identify different conditions of change, at three levels: structural change (policies, practices, resource flows), relational change (relationships, power dynamics) and transformative change (mental models). They identified these conditions for systems change for the different agri-food related objectives mentioned in the Fourth National Development Plan (NDPIV): reducing obesity and undernutrition, lowering rural poverty and dependency on food imports and curbing soil erosion and agriculture-related deforestation.

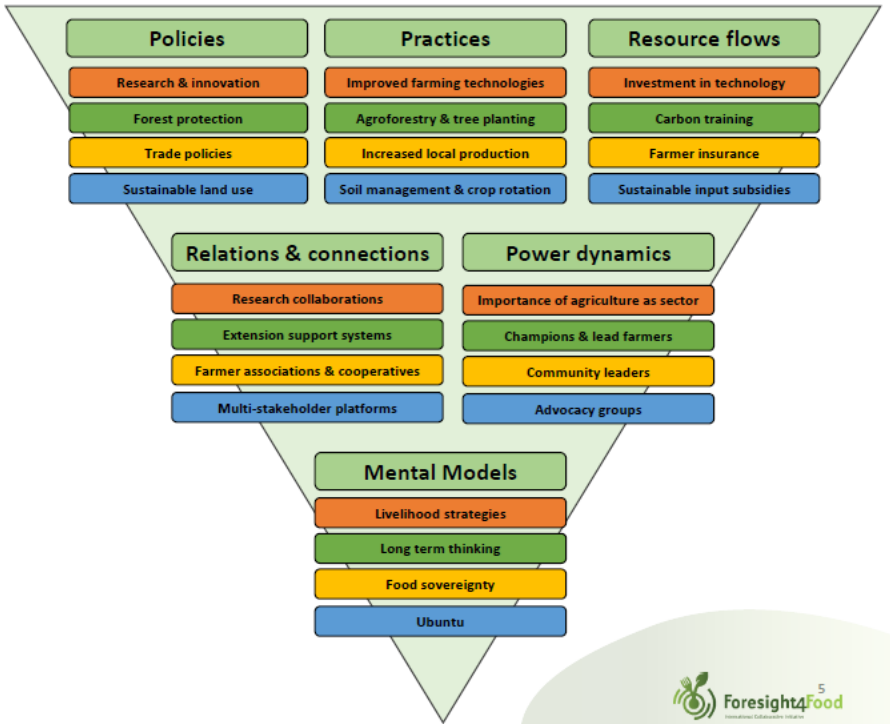


Figure 15. Example of conditions for system change related to improving climate resilience of the Ugandan food system

5.3 Theory of Change

Building on the previous exercises and to further support strategic thinking, participants were introduced to the concept of a Theory of Change (ToC). A Theory of Change is a structured approach to describing how and why a desired change is expected to occur within a specific context. It helps clarify the pathways that lead from concrete activities to long-term impacts, making the change process more transparent and strategic.

Participants of the workshop were invited to make a Theory of Change for each of the key impact areas related to the food system identified in the Fourth National Development Plan (NDPIV): (1) reduced undernutrition among children, (2) reduced dependency on food imports, (3) reduced poverty and improved livelihoods of rural people, (4) reduction of area affected by soil erosion and (5) increased forest cover contributing to climate adaptation.

To create their Theory of Change, they identified the long-term outcomes needed to achieve the desired impact of their impact area. Next, they outlined the necessary outputs and mapped concrete activities to reach these. Finally, they connected the different elements with arrows and reviewed and refined the logic to ensure coherence and feasibility.

The exercise encouraged participants to move from broad aspirations to actionable strategies while maintaining a systems perspective. It was highlighted that insights from the previous exercise on conditions for system change, such as changing mental models, power dynamics, and structural factors, should be integrated into the ToC. This ensures that strategies address not only technical solutions, but also the deeper systemic shifts needed for meaningful and lasting impact.

Figure 16. shows an integrated Theory of Change for food system transformation in Uganda, combining the different ToCs created in the workshop for each of the NDPIV impact areas related to food and agriculture.

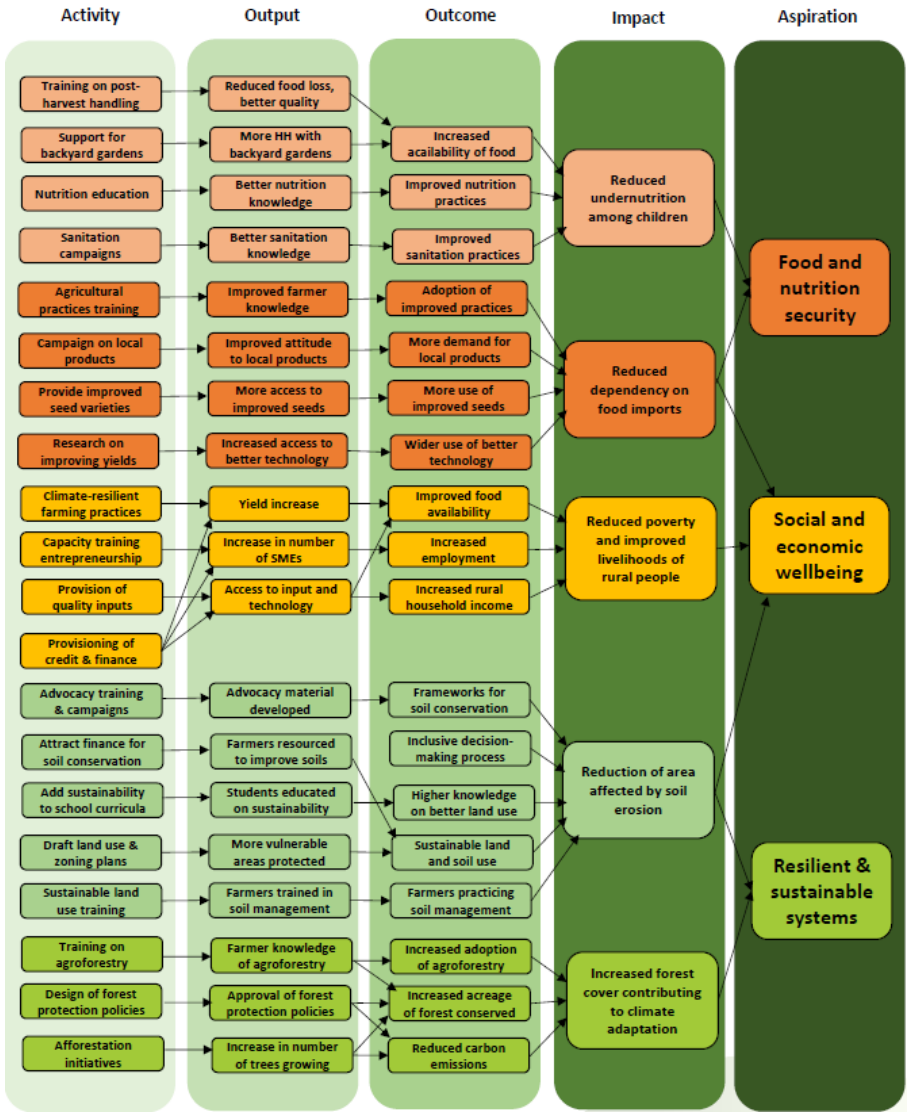


Figure 16. Theory of change for food system transformation in Uganda

5.4 Backcasting

At the end of the FoSTr closing workshop in March 2025, backcasting was introduced as a method for determining the steps needed to achieve a desired future. The central question posed was: Who needs to do what to transform food system outcomes?

It was highlighted that transforming food systems involves various stakeholders, such as policymakers, each with specific roles and responsibilities that contribute to more sustainable, equitable, and healthy food systems.

The backcasting methodology was introduced, showing that backcasting begins with defining a desirable future and then works backward to identify the necessary steps to reach that future. This includes exploring potential actions, obstacles, and opportunities along the way.

Participants were then invited to apply the concept in practice. Each group was asked to work with their specific aspiration statement, which they placed in the top left corner of their worksheet as the key milestone for 2050.

Working under the assumptions of Scenario A (economic distress), participants identified the key pre-conditions that would need to be in place to achieve this aspiration. In the right-hand column, they then outlined the types of policies, practices, or partnerships needed to establish these pre-conditions.

Building on this, they moved step by step backwards in time, identifying earlier milestones and what would be required to reach them, creating a logical pathway from the present day to the desired future.

Figure 17 shows the output of each group (activities and milestones on a timeline towards 2050) combined in a comprehensive roadmap for food system transformation in Uganda.

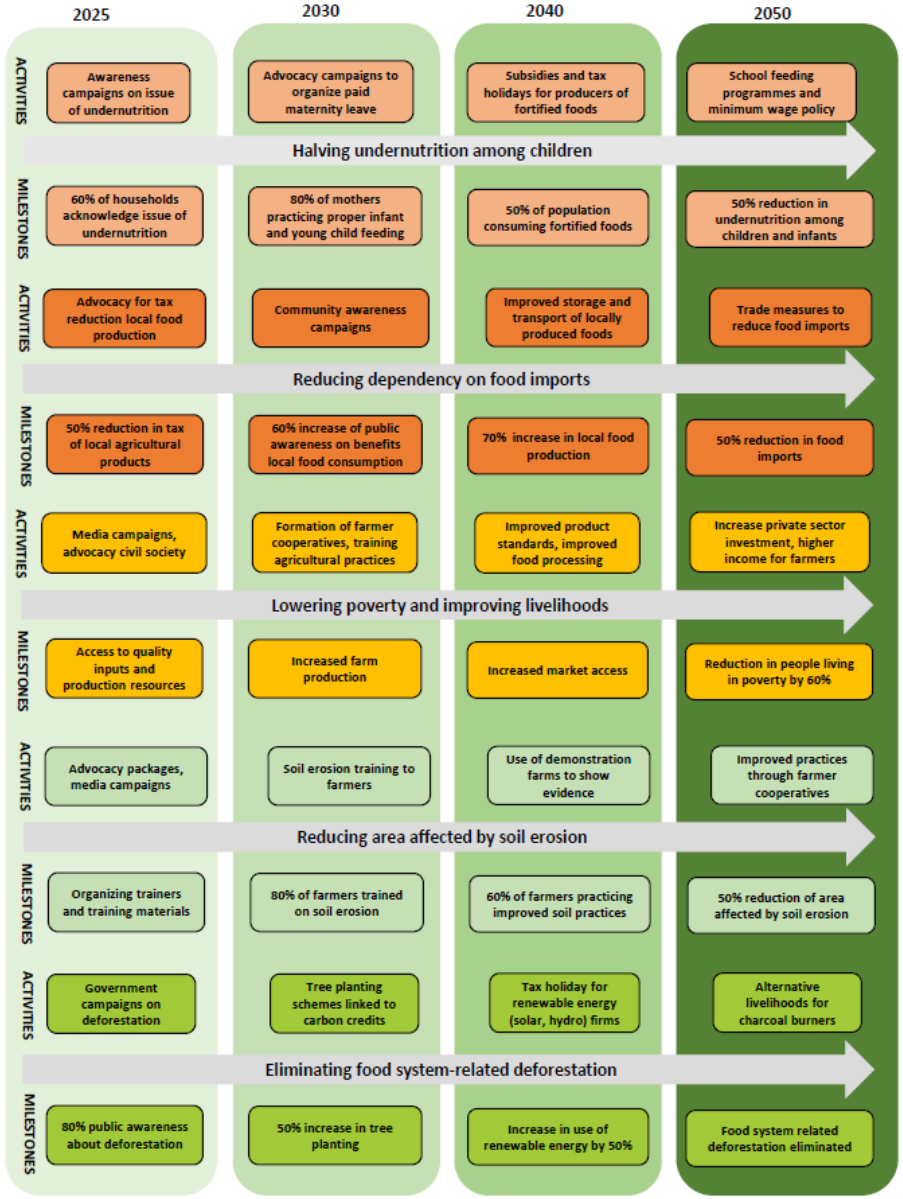


Figure 17. Roadmap for food system transformation in Uganda

5.5. Policy recommendations for Plan of Action

Based on the insights of the foresight process and the activities during the closing workshop, an action agenda was developed for food system transformation in Uganda, that can serve as the basis for the Ugandan Plan of Action for the implementation of its National Pathways. This action agenda included the following recommendations for each of the five action areas:

1. Halving undernutrition among children. A stepwise approach is proposed, starting with raising awareness among low-income households on the issue of undernutrition, followed by advocacy campaigns for paid maternity leave to improve infant and young child feeding. After this, subsidy programmes stimulate the production of fortified food, increasing their consumption. School feeding programmes and minimum wage policies further improve access to nutritious food to help achieve halving child undernutrition.

2. Reducing dependency on food imports. Taxation policies will need to favour local foods compared to imported foods. Community awareness campaigns can further increase awareness on the benefits of consuming Ugandan food products. Improved storage and transport facilities will increase the quality and consumption of locally produced food. Finally, trade measures can further support reducing food imports in favour of Ugandan grown food.

3. Lowering poverty and improving livelihoods. Media campaigns will promote access to quality inputs, while strengthening farmer cooperatives and improving training on good agricultural practices will increase farmer productivity. Improved product standards and better food processing can improve market access of Ugandan farmers. Finally, increased private sector investment will support farmers in lowering poverty and improving livelihoods.

4. Reducing area affected by soil erosion. Advocacy packages, trainers and training materials need to be arranged to provide soil erosion training to farmers. The use of demonstration farms can help to show evidence of improved soil management practices for farmer productivity. Farmer cooperatives can further support and scale efforts to reduce soil erosion.

5. Eliminating food system-related deforestation. Government campaigns can increase public awareness about deforestation. Tree planting schemes linked to carbon credits can increase tree cover across Uganda. Tax holidays for renewable energy firms can improve access to clean energy sources while reducing reliance on charcoal burning for energy. By also providing alternative livelihoods for charcoal burners, deforestation linked to cooking food on charcoal can be further reduced, thereby eliminating all food system related deforestation by 2050.

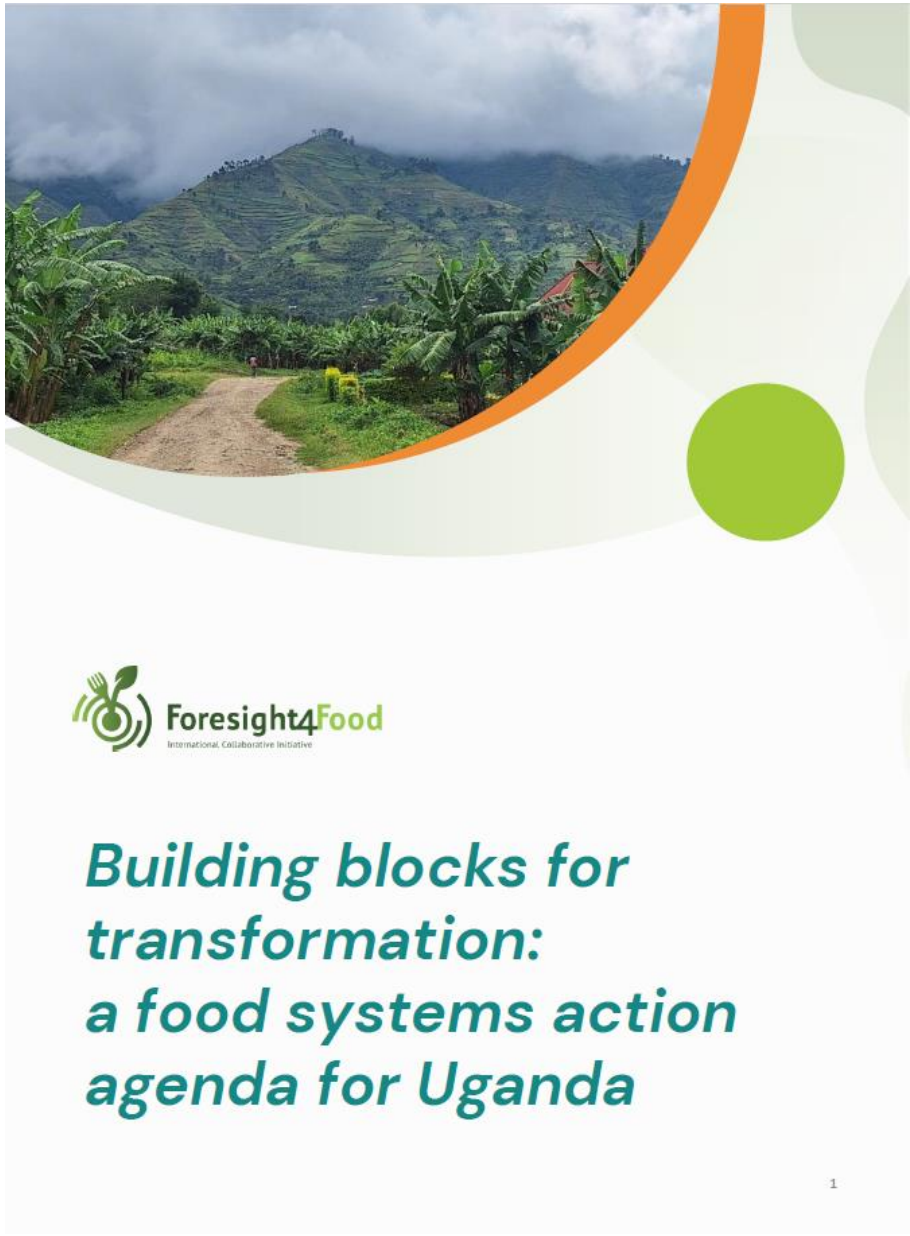


Figure 18. The Ugandan food system transformation action agenda.

5.6. Thematic support through policy briefs

In parallel to the foresight process supporting the development of the Plan of Action for Food System Transformation in Uganda, the research team of the FoSTr programme has also worked to support specific urgent food systems challenges that were identified during the participatory foresight workshops: (1) food loss & waste, (2) climate resilience, and (3) overweight & obesity.

For each of these themes, meetings were held with the relevant ministries: the Ministry of Agriculture for the topic of food loss & waste, the Ministry of Water and Environment for climate resilience, the Ministry of Health for the topic of overweight & obesity. In preparation for these meetings, policy briefs on these food systems challenges were developed, providing context to the challenge, an identification of key trends and drivers, as well as scenarios for how the future of this particular challenge might unfold (Mutambuka & Male, 2024; Nambooze & Muzira, 2024; Ruma & Mbabazi, 2024).

These policy briefs were received well by the different ministries, providing useful insights for the policy process. For each Ministry, follow-up products were identified that could further support the specific needs of each of the Ministries. For the Ministry of Agriculture, a follow-up paper was developed on the cost of inaction of not addressing food loss and waste. For the Ministry of Water and Environment, stress-testing was used to identify opportunities and challenges in the funding landscape for Uganda's climate resilience initiatives. For the Ministry of Health, a follow-up brief was developed on future-proofing Uganda's health systems through nutrition financing and non-communicable diseases policy strategies. These briefs will be published in November, after which they can be found online on the Foresight4Food website.

Finally, specific support was provided to the National Planning Authority in developing a guide on how to use the foresight tools stress-testing and backcasting to support their strategic planning processes. As part of this guide, an analysis was conducted to stress-test various objectives of the Fourth National Development Plan related to the food system. Through this exercise, we aimed, in consultation with the NPA, to identify additional measures or key points of attention to achieve the desired food system outcomes, as well as to demonstrate the potential of applying foresight tools for developing resilient strategies.

Figure 19. A selection of policy briefs and a guide developed to support applying foresight to address key food system challenges

6. Reflections and way forward

6.1 Reflections

To reflect on the progress of our work, a mid-term and final reflection report were developed, in which key stakeholders involved in the FoSTr work in Uganda were consulted through interviews, surveys and focus groups.

From these consultations, a positive picture emerges of FoSTr's contribution in Uganda. FoSTr helped raise awareness among policymakers and stakeholders on future challenges and opportunities, including climate change, trade dependency, and food insecurity. With the food system assessment and data gallery walk, the FoSTr team highlighted, together with stakeholders, critical data gaps and questioned existing evidence bases. The programme also strengthened policy development through evidence, strategies, scenario thinking, and stress-testing exercises, enabling policymakers to design more resilient and forward-looking strategies.

Moreover, the multi-stakeholder process supported cross-ministry engagement and collaboration. With its research team and collaborations with government agencies, FoSTr helped build national capacity for foresight and research collaboration and demonstrated the added value of applying foresight. Stakeholders reported that the process improved their understanding of other actors' perspectives, clarified roles, encouraged systems thinking, and provided structured spaces for dialogue, fostering trust and collaboration across the food system. Finally, FoSTr highlighted the consequences of inaction on important food system challenges, such as climate change, and promoted strategic thinking about alternative futures.

The reflection process also highlighted opportunities for follow-up and lessons to inform future foresight initiatives. Stakeholders suggested ensuring participants have a solid understanding of the food system concept before engaging in foresight exercises, and recommended building in follow-up activities after each workshop to reinforce key ideas. Broadening the range of actors, including grassroots communities, youth, women, and the private sector, was seen as an opportunity to increase relevance and inclusivity. Strengthening relationships with government partners was identified as important for fostering ownership and demand for foresight. Finally, future phases could benefit from partnering with other organisations or co-organising events to enhance sustainability and long-term impact.

More detailed insights on the FoSTr project and the Uganda experience can be found in the final reflection report, which will soon be published on the Foresight4Food website.

6.2 Way forward

While the FoSTr programme ends in 2025, several activities were identified by the FoSTr country facilitators and research team that could take the foresight for food systems change work in Uganda forward.

First, the Community of Practice of people involved in the FoSTr programme could be strengthened further, by organizing an online platform for exchange and make sure they are informed about ongoing foresight activities.

Furthermore, foresight could be integrated further in the research activities and curricula of the universities and research organizations of the FoSTr research team.

Thirdly, the research team has been active in integrating foresight into new research proposals, making it part of their portfolio of research activities that they can offer to a variety of clients in Uganda.

Finally, government organizations such as the National Planning Authority can be further supported in integrating foresight in their policy processes, making it a central process in supporting food systems policy into the future.

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The Foresight for Food System Transformation (FoSTr) is a programme that supports policymakers and other key stakeholders in the food system with scenarios and foresight analysis about the food system of the future. The programme is financed by the Kingdom of the Netherlands, overseen by IFAD and implemented by the University of Oxford's Environmental Change Institute, Wageningen University & Research and key partners in the international Foresight4Food network.