RSM2SNF
Research Supporting African MSMEs
To Provide Safe and Nutritious Food

Stakeholder Perceptions of the Value Chains for Fish and Vegetables in Tanzania

October 2023

Authors: Ayala Wineman, Lenis Saweda O. Liverpool-Tasie, Isaac Minde, and Gideon Boniface

MICHIGAN STATE
UNIVERSITY

Authors

Ayala Wineman is an Assistant Professor in the Department of Agricultural, Food, and Resource Economics at Michigan State University and Research Coordinator of the Global Child Nutrition Foundation.

Lenis Saweda Onipede Liverpool-Tasie is a MSU Foundation Professor in the Department of Agricultural, Food, and Resource Economics at Michigan State University, East Lansing, Michigan.

Isaac Minde is the Tanzania country lead of the "Research Supporting African MSMEs to Provide Safe and Nutritious Food"(RSM2SNF) project and has retired from being a Professor in the Department of Agricultural, Food, and Resource Economics at Michigan State University.

Gideon Boniface is the Project Management Assistant of the "Research Supporting African MSMEs to Provide Safe and Nutritious Food"(RSM2SNF) project in Tanzania.

Acknowledgments

The authors are extremely grateful to the many agrifood stakeholders in Tanzania who participated in the survey, as well as the validation event that will take place in November 2023. This report was prepared with funding from the Bill and Melinda Gates Foundation under Grant No. INV-034790. The contents are the responsibility of the authors of this report and do not necessarily reflect the views of the Bill and Melinda Gates Foundation or Michigan State University.

About Research Supporting African MSMEs to Provide Safe and Nutrition Food (RSM2SNF)

The Research Supporting African MSMEs to Provide Safe and Nutritious Food (RSM2SNF) is funded by the Bill and Melinda Gates Foundation. RSM2SNF dives deep into the wholesale, logistics, processing, and retail segments of the value chains of several products, such as fish, tomato, and green leafy vegetables. The goal is to understand the midstream of these food value chains with a focus on Micro, Small and Medium Enterprises (MSMEs), and to inform policies and interventions to support MSMEs in providing safe and nutritious foods at affordable prices. This five-year project (2022–2026) is led by Michigan State University (MSU) working with partners in Nigeria and Tanzania.

Contents

Executive Summary

The agrifood system in Tanzania is transforming rapidly, with early evidence of a "nutrition transition"—a shift away from traditional foods with limited processing towards higher value foods (such as vegetables and animal-source foods) and products that are highly processed. Transformation is also evident in the agricultural sector where farms increasingly exhibit a commercial orientation, and a declining share of the population is engaged in agriculture whereas jobs have proliferated in the midstream and downstream of agrifood value chains. This process has been propelled by the many micro, small, and medium enterprises (MSMEs) that operate all along agrifood value chains, including producers, input suppliers, transporters, wholesalers, processors, and retailers. While these MSMEs together form the backbone of Tanzania's food system, they face significant challenges that impede their operations.

The "Research supporting African MSMEs to provide safe and nutritious food" (RSM2SNF) project aims to better understand the structure, conduct, and performance of three particularly nutritious and locally relevant foods, namely fish, tomato, and green leafy vegetables (GLVs). In July–September 2023, the RSM2SNF project administered a survey to capture stakeholder perceptions of the most pressing challenges faced by MSMEs in the fish and vegetables value chains in Tanzania. The survey also captured a broad assessment of the food system in Tanzania and touched on gender roles in the fish and vegetables values chains and awareness and perceptions of related legislation, among other topics. Agrifood stakeholders from across the country (with a heavy emphasis on those in the Eastern and Lake zones) were recruited using purposive and snowballing methods. The survey was administered to 276 stakeholders from a wide set of stakeholder groups, including government representatives from national, regional, and more local levels; representatives of the private sector; representatives of agriculture/fishers; representatives of civil society; and representatives of academia/research. Survey results are analyzed for the full sample and are disaggregated by zone, gender of the respondent, and stakeholder group.

Stakeholders judged the status of fish and vegetable markets to differ in terms of availability, affordability, safety, and stability (with vegetables judged ore favorably than fish). Nevertheless, they often ranked the challenges and potential solutions for affordability and safety in a similar way. For both fish and vegetables, the high cost of inputs for production was regarded as the greatest challenge for affordability, and the quality of the environment (e.g., water quality) is viewed as a threat to food safety. In terms of efforts to improve affordability and/or food safety, the greatest priorities for both fish and vegetables were interventions to raise the productivity of producers through research and/or training and the provision of subsidies or cash transfers for producers and post-production MSMEs. This alignment across the two perishable products may point to some synergies in programs or investments; however, creativity may be needed to identify interventions that could plausibly benefit both value chains.

When respondents considered the priorities of food affordability and safety, they seemed to prefer efforts to bring down prices rather than improve safety. Thus, among a list of programs that could address either issues of food safety/food hygiene or affordability, respondents prioritized those aimed at affordability (i.e., increasing productivity or providing subsidies) rather than those aimed at monitoring food system actors or providing hygiene-related infrastructure. This is likely indicative of the stress felt by low-income consumers who are worried that they cannot even access nutritious foods, with food safety deemed a lower-order concern. The relative de-emphasis of food safety and hygiene indicates that greater sensitization is needed around these topics, which are pressing concerns in Tanzania. This has implications for the potential role of the RSM2SNF project. Notably, Tanzanians may not be

receptive to this message if efforts to improve food hygiene/safety would be expected to inflate food prices.

A comparison of perceptions and priorities across stakeholder groups yielded some interesting points of divergence. For example, farmers/producers were more likely to view low productivity on vegetable farms as a problem, especially compared to representatives of the non-farm private sector. Whether improvements in on-farm productivity would improve affordability for consumers or exacerbate postharvest losses is a question in need of greater attention. Representatives of the private sector and of national government tended to view food safety knowledge as a significant challenge to food safety in fish, while producers and representatives of local government disagreed. This could result in a misalignment of priorities if the private sector desires more food safety knowledge while representatives of local government and even civil society place less weight on this driver of food safety.

Overall, respondents from the Lake zone viewed the availability of both fish and vegetables more favorably than their counterparts from the Eastern zone. This may reflect the significance of Lake Victoria to the local economy, as well as a rainfall pattern in the north that ensures crops can be grown through two seasons each year. In terms of the affordability of both fish and vegetables, respondents from the Eastern zone were more likely than those from the Lake zone to view the availability, high cost, and poor quality of infrastructure as challenges, and (at some points in the survey) respondents from the Lake zone seemed to especially de-prioritize the provision of hygiene-related infrastructure.

Women and men in Tanzania were viewed as having distinctly different roles in the value chains for fish and vegetables. Men seem to be more engaged in the provision of inputs for production (for both fish and vegetables) and far more engaged in the production of fish. On the other hand, women were viewed as more engaged than men in the retailing of fish and vegetables, and almost half of respondents thought women were more engaged than men in vegetable production. Overall, women seem to be more engaged in all nodes of the vegetable value chain compared to fish. This has implications for the RSM2SNF project, which aims to understand gendered patterns in the midstream and downstream of agrifood value chains and intends to be purposeful in accounting for gender in the specification of research questions.

As noted, the RSM2SNF project aims to build knowledge and capacity around how MSMEs in the Tanzanian food system can be supported to provide affordable, safe, and nutritious foods. The insights gleaned from this survey will inform the design of the project. A validation event in November 2023 will be an opportunity to clarify and confirm our interpretation of survey results, contextualize the patterns observed, and gather input on how the RSM2SNF project should be designed.

List of Tables

List of Figures

List of Acronyms

AVC	Agrifood value chain
GLV	Green leafy vegetable
MSME	Micro, small, and medium enterprises
NGO	Non-governmental organization
RSM2SNF	Research supporting African MSMEs to provide safe and nutritious food
SSA	Sub-Saharan Africa

1. Introduction

The agrifood system in Tanzania is transforming rapidly, with early evidence of a "nutrition transition"—a shift away from traditional foods with limited processing towards higher value products, such as dairy or fish, and highly processed foods with excessive amounts of sugar, fat, and salt (Haggblade et al. 2016; Keding et al. 2011). This transition is associated with urbanization, increases in women's employment, and rising incomes (Cockx et al. 2018; Sauer et al. 2021; Tschirley et al. 2015), with inverse relationship between income and the share of the food budget dedicated to staples referred to as "Bennett's Law" (Bennett 1941). A recent analysis of dietary patterns in Tanzania found that most food is now purchased rather than self-produced, and that food is increasingly consumed away from home—particularly energy-dense, processed food (Ignowski et al. 2023; Sauer et al. 2021). At the same time, nutrient-dense foods have become more expensive over the 2008–19 period (Ignowski et al. 2023).

Transformation is also evident in the agricultural sector, where farms increasingly exhibit a commercial orientation (Wineman et al. 2021) and are more likely to grow fruits and vegetables, reflecting the shift in local diets. According to the National Sample Census of Agriculture, the total area under fruits and vegetables increased by 126% between 2008 and 2019, and this has been paired with an upsurge in the use of pesticides and herbicides, among other inputs. While aggregate production of fish has been mostly steady between 2000 and 2019, transformation is evident on the margins, where farmed fish production (which has historically been negligible) grew by 563% from 2011 to 2021 (Peart et al. 2021). Aquaculture now accounts for 4% of the country's total fish production. Overall, the share of households engaged in agriculture/food production decreased markedly between 2008 and 2014 (Wineman et al. 2021), while at the same time, jobs have proliferated in post-production nodes of agrifood value chains (i.e., food trade, storage, processing, packaging, preparation, and distribution, among others) (Kabasa et al. 2015).

These shifts in the agrifood system have implications for the welfare of the Tanzanian population. First, Tanzania faces a triple burden of malnutrition, with some segments of the population suffering from undernutrition (not getting enough food) at the same time as rates of overweight and obesity are rising, and micronutrient deficiencies remain prevalent (Gómez et al. 2013). Already as of 2013, the rate of overweight/obesity among women exceeded the rate of undernourishment in rural Tanzania (Keding et al. 2013). Although the rate of poverty has been on a downward trajectory, falling from 26% to 24% between 2008 and 2014 (Wineman et al. 2021),[1] as of 2020, 65.5% of the population could not afford the cost of a nutrient-adequate diet, and 85% could not afford the cost of a healthy diet (FAO, IFAD, UNICEF, WFP and WHO 2020). The relatively high cost of healthy food (Ignowski et al. 2023) means that consumers are less likely than they might otherwise be to access a healthy diet with adequate micronutrients. Second, to the extent that consumers *are* able to access nutritious foods, the rising popularity of fruits, vegetables, and animal-source products presents an important opportunity to address micronutrient deficiencies. However, foods eaten away from home tend to energy-dense with few micronutrients (Sauer et al. 2021), such that a greater preference for convenience foods may undercut diet quality. It is critical, therefore, to steer the nutrition transition towards healthy and away from highly processed foods (Haggblade et al. 2016).

The many micro, small, and medium enterprises (MSMEs) that operate all along agrifood value chains (AVCs) have an important role to play in making available nutritious foods that are both affordable and

[1] The poverty rate was calculated by comparing the household consumption index per adult equivalent per day to the national (not international) poverty line.

safe. These MSMEs include producers, input suppliers, transporters, wholesalers, processors, and retailers. Together, they form the "backbone" of the agrifood systems in developing regions, supporting food production and then moving the food along from producer to consumer (Reardon et al. 2019). In addition to being responsible for food availability, affordability, and stability in retail markets, agrifood MSMEs also are in a position to ensure (or undermine) food quality and safety, to innovate in ways to make nutritious options more (or less) convenient for consumers than less nutritious options (Ignowski et al. 2023), and to create non-farm employment in both urban and rural areas (Dolislager et al. 2020). MSMEs also play a role in the newly introduced food security dimensions of agency and sustainability (HLPE 2020), as they are the most proximate and accessible value chain actors with whom farmers and consumers interact when they seek to engage in processes that shape the food system; and the behaviors of MSMEs at least partly determine the environmental impact (hence, the sustainability) of the food system.

Nevertheless, MSMEs face significant challenges that affect their ability to provide consumers with affordable, safe, and nutritious foods. These challenges span the micro level, such as limited technical capacity of MSME owners/managers and limited access to finance (Liverpool-Tasie et al. 2020); the meso level, such as poor organization and management of markets or clusters, congestion, security challenges, and limited access to water, cold storage, and other amenities (Reardon et al. 2021); and the macro level, such as poor road and rail infrastructure or limited supply of electricity that significantly increase the costs of operation, as well as policies that make it difficult for MSMEs to be established or formalized (e.g., multiple taxation, bureaucratic and unclear processes). Macro challenges also include the weak regulatory framework used to oversee and monitor the operations of many of SSA's food systems (Liverpool-Tasie et al. 2020; Liverpool-Tasie et al. 2021).

The "Research supporting African MSMEs to provide safe and nutritious food" (RSM2SNF) project, which began in Nigeria in 2022 and launched in Tanzania in April 2023, aims to better understand the structure, conduct, and performance of AVCs and the associated implications for food and nutrition security. Particular attention in the project is given to the midstream and downstream of AVCs, comprising their wholesale, logistics, processing, and retail segments.

In Tanzania, the RSM2SNF project will focus its research on the regions of Dar es Salaam/Pwani, Morogoro, and Mwanza, and it will study the value chains of three particularly nutritious and locally relevant foods, namely fish, tomato, and green leafy vegetables (GLVs). Fish is among the most important animal-sourced foods in Africa and is crucial in combatting malnutrition, particularly among low-income consumers (Chan et al. 2019; Desiere et al. 2018; Headey et al. 2018; Liverpool-Tasie et al. 2021). According to the 2014/15 Tanzania National Panel Survey, 71% of Tanzanian households (and 63% of poor households) consume fish. Households allocate an average of 5.5% of their total food budget to fish, and an average of 41% of the value of animal products consumed is in the form of fish.

Studies also indicate a rise in the share of fruits and vegetables in national consumption of SSA countries (Smale et al. 2021); along these lines, the fruit and vegetable sector is the fastest growing subsector in Tanzania (Van der Maden et al. 2021). According to the 2014/15 Tanzania National Panel Survey, nearly all households (96%) in Tanzania consume some vegetables, with an average of 10% of the total food budget allocated to vegetables. Green leafy vegetables (GLVs) are consumed in 81% of households and comprise, on average, 35% of the value of vegetable products consumed in Tanzanian households. According to the National Sample Census of Agriculture (conducted in 2008 and 2020), aggregate production of tomatoes increased from 209,983 tons in 2008 to 329,761 tons in 2020; this represents an increase from 4.9 to 5.3 kilograms per capita. Likewise, aggregate production of

green leafy vegetables increased from 51,956 tons in 2008 to 118,960 tons in 2020, representing an increase from 1.2 to 1.9 kilograms per capita.

As demand for non-staple foods expands, it is important to understand the configuration of their food supply chains; the incentives for MSMEs to supply affordable, safe, and nutritious food; and the implications for the food and nutrition security of consumers. In addition, perceptions are often a precondition for behavioral change (Deressa et al., 2011; Khanal et al., 2018; Maddison, 2007). Thus, understanding the perceptions of value chain actors will shed light on likely strategies that could prompt behavior changes to increase the availability of affordable, safe, and nutritious foods.

To better understand stakeholder perceptions of the food system in Tanzania and the challenges faced by MSMEs, a survey was administered in mid-2023 to a broad range of agrifood system stakeholders (e.g., representatives from non-governmental/civil society organizations, various levels of government, agriculture, various segments of the private sector (post-production), and research/academia). The intent was to understand the most important issues affecting the fish and vegetables value chains, with a focus on challenges to affordability and food safety and the efforts that should be prioritized to address these challenges. The survey also captured a broad assessment of the Tanzanian food system, awareness and perceptions of related legislation and government-led activities, and understandings of gender roles in the fish and vegetables values chains. The survey allowed for a disaggregated analysis of perceptions across respondent genders, stakeholder groups, and regions of the country.

2. Data and Methods

A survey of stakeholder perceptions was administered to agrifood stakeholders in Tanzania in July–September 2023. A similar survey had been conducted in Nigeria in 2022; that survey was then refined to improve the respondents' experience and revised to reflect the Tanzania context before it was implemented in Tanzania. The survey questionnaire, which is available in the Annex of this report, captured basic information on the respondents and the organizations they represent; general perceptions of the food system with a focus on the fish and vegetable value chains; and awareness and perceptions of related legislation. Emphasis was placed on challenges related to affordability and food safety in the fish and vegetable value chains and potential avenues to address these challenges.

A best-worst scaling approach to eliciting preferences was used at several points in the survey, allowing for priorities to be captured in both an ordinal and cardinal manner. Best-worst scaling has been used in other studies to gather stakeholder perspectives on, and priorities regarding, agrifood policy (Caputo and Lusk 2019; Jones et al. 2013; Maredia et al. 2022). For these questions, respondents were asked to consider a list of options and select their most preferred options (or the items they consider to be most important), and also their least preferred options (or the items they consider to be least important). These responses are analyzed by assigning a value of +1 to options selected as most important/most preferred, –1 to options selected as least important/least preferred, and 0 to options that were not selected. In section 3 of this report, these values are sometimes summed over the sample to discern how the group collectively ranks the various options, and these values are sometimes averaged within a given subsample to compare the ordering and intensity of preferences across different respondent categories. Results for various subsamples are presented wherever views of a given topic seem to vary in an interesting way across categories.

The survey was administered online, and three approaches were followed to identify respondents. First, the RSM2SNF project was launched on April 14, 2023, as part of the 2023 Annual Agricultural Policy Conference, which took place in Dodoma, Tanzania. All participants of that event were invited to

complete the survey. Second, a database of agrifood stakeholders in Tanzania was compiled based on online research, and these stakeholders were also invited to participate in the survey. Third, invitations were extended widely among the professional and personal networks of those affiliated with the RSM2SNF project. Effort was made to ensure representation across genders, different food products (e.g., those engaged with fish or fruits/vegetables), and a wide set of stakeholder groups (e.g., government representatives from national, regional, and more local levels; representatives of the private sector; and representatives of civil society). Effort was also made to ensure representation from various parts of the country, and some participation was seen from 21 out of Tanzania's 31 regions. However, because the RSM2SNF project is focused on three specific areas within the country, namely Dar es Salaam/Pwani, Morogoro, and Mwanza, the survey sample is heavily skewed towards the Eastern zone (which includes Dar es Salaam, Morogoro, and Pwani) and the Lake zone (which includes Kagera, Mara, and Mwanza). It is important to acknowledge that the sample of agrifood stakeholders constructed through these methods of outreach is not representative of the universe of agrifood stakeholders in Tanzania.

Table 1. Stakeholder groups represented in the sample (number of respondents)

Government (national)	13
Government (local)	44
Farmer	88
Private sector	41
Civil society organization	30
Research/Academia	50
Other	10
Total	276

Note: The category of civil society includes those who indicated they worked in non-governmental organizations and one representative of a development partner.

Table 2. Representatives of government (number of respondents)

National government	13
Region government	4
District government	10
Municipal government	18
Ward/Kata/Street government	12

Table 3. Representatives of the private sector (number of respondents)

Trader	29
Processor	2
Leader of private sector association	2
Input supplier	2
Market leader	1
Private sector (other)	5

The final sample included 276 respondents (Table 1). Among these, 68% were from the Eastern zone of the country, 15% were from the Lake zone, and the 6 other zone accounted for the remaining 17% of the sample. Note that according to the most recent national census, 17% and 15% of the country's population is based in the Eastern and Lake zone, respectively (NBS 2022). Thus, the geographic distribution of our sample does not match the national population. However, the sample should provide a view of stakeholders in the two areas of the country that are the focus of the RSM2SNF project; moreover, results in section 4 will be disaggregated by zone to illuminate some geographic differences.

Across stakeholder groups, 32% of respondents were producers (including farmers and fishers), 22% were representatives of government, 17% were representatives of research/academia, 15% were representatives of industry/the private sector, 11% were representatives of civil society, and 4% of respondents could not be categorized.[2] As evident in Table 2, government representatives were

[2] While consumers constitute an important stakeholder group, the RSM2SNF project focuses on supporting MSMEs to supply affordable, safe, and nutritious foods. Thus, the survey focused mostly on activities and stakeholders relevant to food supply and distribution.

distributed across the national, district, municipal, and more local levels. Table 3 indicates that most representatives of the private sector were traders (wholesalers or retailers).

Additional characteristics of the sample are presented in Table 4. A majority (63%) of respondents were men, while 37% were women. A large majority of the sample were non-rural (91%), and a majority had completed secondary school (74%). About one third (33%) of the sample were up to 35 years old, while 58% were between 35 and 55 years of age, and the remaining 9% were over 55 years old. Respondents were also asked about their engagement in various value chains. Over half (56%) were somehow engaged in the fish value chain, over half (53%) were engaged in either the fruit or vegetable value chains, and 20% indicated that they were engaged in another value chain, such as poultry or field crops.

Table 4. Characteristics of the sample (% of respondents)

Gender	Men	63
	Women	37
Age	Under 35 years	33
	35–55 years	58
	Over 55 years	9
Education	Completed primary school	93
	Completed secondary school	74
	Completed university	48
Rural status	Non-rural (Peri-urban or urban)	91
	Rural	9
Location of residence (zone)	Eastern	68
	Lake	15
	Other zone	17
Stakeholder group	Farmer	32
	Research/Academia	18
	Private sector	15
	Civil society organization	11
	Government (local)	16
	Government (national)	5
	Other	4
Value chains	Fish	56
	Fruits	45
	Vegetables	51
	Other	20

3. Results

3.1 Perceptions of the food system

3.1.1 Food market trajectory and quality

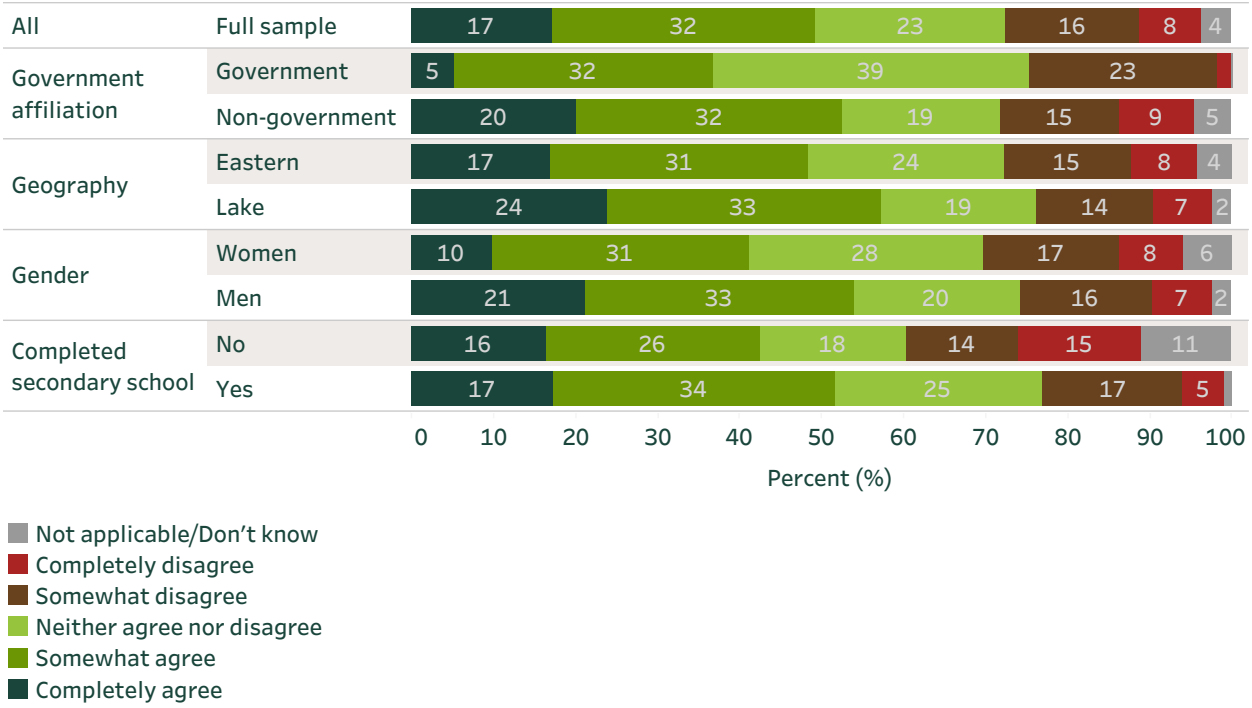
The survey first asked for expectations of the relative importance of traditional markets and modern retail outlets (e.g., supermarkets) over the next decade. Specifically, they reported their level of agreement with the following statement, "*In the next 10 years, modern markets rather than traditional markets will be the major source of safe food in Tanzania*." The distribution of results is presented in Figure 1, panel A. In the full sample, 49% either completely or somewhat agreed with the statement, and 24% either completely or somewhat disagreed. Some interesting divergences are evident when responses are disaggregated. For example, men were more likely than women (by 54% to 41%) to either completely or somewhat agree that modern markets would be a major source of safe food]. Those who were not in government were slightly more likely than members of government to agree with the statement (51% versus 40%).

The survey also asked respondents to consider the trajectory of traditional and modern markets with respect to affordability. Specifically, respondents reported their level of agreement with the following statement, "*In the next 10 years, modern markets rather than traditional markets will be the major source of affordable food in Tanzania*." Results are illustrated in Figure 1, panel B. Again, about half (47%) either completely or somewhat agreed with the statement. As modern markets may be associated with wealthier shoppers in especially urban areas, it is notable that respondents seemed to feel equally about the role of modern markets in regard to both food safety and affordability. However, there was diversity in this perspective: Men were more likely than women, and those who completed secondary school were

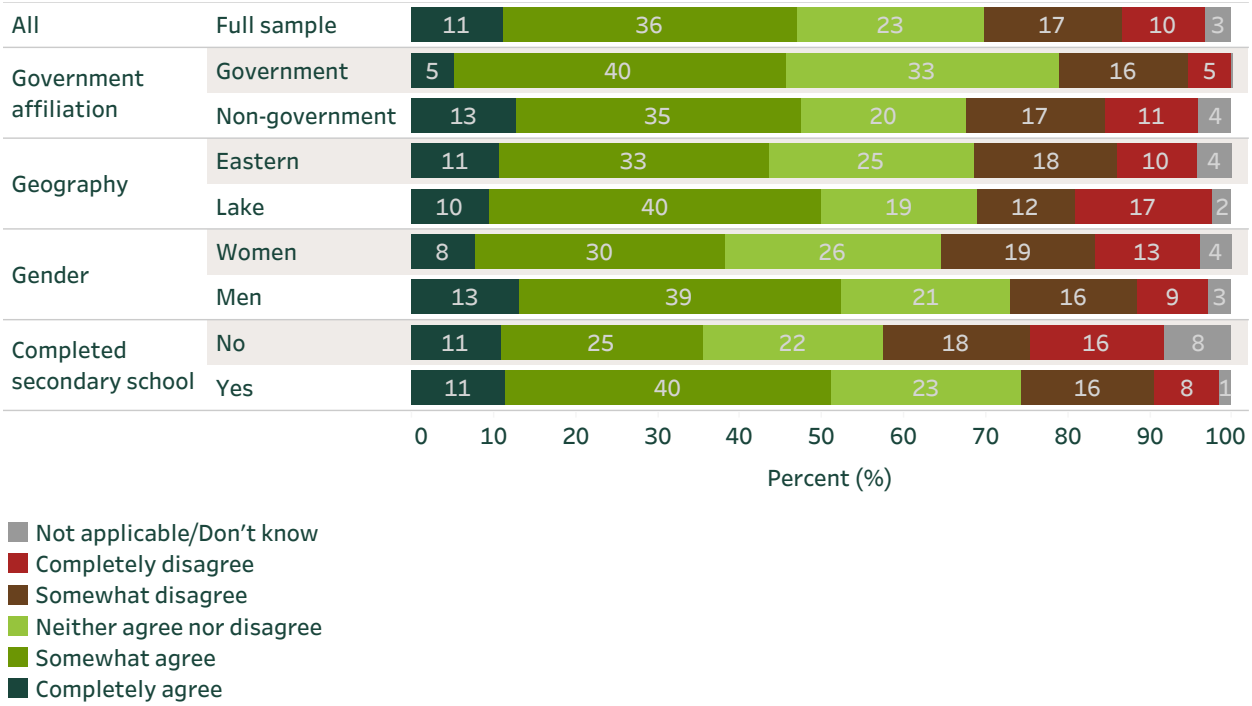
more likely than others, to agree that modern markets would become the dominant source of affordable food.

Figure 1. Role of traditional versus modern markets in Tanzania

(a) Agreement: "In the next 10 years, modern markets rather than traditional markets will be the major source of safe food in Tanzania."



(b) Agreement: "In the next 10 years, modern markets will replace traditional food markets as the major source of affordable food in Tanzania."



Note: Respondents from the Eastern and Lake zones together comprise 83% of the sample. The remaining 17% are dispersed across the other 6 zones and are therefore not shown here.

The survey next captured respondents' broad assessment of fish and vegetable markets in Tanzania. Specifically, respondents rated these markets on a scale from "very poor" to "very good" in terms of affordability, availability, safety, and stability. (Definitions of these terms were provided to respondents, as shown in Annex 1.) Results for the full sample are presented in Figure 2. Overall, respondents judged the market for vegetables more favorably than the market for fish along most axes, with the possible exception of stability. Three quarters (75%) of respondents thought the availability of vegetables was either "very good" or "good", while 50% thought the availability of fish was either "very good" or "good". Respondents were much more likely to view vegetables as affordable (60%) compared to fish (34%), and they were similarly more likely to view vegetables as safe. Specifically, 75% of respondents judged food safety for vegetables as "very good" or "good", while 39% thought the same of fish. Moreover, while 7% of respondents thought food safety for vegetables was "very poor" or "poor", 32% thought the same of fish. It seems clear that food safety is particularly perceived as a problem for fish. The story around stability is more ambiguous, with a greater share of respondents judging stability as "very good" for vegetables compared to fish (12% versus 5%), while a slightly greater share judged stability to be either "very good" or "good" for fish compared to vegetables (48% versus 44%).

Figure 3 displays the same results, disaggregated by several key subgroups. In panel A, perceptions of the food system are disaggregated by zone (focusing on the two zones for which we have considerable representation), showing that the availability of fish was viewed much more favorably among respondents from the Lake zone. Specifically, 43% of those in the Lake zone thought the availability of fish was "very good". Given the centrality of Lake Victoria to the Lake zone economy, this is not surprising. However, 52% of respondents from the Lake zone also thought the availability of vegetables was "very good", a value far higher than the Eastern zone or elsewhere in the country. This perception may reflect the bimodal rainfall distribution in the north of the country which creates two growing seasons, perhaps leaving the impression that vegetables are overall more available.

Panel B of Figure 3 reveals interesting divergence between the perceptions of respondents who were affiliated with government and those who were not–especially in regard to vegetables. Across all dimensions, those who were not in government viewed the market for vegetables more favorably. For example, 42% of respondents outside of government and 20% of those in government thought the availability of vegetables was "very good". One third (33%) of non-government and 23% of government respondents thought the food safety of vegetables was "very good". Likewise, 48% of non-government and 30% of government respondents though the stability of vegetables was either "very good" or "good". Note that more policy makers may be found in Eastern zone or Central zone, and their views of the markets for fish and vegetables may reflect their particular geographies.

Figure 2. Status of the availability, affordability, safety, and stability of fish and vegetables

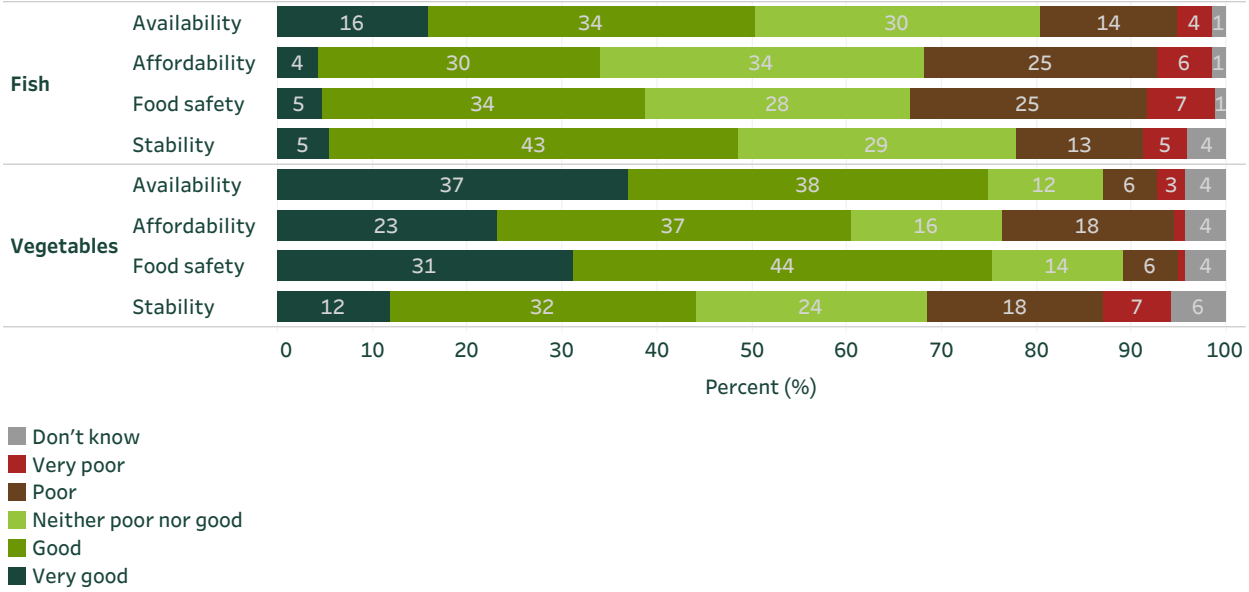
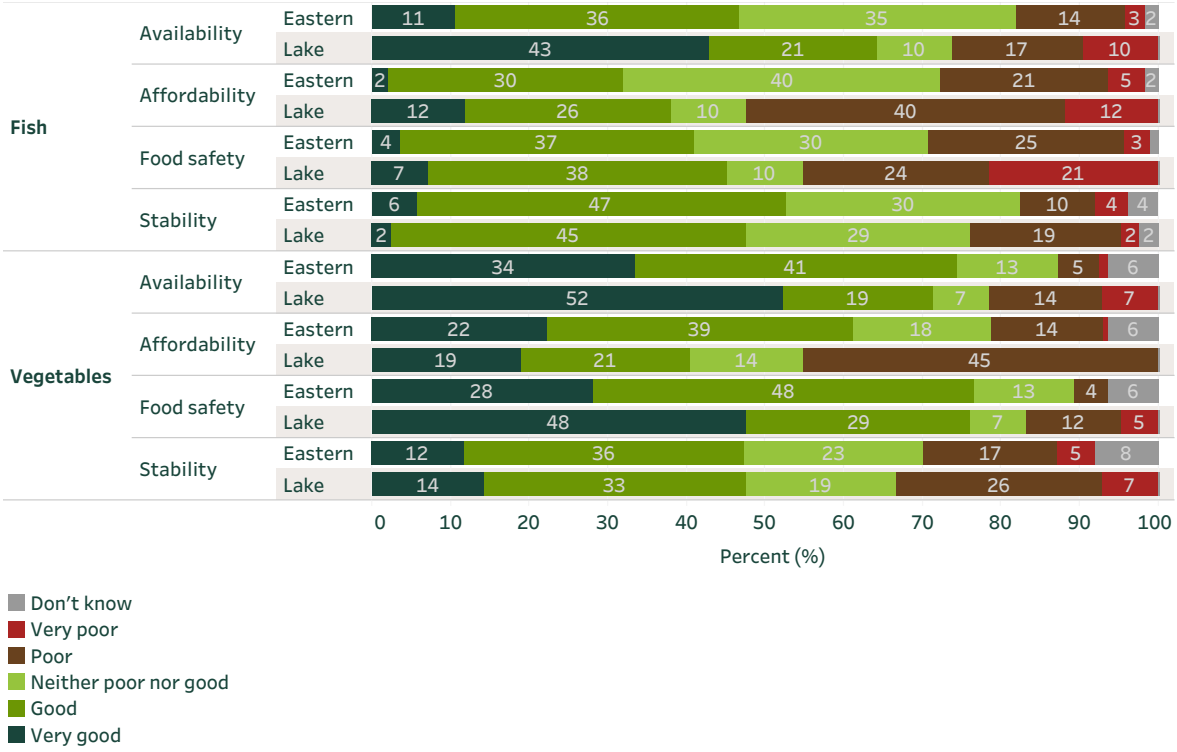
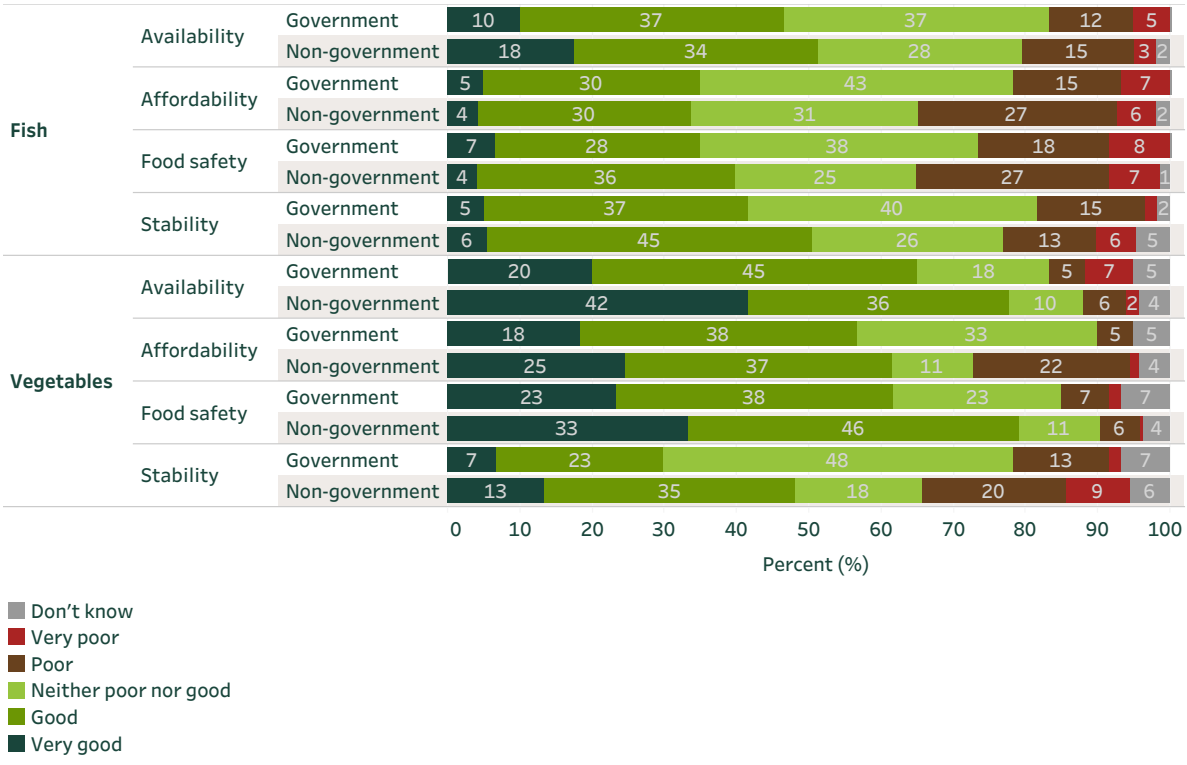


Figure 3. Status of fish and vegetables, disaggregated by subgroup

(a) By zone



(b) By government affiliation



3.1.2 Challenges for the affordability of fish and vegetables

In the spirit of the best-worst scaling approach to ranking preferences, respondents were asked to consider a list of nine challenges related to the affordability of fish or vegetables, in turn, and to select the three that were most and least serious/important. Responses of "most serious" were given a value of 1; responses of "least serious" were given a value of –1; and options that were not selected as either were given a value of 0. These values were then summed over the sample to arrive at an ordinal and cardinal ranking of these challenges.

The responses for fish are illustrated in Figure 4. The greatest perceived challenges (weighted similarly) were the high cost of inputs and equipment such as boats for fish capture or feed for fish farming, and the low productivity of fisheries. Other factors, such as the availability of infrastructure, were regarded as much less important. At the other end of the spectrum, the respondents considered the least serious challenges to include a lack of competition in the fish market and corruption along the value chain.

To compare the perceptions of different subsamples, the values were averaged within each group, resulting in a range from –1 (if all respondents in the group had selected a given option as least serious) to +1 (if all respondents had selected the option as most serious). These average values are presented for different categories, such as stakeholder group or gender, in Figure 5. While there is general alignment across the various stakeholder groups, some intriguing differences are evident. For example, representatives of the private sector, such as traders or processors, were more likely than other groups to prioritize the availability or high cost of electricity. Representatives of local government (ranging from region to district, ward, and even street level) were more likely than representatives of national government to identify the poor quality of infrastructure such as roads as a challenge for the affordability of fish. While all stakeholder groups tended to de-prioritize corruption as a challenge, representatives of civil society evidently view this (on average) as a more serious challenge than other options in the list. A disaggregation of all respondents by their government affiliation likewise indicates that representatives of government were much more likely to de-prioritize corruption as a challenge, whereas respondents who were outside of government held a more ambiguous view of corruption.

Figure 5 also highlights the views of respondents from the two zones for which our sample has considerable representation, namely the Eastern zone and the Lake zone. (Because other respondents are scattered throughout the 6 other zones in the country, we do not report on other zones.) Respondents from the Eastern zone were more likely than those from the Lake zone to view the availability, high cost, and poor quality of infrastructure as challenges, whereas those from the Lake zone were more likely to consider a lack of competition in the market as a challenge. This geographic difference may reflect different levels of infrastructure or diverging structures of the fish market in these two key settings for fish capture/production.

The survey asked a parallel set of questions for vegetables, and the responses of the full sample are presented in Figure 6, showing a somewhat different pattern than what was seen for fish. Now, while the high cost of inputs, such as fertilizer, other agro-chemicals, or seed, is widely viewed as a serious challenge for the affordability of vegetables, respondents were much less likely to view low productivity as a key challenge. Respondents were either more neutral about or more ambivalent about the level of competition in the vegetable market as a challenge for affordability. As with fish, corruption were not viewed as a critical challenge for the affordability of vegetables.

Across stakeholder groups, representatives of the private sector were more likely than other groups to consider formal taxes and other fees beyond production costs (such as Tanzania's vegetable cess (Nyange et al. 2014)) as an important challenge for the affordability of vegetables (Figure 7). Note that it is primarily traders who must pay the vegetable cess when transporting large volumes of vegetables between districts. Members of the private sector also place a greater emphasis on a lack of competition in the market, such as few vegetable sellers, and place greater weight on corruption as a challenge. Overall, it seems that traders/marketers view the functioning of vegetable markets as a problem. Farmers/producers were more likely to view low productivity on vegetable farms as a problem, compared to representatives of the non-farm private sector.

Across the two zones to which we give attention, respondents from the Lake zone were much more likely to view low productivity as a problem, compared to respondents from the Eastern zone. They were also *less* likely than their counterparts in the Eastern zone to view the availability, high cost, or quality of infrastructure as a problem. A comparison across men and women shows that women were more likely than men to view the availability or high cost of infrastructure, such as storage facilities, as a challenge. As will be discussed in section 3.1.6, this may be because women were more likely to engage in vegetable trade (both wholesale and retail).

Figure 4. Challenges for the affordability of fish

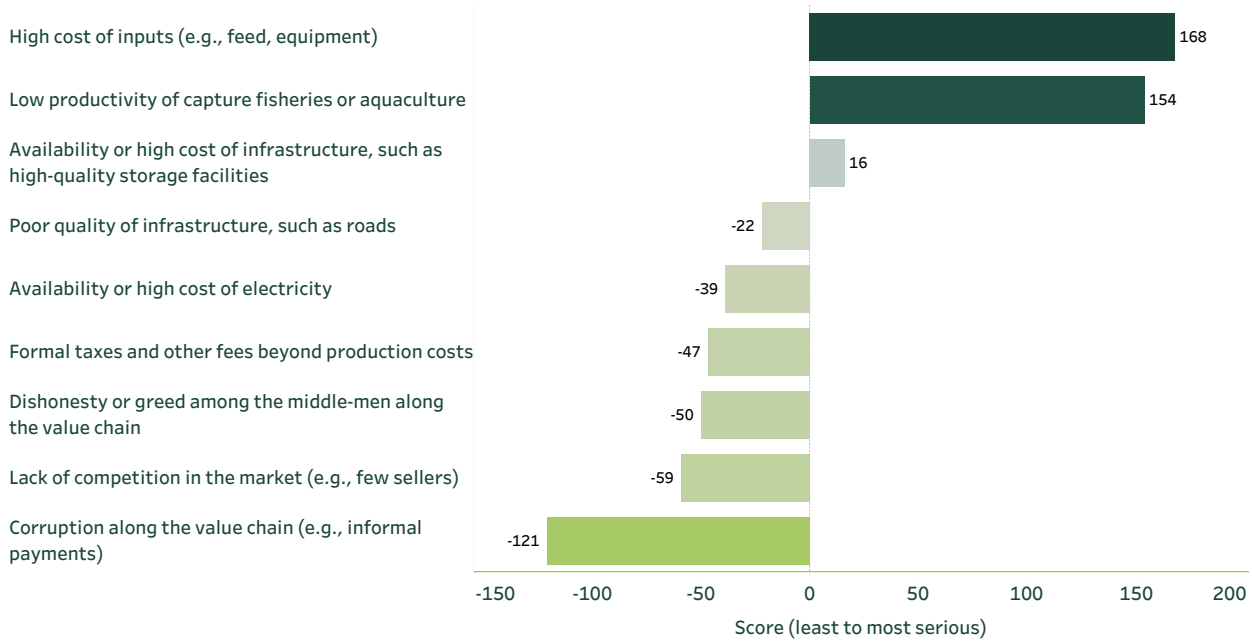


Figure 5. Challenges for the affordability of fish, disaggregated by subgroup

	Stakeholder group						Government affiliation		Fish value chain actor		Geography		Gender	
	Government (national)	Government (local)	Farmer/Producer	Industry/Private sector	Civil society/Donor	Research/Academia	Government	Non-government	Yes	No	Eastern	Lake	Women	Men
High cost of inputs (e.g., feed, equipment)	0.69	0.68	0.58	0.49	0.73	0.52	0.68	0.59	0.58	0.65	0.58	0.74	0.58	0.63
Low productivity of capture fisheries or aquaculture	0.77	0.64	0.63	0.44	0.70	0.28	0.67	0.53	0.62	0.48	0.60	0.57	0.56	0.56
Availability or high cost of infrastructure, such as high-quality storage facilities	0.54	-0.18	-0.22	0.24	0.20	0.34	-0.02	0.08	-0.06	0.20	0.06	-0.26	0.06	0.06
Poor quality of infrastructure, such as roads	-0.54	0.25	-0.01	-0.17	-0.20	-0.24	0.07	-0.12	-0.03	-0.14	-0.02	-0.26	-0.15	-0.04
Availability or high cost of electricity	-0.08	-0.32	-0.14	0.20	-0.40	-0.18	-0.26	-0.11	-0.14	-0.15	-0.15	-0.10	-0.07	-0.18
Formal taxes and other fees beyond production costs	-0.46	-0.18	-0.09	-0.27	-0.23	-0.02	-0.25	-0.15	-0.14	-0.21	-0.19	-0.05	-0.15	-0.18
Lack of competition in the market (e.g., few sellers)	-0.23	-0.18	-0.13	-0.17	-0.27	-0.28	-0.19	-0.22	-0.25	-0.17	-0.27	0.07	-0.13	-0.26
Dishonesty or greed among the middle-men along the value chain	-0.38	0.02	-0.14	-0.44	-0.33	-0.04	-0.07	-0.21	-0.12	-0.25	-0.18	-0.21	-0.21	-0.17
Corruption along the value chain (e.g., informal payments)	-0.31	-0.73	-0.49	-0.32	-0.20	-0.38	-0.63	-0.39	-0.46	-0.41	-0.44	-0.50	-0.50	-0.40

Note: With the exception of the disaggregation by status as a fish value chain actor, all respondents are included in this table. For example, the column for farmers/producers includes those who produce all products, and the column for private sector representatives includes those who trade/market all products.

Figure 6. Challenges for the affordability of vegetables

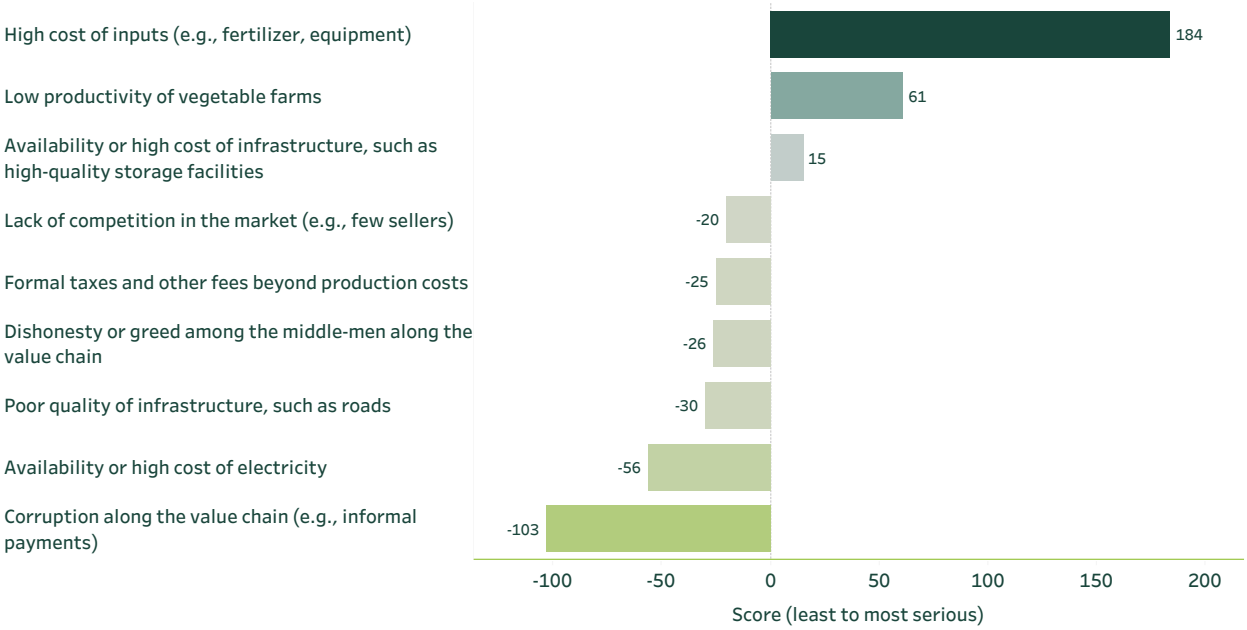


Figure 7. Challenges for the affordability of vegetables, disaggregated by subgroup

	Stakeholder group						Government affiliation		Geography		Gender	
	Government (national)	Government (local)	Farmer/ Producer	Industry/ Private sector	Civil society/Donor	Research/ Academia	Government	Non-government	Eastern	Lake	Men	Women
High cost of inputs (e.g., fertilizer, equipment)	0.69	0.70	0.68	0.66	0.60	0.62	0.70	0.66	0.65	0.71	0.69	0.63
Low productivity of vegetable farms	0.46	0.43	0.36	-0.29	0.40	0.20	0.44	0.16	0.11	0.57	0.25	0.17
Availability or high cost of infrastructure, such as high-quality storage facilities	0.31	-0.11	-0.11	-0.05	0.10	0.36	-0.02	0.07	0.14	-0.33	-0.05	0.23
Lack of competition in the market (e.g., few sellers)	-0.15	-0.09	-0.07	0.02	-0.07	-0.12	-0.11	-0.06	-0.08	0.07	-0.05	-0.12
Formal taxes and other fees beyond production costs	-0.08	-0.16	-0.24	0.29	-0.10	-0.22	-0.14	-0.08	-0.16	0.17	-0.06	-0.15
Dishonesty or greed among the middle-men along the value chain	-0.23	-0.20	-0.07	0.17	-0.17	-0.18	-0.21	-0.06	-0.04	-0.29	-0.14	-0.02
Poor quality of infrastructure, such as roads	-0.31	0.23	-0.02	-0.41	-0.20	-0.06	0.11	-0.16	-0.01	-0.45	-0.09	-0.14
Availability or high cost of electricity	-0.23	-0.32	0.05	-0.29	-0.37	-0.34	-0.30	-0.18	-0.23	0.00	-0.21	-0.20
Corruption along the value chain (e.g., informal payments)	-0.46	-0.48	-0.58	-0.10	-0.20	-0.26	-0.47	-0.35	-0.38	-0.45	-0.36	-0.40

3.1.3 Challenges for the safety of fish and vegetables

Respondents were next asked to consider a list of six challenges related to the food safety of fish and select the two most and two least serious challenges. Results for the safety of fish are presented in Figure 8. The greatest challenges were a lack of infrastructure to maintain food safety and food hygiene and the manner in which fish consume toxins or other dangerous substances. There was considerable agreement that weak food safety legislation is the *least* important challenge for food safety in fish. Dishonesty on the part of value chain actors (such as willfully selling spoiled or contaminated products) was also viewed as a less important challenge.

When responses are disaggregated by stakeholder group in Figure 9, diversity emerges in how various groups view the lack of knowledge regarding food safety. For example, representatives of national government and of industry seem to view this as a most important challenge, while fish producers and representatives of local government hold a very different view. The reason for this divergence may merit further exploration. When results are disaggregated by those who are and are not engaged in the fish value chain, it is noteworthy that those in the value chain do not tend to view a lack of food safety knowledge as a problem, while those outside the value chain were most likely to view this as a challenge. Across regions, respondents from the Lake zone tend to view a lack of infrastructure to maintain food safety as a more pressing problem, compared to respondents from Eastern zone.

A parallel set of questions were asked about vegetables, with results from the full sample shown in Figure 10. The most serious challenge to the safety of vegetables was considered to be unclean water used in irrigation. It follows that the environment in which crops are produced or (as seen earlier) fish are captured seems to place pressure on food safety in Tanzania. As with fish, dishonesty on the part of

food system actors was not regarded as a pressing challenge, nor was inadequate food safety legislation.

When these responses for food safety in vegetables are compared across stakeholder groups in Figure 11, the unusual pattern of priorities among representatives of the private sector stands out. They viewed lack of food safety knowledge as a key concern, or much greater importance than other stakeholder groups. Representatives of local government also tended to de-prioritize the challenge of weak food safety legislation to a greater extent than other groups; likewise, representatives of national government tended to de-prioritize the lack of food safety guidelines in informal markets. Interestingly, those engaged in the horticulture value chain placed more emphasis than others on the lack of food safety knowledge; an opposite pattern was seen with the fish value chain in Figure 9.

Figure 8. Challenges for the safety of fish

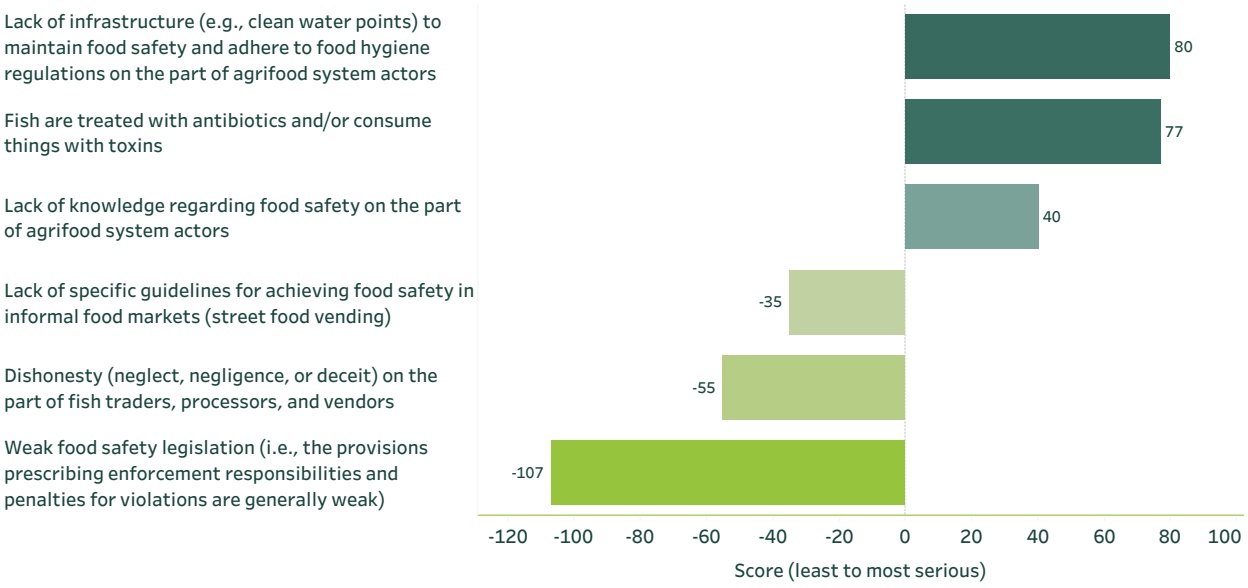


Figure 9. Challenges for the safety of fish, disaggregated by subgroup

	Stakeholder group						Government affiliation		Fish value chain actor		Geography		Gender	
	Government (national)	Government (local)	Farmer/ Producer	Industry/ Private sector	Civil society/Donor	Research/ Academia	Government	Non-government	Yes	No	Eastern	Lake	Women	Men
Fish are treated with antibiotics and/or consume things with toxins	-0.08	0.31	0.46	0.03	0.21	0.26	0.22	0.32	0.35	0.23	0.34	0.29	0.41	0.23
Lack of knowledge regarding food safety on the part of agrifood system actors	0.75	-0.18	-0.08	0.51	0.34	0.19	0.04	0.18	-0.09	0.47	0.12	0.05	0.18	0.14
Lack of infrastructure (e.g., clean water points) to maintain food safety and adhere to food hygiene regulations on the part of agrifood system actors	0.00	0.54	0.37	0.28	0.07	0.36	0.41	0.28	0.40	0.19	0.28	0.51	0.26	0.34
Weak food safety legislation (i.e., the provisions prescribing enforcement responsibilities and penalties for violations are generally weak)	-0.33	-0.54	-0.39	-0.31	-0.41	-0.43	-0.49	-0.39	-0.38	-0.45	-0.37	-0.56	-0.40	-0.42
Lack of specific guidelines for achieving food safety in informal food markets (street food vending)	-0.25	0.00	-0.15	-0.15	-0.14	-0.11	-0.06	-0.15	-0.10	-0.18	-0.17	-0.05	-0.23	-0.07
Dishonesty (neglect, negligence, or deceit) on the part of fish traders, processors, and vendors	-0.08	-0.13	-0.20	-0.36	-0.07	-0.28	-0.12	-0.24	-0.17	-0.27	-0.20	-0.24	-0.21	-0.21

Figure 10. Challenges for the safety of vegetables

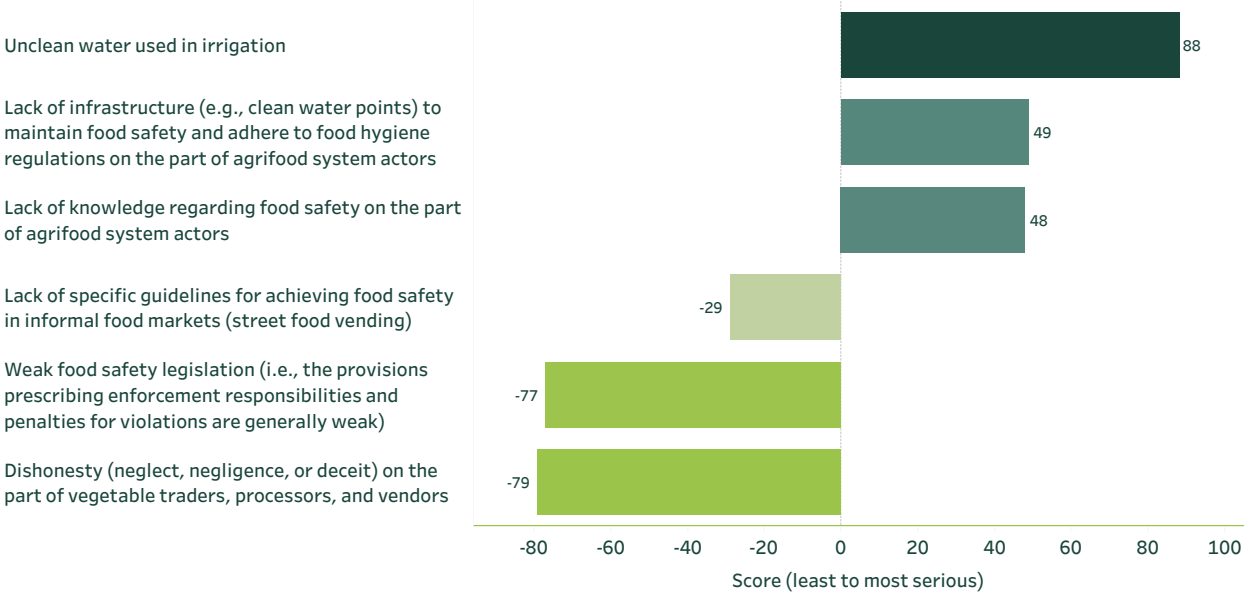


Figure 11. Challenges for the safety of vegetables, disaggregated by subgroup

	Stakeholder group						Government affiliation		Horticulture value chain actor		Geography		Gender	
	Government (national)	Government (local)	Farmer/Producer	Industry/ Private sector	Civil society/Donor	Research/ Academia	Government	Non-government	Yes	No	Eastern	Lake	Women	Men
Unclean water used in irrigation	0.38	0.41	0.48	0.02	-0.33	0.50	0.40	0.30	0.19	0.46	0.43	0.14	0.36	0.29
Lack of infrastructure (e.g., clean water points) to maintain food safety and adhere to food hygiene regulations on the part of agrifood system actors	0.31	0.34	0.28	-0.22	0.30	0.08	0.33	0.14	0.14	0.22	0.16	0.33	0.16	0.19
Lack of knowledge regarding food safety on the part of agrifood system actors	0.15	-0.16	-0.05	0.61	0.33	0.26	-0.09	0.24	0.30	0.03	0.14	0.17	0.15	0.19
Lack of specific guidelines for achieving food safety in informal food markets (street food vending)	-0.54	0.05	-0.11	-0.02	-0.13	-0.08	-0.09	-0.11	-0.07	-0.15	-0.15	0.00	-0.11	-0.10
Weak food safety legislation (i.e., the provisions prescribing enforcement responsibilities and penalties for violations are generally weak)	-0.15	-0.48	-0.32	-0.12	0.07	-0.34	-0.40	-0.25	-0.30	-0.25	-0.29	-0.40	-0.30	-0.26
Dishonesty (neglect, negligence, or deceit) on the part of vegetable traders, processors, and vendors	-0.15	-0.16	-0.28	-0.27	-0.23	-0.42	-0.16	-0.32	-0.26	-0.32	-0.29	-0.24	-0.25	-0.30

3.1.4 Efforts to improve the affordability and/or safety of fish and vegetables

After asking about challenges for the affordability and safety of fish and vegetables, the survey gathered preferences for potential solutions to these challenges. Specifically, the survey asked, "If the government could increase its spending on programs to improve the affordability and/or safety of fish (or vegetables) in Tanzanian markets, which of the following areas do you think should be the highest and lowest priority for additional investment?" From a list of nine options, respondents selected the three most important (highest priority) and three least important (lowest priority) interventions.

Results in Figure 12 for fish show that efforts to increase the productivity of fishers or fish farmers through research and/or training were regarded as the greatest priority. This was followed by efforts to provide subsidies or cash transfers to fishers/fish farmers and MSMEs post-production with the aim of improving productivity, reducing post-harvest losses, and/or adopting safety practices. The two least-prioritized options included efforts to address corruption the provision of hygiene-related infrastructure. One noteworthy difference from the results seen in Nigeria (Wineman and Liverpool-Tasie 2022) is that efforts to reduce bureaucracy along the supply chain was regarded as among the least important priorities in Nigeria but is ranked in the middle of this list in Tanzania. This may imply that bureaucracy is a larger problem in Tanzania, or, conversely, that agrifood stakeholders have greater faith in the potential to reduce bureaucracy.

The order of these priorities for fish is mostly consistent across stakeholder groups (Figure 13)—with some noteworthy exceptions. Acknowledging that we have just 13 observations of representatives of the national government, it is notable that these respondents placed a high value on infrastructure-based efforts to reduce food loss/waste (e.g., cold storage), an option that was not prioritized by other stakeholder groups. Representatives of local government placed greater weight on programs of oversight/monitoring of producers/fishers and MSMEs in the fish value chain. Producers (of all products, not only fish) particularly de-prioritized efforts to facilitate the marketing and trade of fish. The reasons for this may be worth exploring. Some differences also emerge in a comparison across respondents in the Eastern and Lake zones. Specifically, those from the Lake zone seem to especially de-prioritize the provision of hygiene-related infrastructure. (A negative average value that is relatively large in absolute

magnitude implies that respondents were mostly aligned in their selection of this option as among the *least* important programs.)

Results for vegetables are shown in Figure 14. Again, efforts to increase the productivity of vegetable farmers through research and/or training were regarded as the greatest priority, followed by the provision of subsidies or cash transfers for vegetable farmers and MSMEs post-production. As with fish, the two least-prioritized programs included efforts to address corruption and provide hygiene-related infrastructure. That corruption is perceived as least important seems to indicate that it is not a serious or burdensome problem in Tanzania. Overall, the ordering of priorities generally indicates that agrifood stakeholders value food affordability more than safety.

Across stakeholder groups, some interesting divergences emerge (Figure 15). For example, representatives of industry/the private sector were more likely than other groups to look favorably on the provision of hygiene-related infrastructure. Such infrastructure may be most relevant for traders/marketers who want to wash their products and dispose of waste. Nevertheless, it is not clear why this pattern was true for vegetables but not fish. Representatives of research/academia were more likely than other stakeholder groups to prioritize infrastructure-based efforts to reduce food loss. At the same time, this option was de-prioritized by farmers and representatives of local government. This may indicate that the focus of research on vegetable value chains is not aligned with the priorities of key value chain actors. Across geographic zones, respondents from Lake zone were much more unanimous in prioritizing efforts to increase the productivity of vegetable farms, whereas the priorities of respondents from Eastern zone were somewhat more diverse.

Figure 12. Programs to improve the affordability and/or safety of fish

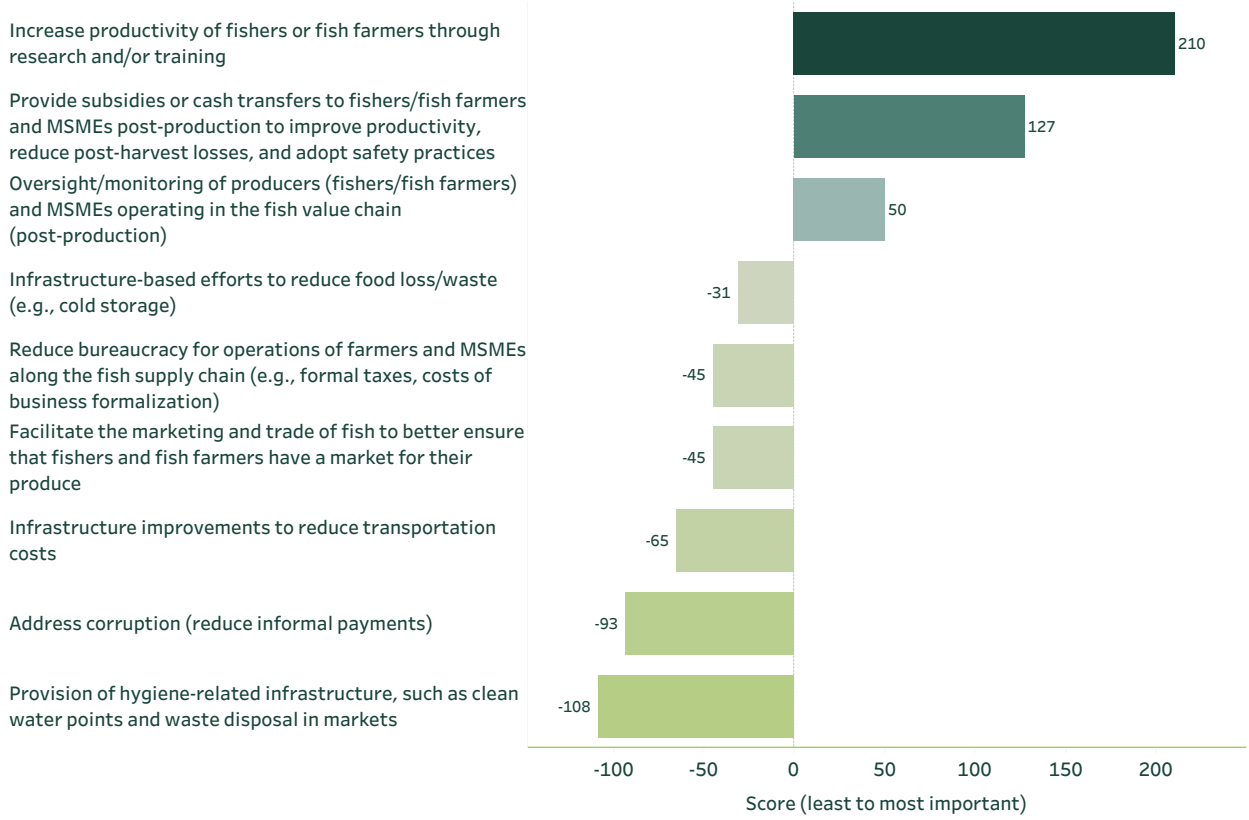


Figure 13. Programs to improve the affordability and/or safety of fish, disaggregated by subgroup

	Stakeholder group						Government affiliation		Fish value chain actor		Geography		Gender	
	Government (national)	Government (local)	Farmer/Producer	Industry/ Private sector	Civil society/Donor	Research/ Academia	Government	Non-government	Yes	No	Eastern	Lake	Men	Women
Increase productivity of fishers or fish farmers through research and/or training	0.69	0.84	0.91	0.61	0.47	0.72	0.81	0.75	0.72	0.81	0.78	0.88	0.74	0.80
Provide subsidies or cash transfers to fishers/fish farmers and MSMEs post-production to improve productivity, reduce post-harvest losses, and adopt safety practices	0.31	0.48	0.58	0.51	0.37	0.24	0.44	0.47	0.42	0.51	0.46	0.43	0.47	0.45
Oversight/monitoring of producers (fishers/fish farmers) and MSMEs operating in the fish value chain (post-production)	-0.31	0.59	0.39	0.10	-0.23	-0.08	0.39	0.13	0.28	0.06	0.28	0.10	0.10	0.32
Reduce bureaucracy for operations of farmers and MSMEs along the fish supply chain (e.g., formal taxes, costs of business formalization)	-0.38	-0.11	-0.06	-0.27	-0.13	-0.18	-0.18	-0.16	-0.16	-0.17	-0.22	0.05	-0.20	-0.10
Infrastructure improvements to reduce transportation costs	-0.54	-0.61	-0.22	-0.15	0.07	-0.14	-0.60	-0.14	-0.22	-0.25	-0.23	-0.36	-0.24	-0.24
Infrastructure-based efforts to reduce food loss/waste (e.g., cold storage)	0.69	-0.45	-0.27	0.00	0.10	0.04	-0.19	-0.09	-0.08	-0.16	-0.11	-0.21	-0.11	-0.11
Address corruption (reduce informal payments)	-0.38	-0.20	-0.28	-0.44	-0.17	-0.48	-0.25	-0.36	-0.36	-0.31	-0.38	-0.24	-0.30	-0.40
Facilitate the marketing and trade of fish to better ensure that fishers and fish farmers have a market for their produce	0.15	0.05	-0.41	-0.15	-0.20	0.08	0.07	-0.22	-0.21	-0.11	-0.25	0.10	-0.10	-0.27
Provision of hygiene-related infrastructure, such as clean water points and waste disposal in markets	-0.23	-0.57	-0.64	-0.22	-0.27	-0.20	-0.49	-0.37	-0.40	-0.38	-0.33	-0.74	-0.35	-0.46

Figure 14. Programs to improve the affordability and/or safety of vegetables

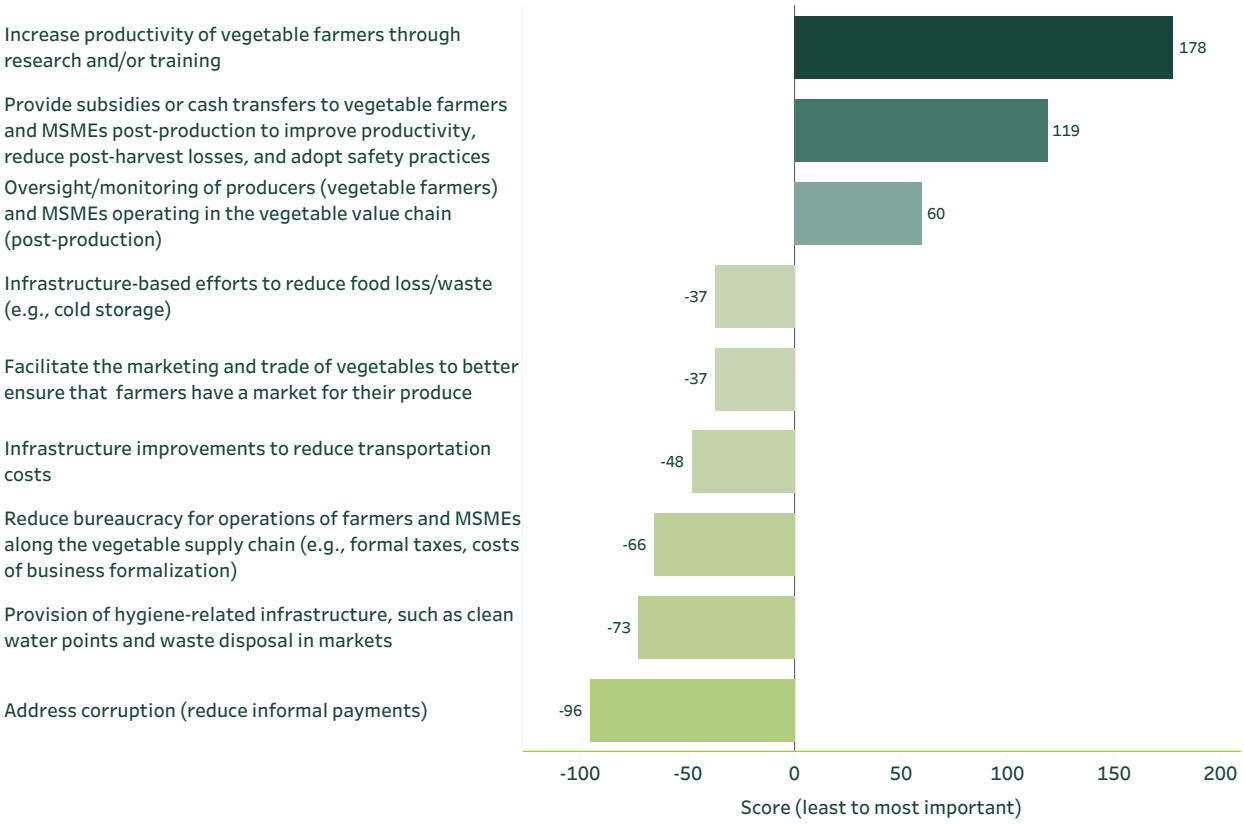


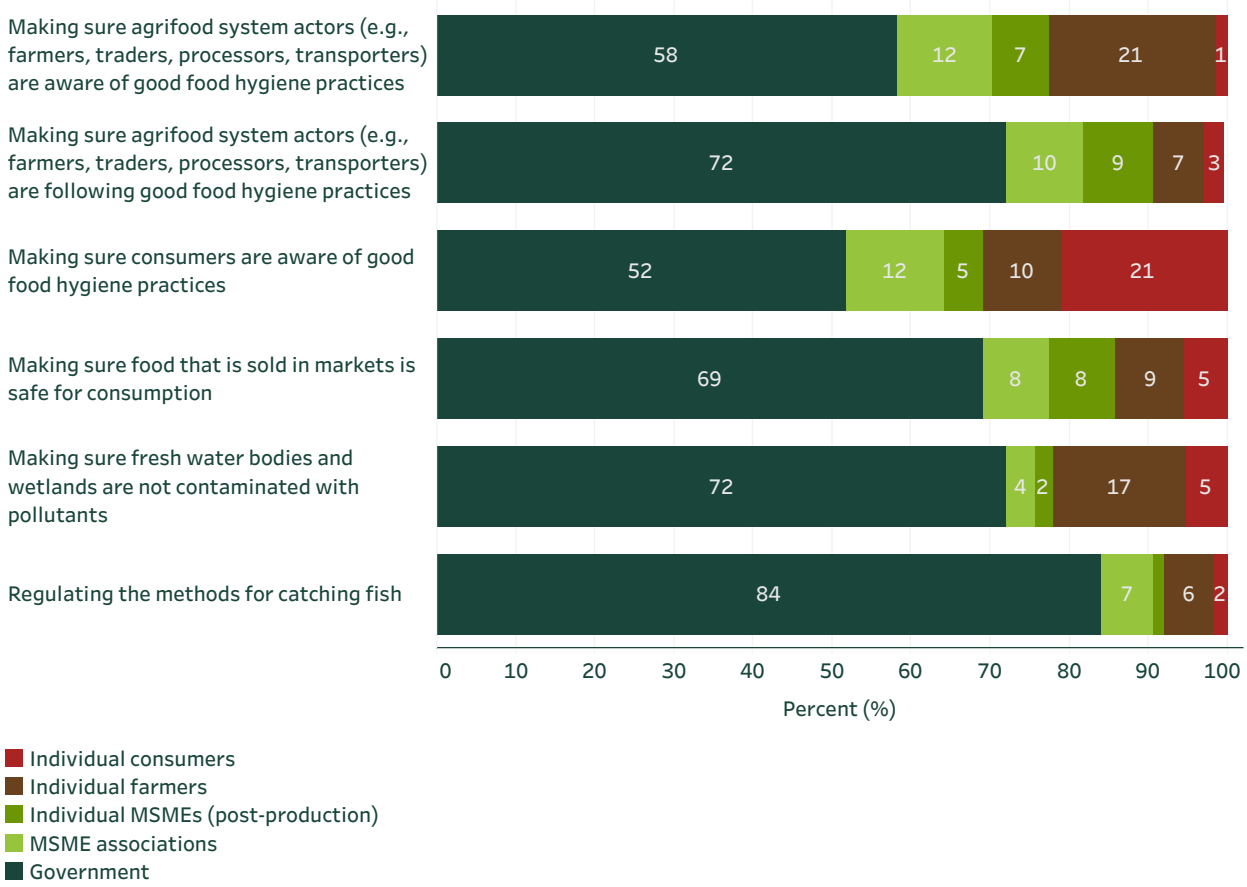
Figure 15. Programs to improve the affordability and/or safety of vegetables, disaggregated by subgroup

	Stakeholder group						Government affiliation		Horticulture value chain actor		Geography		Gender	
	Government (national)	Government (local)	Farmer/ Producer	Industry/ Private sector	Civil society/Donor	Research/ Academia	Government	Non-government	Yes	No	Eastern	Lake	Men	Women
Increase productivity of vegetable farmers through research and/or training	0.54	0.75	0.83	0.22	0.37	0.74	0.70	0.63	0.73	0.55	0.59	0.88	0.63	0.67
Provide subsidies or cash transfers to vegetable farmers and MSMEs post-production to improve productivity, reduce post-harvest losses, and adopt safety practices	0.38	0.61	0.66	0.27	0.10	0.14	0.56	0.40	0.49	0.37	0.46	0.33	0.40	0.49
Oversight/monitoring of producers (vegetable farmers) and MSMEs operating in the vegetable value chain (post-production)	0.15	0.34	0.53	-0.24	-0.07	0.08	0.30	0.20	0.24	0.19	0.31	0.07	0.14	0.35
Facilitate the marketing and trade of vegetables to better ensure that farmers have a market for their produce	-0.15	-0.07	-0.40	-0.05	0.13	0.04	-0.09	-0.15	-0.06	-0.22	-0.22	0.07	-0.09	-0.22
Infrastructure-based efforts to reduce food loss/waste (e.g., cold storage)	0.00	-0.25	-0.33	-0.05	0.00	0.22	-0.19	-0.12	-0.22	-0.04	-0.13	-0.14	-0.06	-0.26
Infrastructure improvements to reduce transportation costs	-0.15	-0.48	-0.11	0.05	-0.07	-0.28	-0.40	-0.11	-0.30	-0.03	-0.19	-0.07	-0.17	-0.19
Reduce bureaucracy for operations of farmers and MSMEs along the vegetable supply chain (e.g., formal taxes, costs of business formalization)	-0.46	-0.20	-0.25	-0.20	-0.17	-0.22	-0.26	-0.23	-0.23	-0.25	-0.24	-0.24	-0.25	-0.22
Provision of hygiene-related infrastructure, such as clean water points and waste disposal in markets	0.08	-0.55	-0.58	0.22	-0.07	-0.16	-0.40	-0.23	-0.31	-0.22	-0.26	-0.45	-0.28	-0.25
Address corruption (reduce informal payments)	-0.38	-0.16	-0.35	-0.22	-0.23	-0.56	-0.21	-0.38	-0.33	-0.37	-0.32	-0.45	-0.33	-0.38

3.1.5 Responsibilities in management of the food system

For a set of governance functions in the agrifood system, the survey gathered views on what entity (or who) should be primarily responsible. The options included government, MSME associations, individual MSMEs (post-production), individual farmers, individual consumers, and an "other" option where respondents could specify any other entity. Results for the full sample are presented in Figure 16. The government is viewed as most responsible for all functions, although there is some variation. For example, 84% of respondents thought the government is most responsible for regulating the methods of fish capture, and 72% thought the government is most responsible for making sure practices of food hygiene are followed by food system actors. On the other hand, just 52% thought that government is most responsible for consumers' awareness of food hygiene; awareness is more likely to be viewed as an individual responsibility, i.e., for individual farmers or consumers. Overall, MSME associations do not seem to be viewed as particularly responsible for various functions such as ensuring that food sold in markets is safe for consumption. The role of MSME associations in Tanzania, and their potential for a greater role, is perhaps a topic worthy of attention.

Figure 16. Entities that should be primarily responsible for different functions



3.1.6 Roles of women and men in the food system

To understand the roles of women and men in the value chains for fish and vegetables in Tanzania, respondents were asked to consider various functions along each value chain and specify whether they thought women or men were more engaged or whether they were equally engaged. Results are presented in Figure 17. Across the full sample (and as had been found in Nigeria (Wineman and Liverpool-Tasie 2022), men were viewed as being more engaged in the provision of inputs for production (for both fish and vegetables) and far more engaged in the production of fish. Specifically, 93% of respondents perceived that men were more engaged than women in capture fisheries. Men were also far more engaged in transport for fish (79%) and vegetables (52%). On the other hand, women were viewed as being more engaged than men in the retailing of fish (60%) and vegetables (67%). Women seem to be more likely to be engaged in all nodes of the vegetable value chain compared to fish. For example, while 37% of respondents thought that women were more engaged than men in vegetable wholesale trading (and 36% thought men and women were equally engaged), just 11% thought women were more engaged than men in fish wholesale trading (and 34% thought men and women were equally engaged). Almost half (47%) of respondents thought women were more engaged than men in vegetable production, while just 24% thought men were more engaged than women.

These responses are disaggregated by gender of the respondent in Figure 18. In a pattern that was also evident in Nigeria (Wineman and Liverpool-Tasie 2022), women were slightly more likely to perceive a larger role for women across various nodes of the two value chains. For example, 58% of men and 64% of women thought that women were more engaged than men in fish retailing. However, there were

some notable exceptions. For example, 26% of women and 43% of men thought that women were more engaged than men in vegetable wholesale. The reasons for this divergence in perception may merit exploration.

Figure 17. Roles of men and women in the fish and vegetable value chains

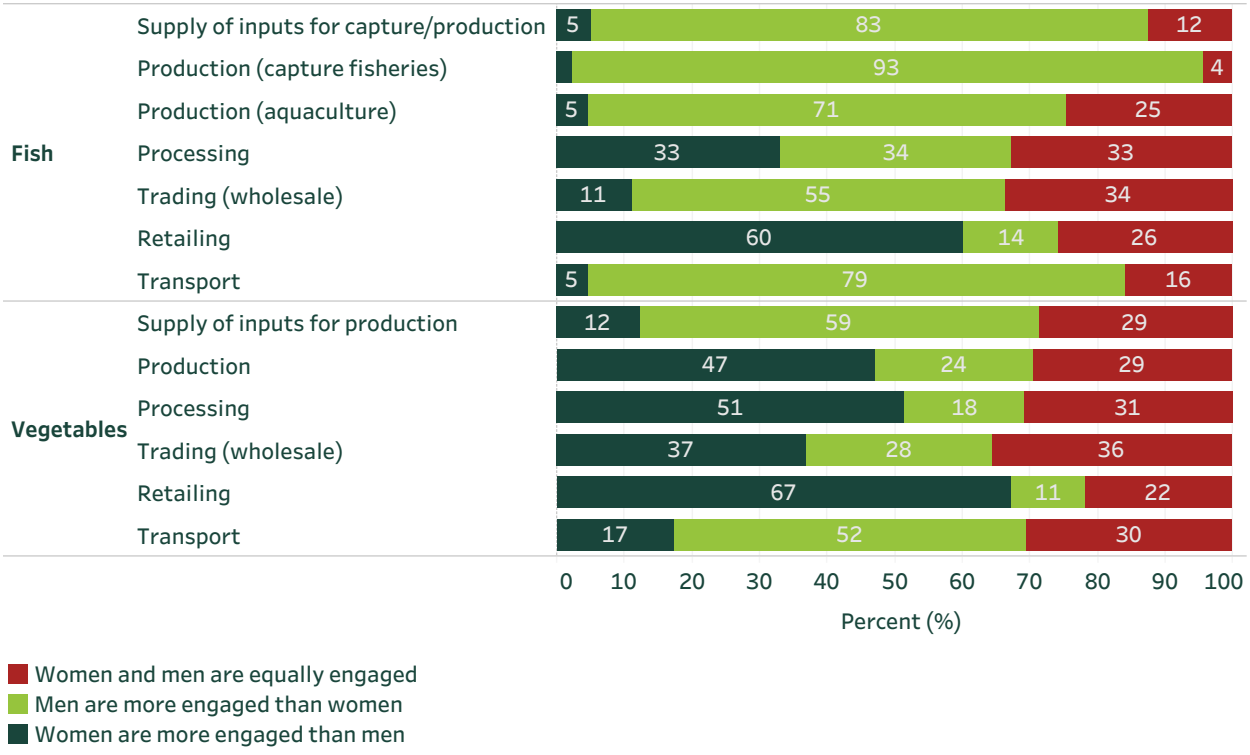
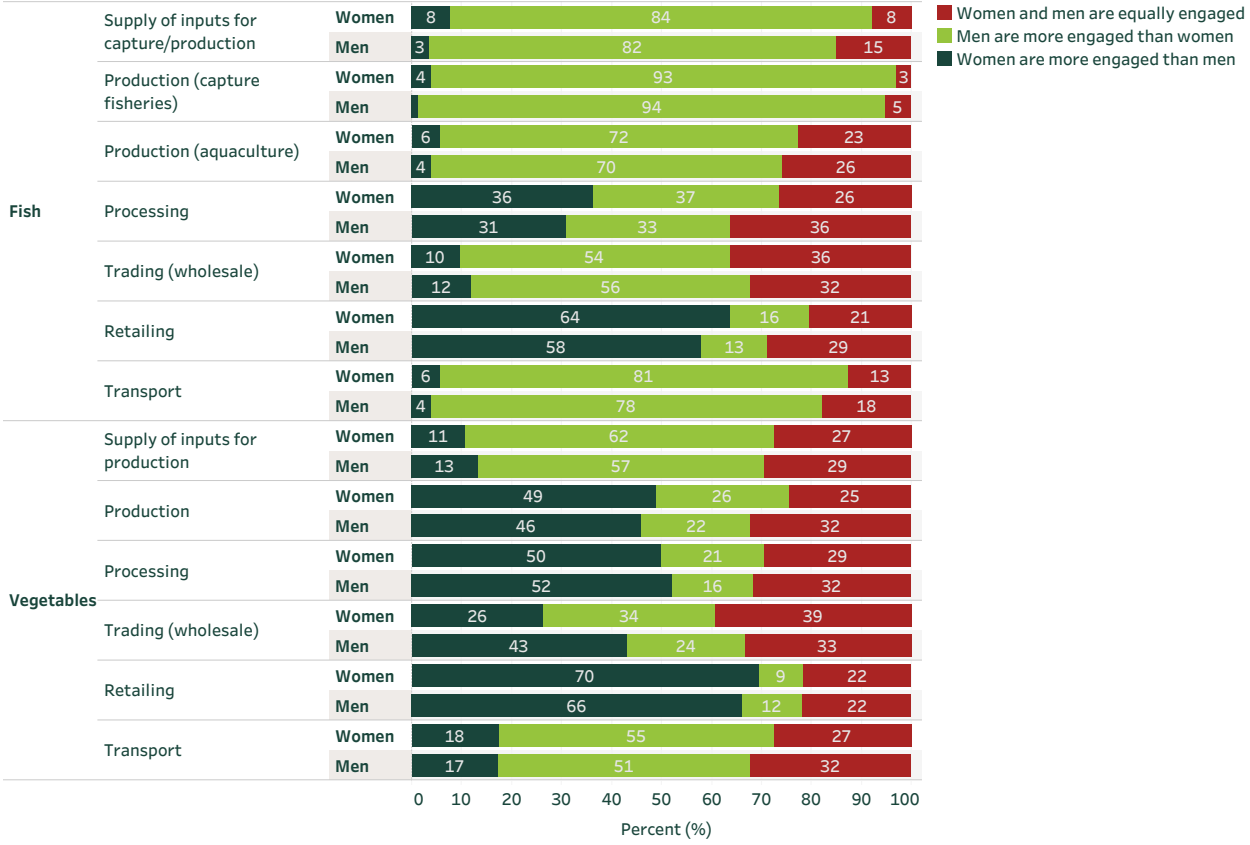


Figure 18. Roles of men and women in the fish and vegetable value chains, disaggregated by gender of respondent



3.2 Perceptions of legislation and government-led activities

In addition to capturing perceptions of the agrifood system in Tanzania, the survey also aimed to capture the level of respondents' familiarity with key pieces of relevant legislation. These policies and bills are listed in Figure 19. A fairly small share (13–29%) of respondents characterized themselves as "very familiar" with any policy/bill. The National Environmental Policy (2021) claimed the greatest level of familiarity, with 71% of respondents either "very familiar" or "somewhat familiar" with the legislation. This value was at least 65% for the Agricultural Sector Development Program II (ASDP II), the National Agricultural Policy (2013), and the Food Safety Act. Respondents tended to be least familiar with the Tanzania Finance Act of 2022 (with 44% reporting that they were "not at all familiar") and the National Multi-sectoral Nutrition Action Plan (2016-2021; 2021-2026). While it is not expected that all agrifood stakeholders would be familiar with all pieces of legislation, these findings may indicate a need for greater sensitization so stakeholders of various types can aim to influence and interact with policies that are likely relevant for their activities and priorities.

Respondents who claimed at least some familiarity with each policy or bill were then asked to evaluate the extent to which the policy/bill provides support for agrifood MSMEs (Figure 20). Among respondents that were familiar with each policy/bill, 44–73% felt that support for MSMEs was adequate. Notably, 73% seemed satisfied with the Micro, Small, and Medium Enterprise Policy (2021-2025), and just 15% thought it did not provide adequate support for MSMEs. The broad vote of confidence in this policy (among those who were familiar with it) may merit an examination of why this policy is perceived to work well, and how the policy was crafted to bring about a fairly positive result. On the other hand, the

Agricultural Marketing Policy (2008) is rated poorly, with just 45% of respondents reporting that it provides MSMEs with adequate support; the reasons for such a dim view of this policy ought to be explored.

Figure 19. Familiarity with agrifood policies

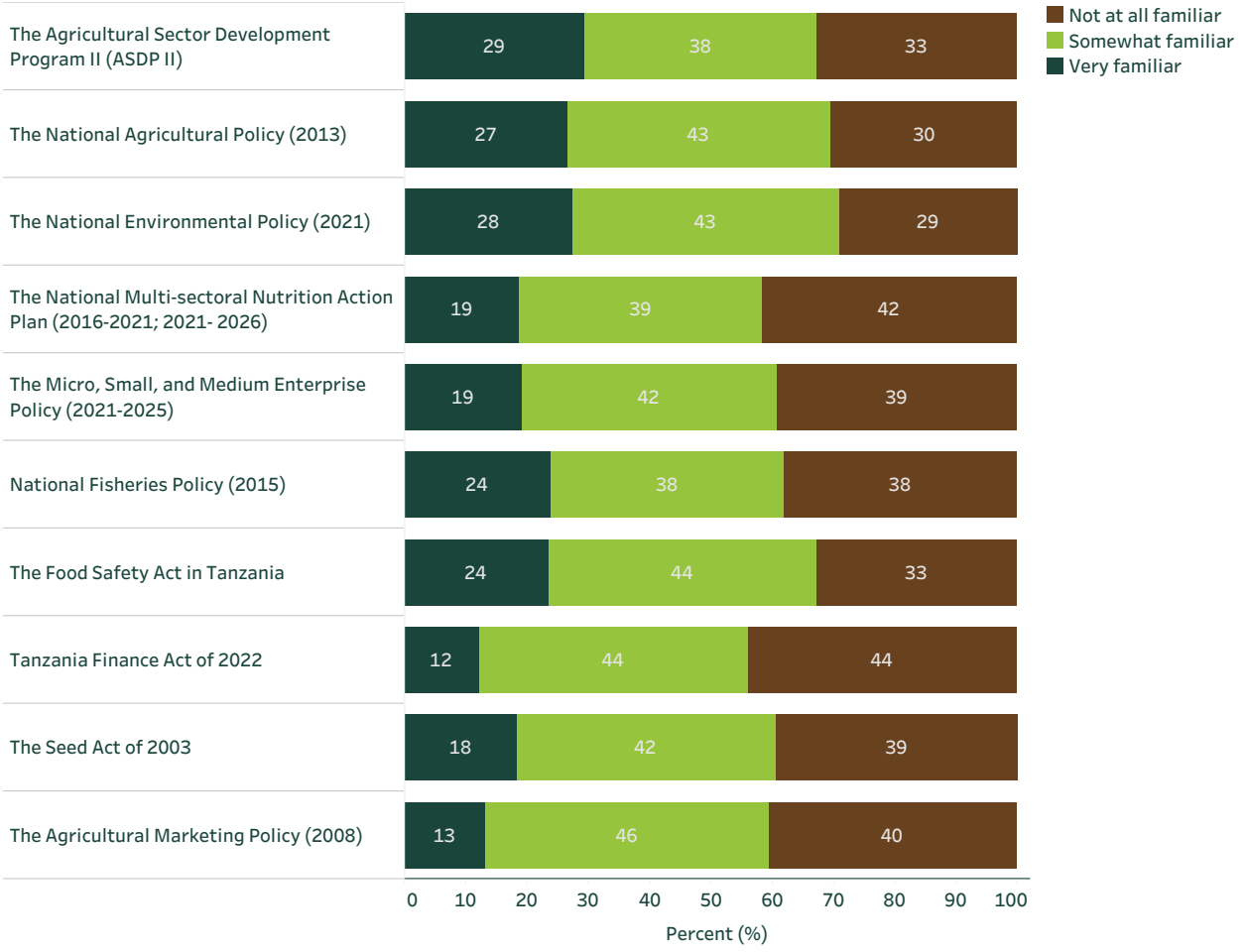
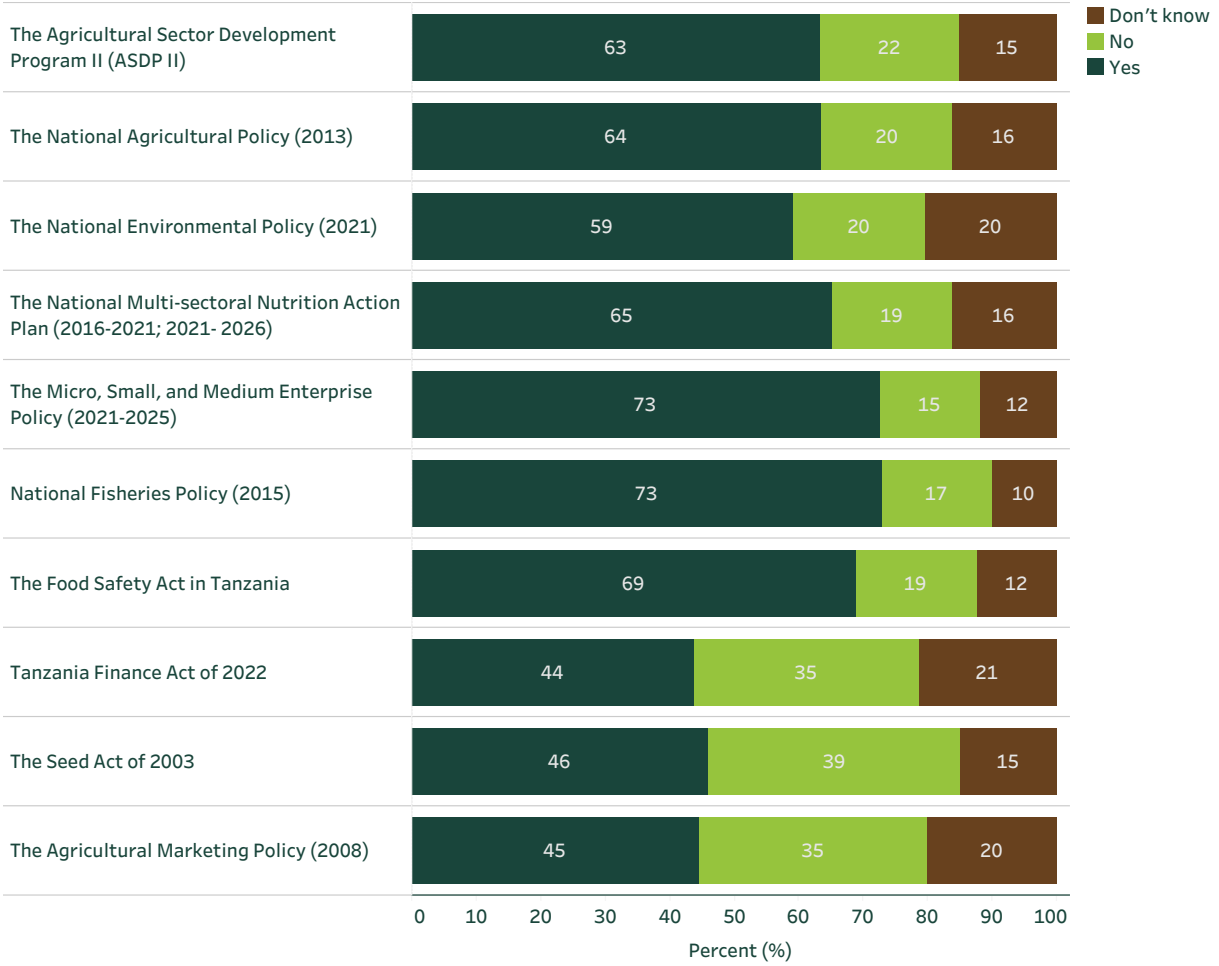


Figure 20. Perceptions of support for MSMEs within agrifood policies



Note: These values are defined only for respondents that were at least "somewhat" familiar with each policy/bill.

4. Discussion

4.1 Overarching themes

This stakeholder perceptions survey aimed to discern how agrifood stakeholders in Tanzania perceive the state of their food system, with a focus on the value chains for fish and vegetables. The questionnaire elicited priorities related to challenges in these value chains, as well as possible solutions to these challenges. Several overarching themes can be drawn from the results.

One theme is the extent to which modern markets are anticipated to become increasingly important in Tanzania. Notably, this is the case when referring to the role of modern markets as a source of both safe and affordable foods (Figure 1, Panels A and B). This likely has implications for whether and how fish and vegetables can be made more affordable and safer in the coming years. Nevertheless, perspectives on this topic do vary across respondents with different levels of education, loosely suggesting that modern markets may play a smaller role in food access within lower-income communities. Another important theme is the extent to which agrifood stakeholders in Tanzania expect the government to assume responsibility for various functions, including oversight of food hygiene and environmental protection (Figure 16). This likely reflects the strong role of the state in Tanzania's history

and present-day agrifood economy (Cooksey 2011). However, the limited role assigned to MSME associations may be a topic worthy of attention, particularly as they may have potential to play a larger role.

Although stakeholders judged the status of fish and vegetable markets to differ in terms of availability, affordability, safety, and stability (Figure 2), they often ranked the challenges and potential solutions for affordability and safety in a similar way. For both fish and vegetables, the high cost of inputs for production was regarded as the greatest challenge for affordability (Figure 4 and Figure 6). In terms of efforts to improve affordability and/or food safety, the greatest priorities for both fish and vegetables were interventions to raise the productivity of producers through research and/or training and the provision of subsidies or cash transfers for producers and post-production MSMEs. While this alignment across the two perishable products may point to some synergies in programs or investments, an intervention such as research/training cannot easily be shared across products (unlike improved infrastructure, which could plausibly benefit both value chains).

When respondents considered the priorities of food affordability and safety, they seemed to prefer efforts to bring down prices rather than improve safety (as was also seen in Nigeria (Wineman and Liverpool-Tasie 2022). Thus, among a list of programs that could address either issues of food safety/food hygiene or affordability, respondents prioritized those aimed at affordability (i.e., increasing productivity or providing subsidies) rather than those aimed at monitoring food system actors or providing hygiene-related infrastructure (Figure 12 and Figure 14). For fish, the provision of hygiene-related infrastructure was even deemed the *least* important intervention among the list of options (Figure 12). This is likely indicative of the stress felt by low-income consumers who are worried that they cannot even access nutritious foods, with food safety deemed a lower-order concern. The relative de-emphasis of food safety and hygiene indicates that greater sensitization is needed around these topics, which are pressing concerns in Tanzania (Gaspare et al. 2009; Van der Maden et al. 2021; Wenaty et al. 2019). This has implications for the potential role of the RSM2SNF project. Notably, Tanzanians may not be receptive to this message if efforts to improve food hygiene/safety would be expected to inflate food prices.

Overall, corruption seems to be regarded as less urgent than other concerns in Tanzania. As efforts to address corruption (and, a lesser extent, efforts to reduce bureaucracy) were generally not prioritized by agrifood stakeholders. Corruption along the value chain (e.g., informal payments) was deemed the least important challenge for affordability of both fish and vegetables, while formal taxes and other fees beyond production costs were positioned in the middle of the list of challenges (Figure 4 and Figure 6). Among the challenges for food safety, dishonesty (neglect, negligence, or deceit) on the part of traders, processors, and vendors was the least important challenge for vegetables and the second least important challenge for fish (Figure 8 and Figure 10). Likewise, efforts to address corruption were among the least prioritized interventions to improve the affordability and/or safety of both fish or vegetables, while efforts to reduce bureaucracy were ranked somewhere in the middle or towards the bottom of the list (Figure 12 and Figure 14). This does not automatically imply that corruption is not a concern in Tanzania; rather, with a focus on the fish and vegetable value chains, it seems to be far less of a concern than other issues.

4.2 Differences by product

Respondents were asked to consider differences between the value chains/markets for fish and vegetables in Tanzania. Overall, respondents seemed to feel that vegetables were more available, affordable, and safer than fish (Figure 2). One might therefore expect that the reported challenges for affordability and safety would differ markedly across these two products; however, the differences were

subtle. When considering challenges for affordability, respondents did not feel that a lack of competition in the market for fish was a problem (Figure 4); however, this challenge was viewed as somewhat of a greater priority for vegetables (Figure 6). The reason for this divergence across products merits attention. Challenges for the safety of fish and vegetables also differ somewhat, with the presence of toxins relevant for fish, while the use of unclean water for irrigation was viewed as highly relevant for vegetables (Figure 8 and Figure 10). In both cases, however, it is at least partly the quality of the environment that affects food safety. One last point of divergence is that those engaged in the horticulture value chain tended to prioritize a lack of food safety knowledge as a challenge for food safety in vegetables (Figure 11), while an opposite pattern was seen with actors in (and out of) the fish value chain (Figure 9).

When considering interventions to address challenges for affordability and safety in the fish and vegetable value chains, a difference emerges around support for the provision of hygiene-related infrastructure. Specifically, for vegetables, representatives of industry/the private sector were more likely than other groups to prioritize hygiene-related infrastructure, which may be most relevant for traders/marketers. However, the same pattern was not seen for fish. Overall, there was more convergence than divergence in perceptions of the value chains for these two nutritious but highly perishable products.

4.3 Differences by stakeholder group

The sample included producers as well as representatives of the post-production private sector, multiple levels of government, research/academia, and civil society. This breadth allows for a comparison of perceptions and priorities across stakeholder groups, with several noteworthy findings.

Particularly for vegetables, when respondents were asked to rank the markets for fish and vegetables with regard to their availability, affordability, safety, and stability, we noted some divergence between the perceptions of respondents who were affiliated with government and those who were not–especially in regard to vegetables. Specifically, those who were not in government viewed the market for vegetables more favorably (Figure 3, Panel B). As noted earlier, representatives of government may be more likely to be based in Eastern zone or Central zone (which contains Dodoma, the capital), and their views of the markets for fish and vegetables may reflect their particular geographies. The precise reason for this divergence in views merits exploration.

Some interesting differences across stakeholder groups emerged around the topic of corruption (informal payments). For examples, compared to other groups, representatives of civil society viewed corruption as a more serious challenge (on average) for the affordability of fish, with a similar (though less stark) pattern seen for vegetables (Figure 5 and Figure 7). Likewise, representatives of government tended to de-prioritize corruption as a challenge for affordability of fish, while others held a more neutral or ambivalent view. Given these points of divergence, it would be interesting to understand who other groups, such as representatives of the private sector or civil society, view as responsible for corruption. Interesting patterns are also evident around the topic of formal taxes/fees. Specifically for vegetables, representatives of the private sector were more likely than others to see formal taxes/fees as a significant challenge for the affordability of vegetables (Figure 7). As noted earlier, it is primarily traders who must pay the vegetable cess when transporting vegetables across district lines (Nyange et al. 2014), and traders' ranking of priorities may reflect the burden of this cess and their awareness of how the tax is passed along to consumers.

Farmers/producers were more likely to view low productivity on vegetable farms as a problem, compared to representatives of the non-farm private sector (Figure 7 and Figure 15). As respondents

are expected to care more about challenges that affect their own welfare, this is not surprising. However, this divergence is particularly interesting in light of a recent analysis from India on the impact of greater vegetable productivity on vegetable availability in retail markets (Spiker et al. 2023). The authors concluded that improved on-farm productivity could potentially exacerbate postharvest losses, with results that offset or even worsen the situation in retail markets. Altogether, the focus on the production node of the fish and vegetable value chains (as shown clearly in Figure 12 and Figure 14) may reflect some path dependency in thinking about the food system, with attention heavily skewed toward production rather than other nodes of the value chain. The priorities of stakeholders came through clearly in this survey; additional research is perhaps still needed to understand whether this is an accurate view of the drivers of food affordability.

Some variation is seen across stakeholder groups around the relevance of food safety knowledge to food safety outcomes. For example, representatives of the private sector and of national government tended to view food safety knowledge as a very important challenge to food safety in fish, while producers and representatives of local government disagreed (Figure 9). For vegetables, representatives of the private sector similarly viewed a lack of food safety knowledge as a key concern (though now representatives of national government were less aligned) (Figure 11). This could result in a misalignment of government priorities if the private sector desires more food safety knowledge while representatives of local government and even civil society place less weight on this driver of food safety.

For the fish value chain, representatives of local government placed greater weight than others on programs of oversight/monitoring of producers/fishers and MSMEs in the fish value chain, while producers particularly de-prioritized efforts to facilitate the marketing and trade of fish. For the vegetable value chain, representatives of research/academia were more likely than others to prioritize infrastructure-based efforts to reduce food loss. It therefore seems there is some divergence between how different groups think the various challenges should be prioritized and approached.

4.4 Differences by geography

Although this sample cannot be used to explore geographic differences across the whole country, we have been able to compare the perspectives of respondents across two parts of the country that are of particular interest to the RSM2SNF project, namely the Eastern and Lake zones. Overall, respondents from the Lake zone viewed the availability of both fish and vegetables more favorably than their counterparts from the Eastern zone (Figure 3, Panel A). As noted, this may reflect the significance of Lake Victoria to the local economy, as well as a rainfall pattern in the north that ensures crops can be grown through two seasons each year. In terms of the affordability of both fish and vegetables, respondents from the Eastern zone were more likely than those from the Lake zone to view the availability, high cost, and poor quality of infrastructure as challenges (Figure 5 and Figure 7). Nevertheless, when it comes to challenges for food safety, respondents from the Lake zone seemed to view a lack of infrastructure to maintain food safety as a more pressing problem (Figure 9). The reasons for these differences across geographies, as well as the differences in the role of infrastructure for affordability and safety, may merit further exploration.

In terms of interventions that can potentially address the challenges to the affordability and/or safety of fish, respondents from the Lake zone seemed to especially de-prioritize the provision of hygiene-related infrastructure (Figure 13). (Note that they seemed to view hygiene-related infrastructure as important for food safety; their de-prioritization in Figure 13 is more likely to reflect the de-prioritization of food safety relative to affordability.) For vegetables, respondents from Lake zone were united in prioritizing efforts

to increase the productivity of vegetable farms, while the priorities of respondents from Eastern zone were somewhat more diverse.

4.5 Differences by gender

The survey surfaced some small differences in how women and men view and experience the agrifood system. For example, compared to female respondents, male respondents seemed to expect modern markets to play a larger role in Tanzania in the coming decade (Figure 1, panels A and B). However, in most cases, women and men seemed to share a similar view of the value chains for fish and vegetables.

As seen in Figure 17, women and men in Tanzania were viewed as having distinctly different roles in the value chains for fish and vegetables. Men seem to be more engaged in the provision of inputs for production (for both fish and vegetables) and far more engaged in the production of fish. On the other hand, women were viewed as being more engaged than men in the retailing of fish and vegetables, and almost half of respondents thought women were more engaged than men in vegetable production. Overall, women seem to be more engaged in all nodes of the vegetable value chain compared to fish. This has implications for the RSM2SNF project, which aims to understand gendered patterns in the midstream and downstream of agrifood value chains and aims to be purposeful in accounting for gender in the specification of research questions.

4.6 Comparison with stakeholder perceptions in Nigeria

Across a number of axes, the perceptions of agrifood stakeholders in Tanzania align with those of stakeholders in Nigeria (Wineman and Liverpool-Tasie 2022). In both countries, respondents judged the market for vegetables to be more favorable (in terms of availability and affordability) than the market for fish. In both countries, respondents seemed to prefer interventions that would bring down food prices rather than improve food safety. In both countries, the high cost of inputs for production/capture was regarded as a large challenge for the affordability of fish and vegetables. Along the same lines, there was a heavy emphasis on the costs of inputs and a lesser focus on post-production challenges (e.g., post-production food losses). In both countries, women and men were viewed as having distinct roles in the value chains for fish and vegetable, with men more engaged in the provision of inputs for production and in the production of fish, while women were relatively more engaged in the production and processing of vegetables and the retailing of both fish and vegetables. Nevertheless, the stories in these two countries differ in other ways: Security concerns are prevalent in Nigeria, while these were considered so much less salient in Tanzania that the topic was removed when the survey was administered in Tanzania. Moreover, whenever responses were disaggregated by subpopulation, the unique context of Tanzania emerges as an explanation for the diversity in perspectives found within the Tanzania sample.

5. Conclusion

Results of the RSM2SNF stakeholder perceptions survey, conducted in mid-2023, paint a detailed picture of the fish and vegetable value chains in Tanzania. These insights will inform the design of the RSM2SNF project, which aims to build knowledge and capacity around how MSMEs in the Tanzanian food system can be supported to provide affordable, safe, and nutritious foods. Several examples of practical implications (among others) are enumerated below.

1. The survey revealed a preference for government efforts to bring down food prices (e.g., via efforts to improve productivity or subsidies to lower production costs) rather than specifically to

improve food safety (e.g., via improved monitoring of food system actors and provision of hygiene-related infrastructure). Efforts to address food hygiene/food safety should ideally not raise the price of food. The RSM2SNF project should look for win-win (or neutral-win) opportunities when thinking about how food safety can be improved.

2. Nevertheless, food safety and hygiene are pressing concerns in Tanzania. This issue is only growing in importance as chemicals are increasingly used in production/capture and food preservation of both fish and vegetables. This indicates that greater sensitization may be needed around the importance of food safety and hygiene; RSM2SNF will work to provide this sensitization and convey the implications of poor food safety for health and productivity. The potential tension between an imperative to improve food safety and reduce both pre- and post-harvest food loss will need to be acknowledged.

3. There is a dominant perception that the high cost of inputs and fishing equipment is a major challenge for food affordability in Tanzania, while less concern is directed toward post-production food loss as a driver of high food prices. Additional research is needed to understand whether this perception is an accurate view of the cost build-up along the fish and vegetable value chains. RSM2SNF will pursue this research, giving attention to the full length of the value chain, in order to identify the most important drivers of affordability when these products reach retail markets.

4. Women and men play distinct roles in the value chains for fish and vegetables in Tanzania. These highly gendered patterns indicate that any intervention to improve these value chains would necessarily have gendered impacts. For example, an intervention aimed at tomato wholesalers will likely reach a greater share of women than an intervention aimed at fish wholesalers. A research program focused on aquaculture could delve into why women seem to be excluded from this (small but) growing sector, and how gender barriers can potentially be reduced. Gender-specific issues will be given attention in RSM2SNF project activities, and the project is committed to learning about the gender dimensions of potential interventions.

5. Different stakeholder groups sometimes held different views on the value chains for fish and vegetables. As one example, farmers/producers were more likely than representatives of the non-farm private sector to be alarmed by low productivity on vegetable farms. This brings some ambiguity in terms of the most promising levers for improved vegetable affordability. The RSM2SNF project should delve deeper into exploring why different groups see the agrifood system differently—for example, who are the winners and losers from an improvement in vegetable productivity.

6. Representatives from different levels of government sometimes held different views on the value chains for fish and vegetables. As one example, representatives of local government (at the level of region and more local levels) viewed the poor quality of infrastructure, such as roads, as an obstacle to fish affordability; this was in contrast to the perspective held by our sample of representatives of national government. It is important for the RSM2SNF project to engage creatively with government at the level of region, district, ward, municipality, and even neighborhood.

7. The survey results point to limited familiarity with agriculture and food system policies in Tanzania. Less than 29% of respondents were "very familiar" with any policy. This suggests that efforts to increase citizen awareness of government policies (and the potential opportunities and/or implications of these policies) may be welcome. RSM2SNF will prepare communication

pieces aimed at raising awareness of food safety issues and associated regulations, as well as issues related to the MSME Policy.

8. Views of the fish and vegetable value chains sometimes differed across the Eastern and Lake zones, the two zones in which RSM2SNF will be engaging in Tanzania. Some of this difference may reflect diverse agro-ecologies in the country, but some may reflect diverse ways that policy has been implemented at the regional or more local levels. This highlights a need for context-specific efforts to increase access to nutritious foods. RSM2SNF will carry out separate but related studies in Mwanza, Morogoro, and Dar es Salaam/Pwani to understand the various factors that account for diverging assessments of fish and vegetable value chains.

References

Bennett, M. K. 1941. International contrasts in food consumption. *Geographical Review*, 31 (3): 365–376.

Caputo, V., and J.L. Lusk. 2019. What agricultural and food policies do US consumers prefer? A Best - Worst Scaling approach. *Agricultural Economics*, 51: 75 – 93.

Chan, C.Y., N. Tran, S. Pethiyagoda, C.C. Crissman, T.B. Sulser, and M. J. Phillips. 2019. Prospects and challenges of fish for food security in Africa. *Global Food Security*, 20: 17–25.

Cockx, L., L. Colen, and J. de Weerdt. 2018. From corn to popcorn? Urbanization and dietary change: evidence from rural-urban migrants in Tanzania. *World Development*, 110: 140–159.

Cooksey, B. (2011). Marketing reform? The rise and fall of agricultural liberalisation in Tanzania. *Development Policy Review*, 29 (s1): s57–s81.

Deressa, T.T., R.M. Hassan, and C. Ringler. 2011. Perception of and adaptation to climate change by farmers in the Nile basin of Ethiopia. *Journal of Agricultural Science*, 149 (1): 23–31.

Desiere, S., Y. Hung, W. Verbeke, and M. D'Haese. 2018. Assessing current and future meat and fish consumption in Sub-Sahara Africa: Learnings from FAO Food Balance Sheets and LSMS household survey data. *Global Food Security*, 16: 116–126.

Dolislager, M., T. Reardon, A. Arslan, L. Fox, L.S.O. Liverpool-Tasie, C. Sauer, and D. Tschirley. 2020. Youth and adult agrifood system employment in developing regions: Rural (peri-urban to hinterland) vs. urban. *Journal of Development Studies*, 57 (4): 571–593.

FAO, IFAD, UNICEF, WFP and WHO. 2020. The State of Food Security and Nutrition in the World 2020: Transforming Food Systems for Affordable Healthy Diets. FAO: Rome.

Gaspare, L., J. F. Machiwa, S. J. M. Mdachi, G. Strck, and W. Brack. 2009. Polycyclic aromatic hydrocarbon (PAH) contamination of surface sediments and oysters from the inter-tidal areas of Dar es Salaam, Tanzania. *Environmental Pollution*, 57 (1): 24–34.

Gómez, M. I., C. B. Barrett, T. Raney, P. Pinstrup-Andersen, J. Meerman, A. Croppenstedt, S. Lowder, B. Carisma, and B. Thompson. Post-Green Revolution food systems and the triple burden of malnutrition. ESA Working Paper No. 13-02. Food and Agriculture Organization of the United Nations: Rome.

Haggblade, S., K. G., Duodu, J. D. Kabasa, A. Minnaar, N. K. O. Ojiji, and J. R. N. Taylor. 2016. Emerging early actions to bend the curve in Sub-Saharan Africa's nutrition transition. *Food and Nutrition Bulletin*, 37 (2): 219-41.

Headey, D., K. Hirvonen, and J. Hoddinott. 2018. Animal sourced foods and child stunting. *American Journal of Agricultural Economics,* 100 (5): 1302–1319.

High Level Panel of Experts (HLPE). 2020. *Food Security and Nutrition: Building a Global Narrative Towards 2030*. CFS: Rome.

Ignowski, L., B. Belton, N. Tran, and H. Ameye. 2023. Dietary inadequacy in Tanzania is linked to the rising cost of nutritious foods and consumption of food-away-from-home. *Global Food Security*, 37: 100679.

Jones, A.K., D.L. Jones, G. Edwards-Jones, and P. Cross. 2013. Informing decision making in agricultural greenhouse gas mitigation policy: A Best–Worst Scaling survey of expert and farmer opinion in the sheep industry. *Environmental Science & Policy*, 29: 46-56.

Kabasa, J. D., J. Kirsten, and I. Minde. 2015. Implications of changing agri-food system structure for agricultural education and training in Sub-Saharan Africa. *Journal of Agribusiness in Developing and Emerging Economies*, 5 (2): 190–199.

Keding, G., J. M. Msuya, B. L. Maass, and M. B. Krawinkel. 2011. Dietary patterns and nutritional health of women: The nutrition transition in rural Tanzania. *Food and Nutrition Bulletin*, 32 (3): 218–226.

Keding, G., J. M. Msuya, B. L. Maass, and M. B. Krawinkel. 2013. Obesity as a public health problem among adult women in rural Tanzania. *Global Health: Science and Practice*, 1 (3): 359–371.

Khanal, U., C. Wilson, V. N. Hoang, and B. Lee. 2018. Farmers' adaptation to climate change, its determinants and impacts on rice yield in Nepal. *Ecological Economics*, 144: 139–147.

Liverpool-Tasie, L.S.O., A. Wineman, Young, S. Tambo, J., Vargas, C. Reardon, T, Adjognon, G.S., Porciello, J. Gathoni, N., Bizikova, L., A. Galie, and A. Celestin. 2020. Evidence Synthesis: Market links between value chain actors and small-scale producers in developing regions. *Nature Sustainability*, 3: 799–808.

Liverpool-Tasie, L.S.O., A. Sanou, T. Reardon, and B. Belton. 2021. Demand for imported versus domestic fish in Nigeria. *Journal of Agricultural Economics*, 72 (3): 782–804.

Maddison, D. 2007. The perception of and adaptation to climate change in Africa. Policy Research Working Paper; No. 4308. World Bank, Washington, D.C.

Maredia, M.K., J. Goeb, D.L. Ortega, N.L.K. Synt, and A.M. Zu. 2022. Preferences for pandemic recovery policies: Perspectives of Myanmar agri-food system participants. *Journal of the Agricultural and Applied Economics Association*, 1: 334– 351.

National Bureau of Statistics (NBS). 2022. *Tanzania Census 2022*. Dodoma. Accessed at: https://sensa.nbs.go.tz.

Nyange, D., D. Tschirley, H. Nassoro, and A. Gaspar. 2015. Agricultural produce cess in Tanzania: policy options for fiscal reforms. Feed the Future Innovation Lab for Food Security Policy Research Paper 1. East Lansing: Michigan State University. Accessed at: https://ageconsearch.umn.edu/record/256936/.

Peart, J., N. Tran, C. Y. Chan, A. Maskaeva, A. P. Shoko, I. A. Kimirei, and N. A. Madalla. 2021. A review of fish supply–demand in Tanzania. Penang, Malaysia: WorldFish. Program Report: 2021-32.

Reardon, T. R. Echeverria, J. Berdegué, B. Minten, L.S.O. Liverpool-Tasie, D. Tschirley, and D. Zilberman. 2019. Rapid transformation of food systems in developing regions: Highlighting the role of agricultural research & innovations. *Agricultural Systems*, 172: 47–59.

Reardon, T., L.S.O. Liverpool-Tasie, and B. Minten. 2021. Quiet Revolution by SMEs in the midstream of value chains in developing regions: wholesale markets, wholesalers, logistics, and processing. *Food Security*, 13: 1577–1594.

Sauer, C.M., T. Reardon, D. Tschirley, L.S.O. Liverpool-Tasie, T. Awokuse, R. Alphonce, D. Ndyetabula, and B. Waized. 2021. Consumption of processed food and food away from home in big cities, small towns, and rural areas of Tanzania. *Agricultural Economics*, 52 (5): 749–770.

Smale, M., V. Theriault, and R. Vroegindewey. 2021. Nutritional implications of dietary patterns in Mali. *African Journal of Agricultural and Resource Economics*, 15 (3): 177–193.

Spiker, M.L., J. Welling, D. Hertenstein, S. Mishra, K. Mishra, K.M. Hurley, R.A. Neff, J. Fanzo, and B.Y. Lee. 2023. When increasing vegetable production may worsen food availability gaps: A simulation model in India. *Food Policy*, 116: 102416.

Tschirley, D., T. Reardon, M. Dolislager, and J. Snyder. 2015. The rise of a middle class in east and southern Africa: implications for food system transformation. *Journal of International Development*, 27 (5): 628–646.

Van der Maden, E., E. Ringo, and L. Eunice. 2021. Scoping study on fruits and vegetables: Results from Tanzania. Wageningen, Wageningen Economic Research, Report 2021-111.

Wenaty, A., A. Fromberg, F. Mabiki, B. E. Chove, A. Dalsgaard, and R. H. Mdegela. 2019. Assessment of health risks associated with organochlorine pesticides levels in processed fish products from Lake Victoria. *African Journal of Food Science*, 13 (5): 101–110.

Wineman, A., and L. S. O. Liverpool-Tasie. 2022. Stakeholder perceptions of the fish and vegetable value chains in Nigeria. Report prepared for the Research Supporting African MSMEs to Provide Safe and Nutritious Food (RSM2SNF) project. Michigan State University: East Lansing. Accessed at: https://www.canr.msu.edu/resources/stakeholder-perceptions-of-the-fish-and-vegetable-value-chains-in-nigeria.

Wineman, A., T.S. Jayne, E. Isinika Modamba, and H. Kray. 2020. The changing face of agriculture in Tanzania: Indicators of transformation. *Development Policy Review*, 38 (6): 685–709.

Annex

ANNEX 1: STAKEHOLDER PERCEPTIONS SURVEY

Survey structure

A. Information about yourself and the organization you represent
B. General perceptions of the food system
C. Perceptions of legislation and government-led activities (short section)
D. Knowledge of food safety (short section)

Definitions of key terms

- The **availability** of food for consumers in Tanzanian markets is a function of food production, imports, and the amount of food that is lost/wasted in the harvest and marketing process.
    - For example, higher yields for farmers and lower food loss will both increase availability.
- The **affordability** of food for consumers in Tanzanian markets is a function of both supply and demand.
    - On the supply side, affordability relates to availability, transaction costs/marketing costs, and the degree of competitiveness in the market.
    - For example, high transportation cost and low availability usually make food prices higher and thus less affordable.
- **Food safety** in Tanzanian markets is a function of contamination, spoilage, and hygiene when harvesting, transporting, storing, and handling food.
- **Food stability** refers to a situation where food is consistently available over the long term, and its availability is not affected by shocks such as drought, floods, or inflation.
- **Micro, small, and medium enterprises** range in size from nano (only immediate household members are full-time workers) to micro (1–4 employees), small (5–49 employees), and medium (50–99 employees).

A. Information about yourself and the organization/business you represent

A1. Name: _____

A2. Stakeholder group: (*Select one*)

☐ Government
☐ Industry/Private sector
☐ Farmer/Producer/Fisher
☐ Non-government organization (NGO) / Civil society organization
☐ Research/Academia
☐ Donor/Development partner
☐ Other: _____

A2.1 At what level of government do you work? (*Select one*)

☐ National level
☐ Region level
☐ District level
☐ Municipality/Township authority
☐ Other: _____

A2.2 What is your main role in industry/private sector? (*Select one*)

☐ Trader
☐ Transporter

☐ Food processor
☐ Market leader
☐ Leader of private sector association
☐ Other: _____

A3. Organization/Business: _____

A4. Is your work/expertise related to any of the following value chains? *Select all that apply.*
☐ Fisheries/aquaculture
☐ Vegetables
☐ Fruits
☐ Other: _____

A5. Contact information:
E-mail address(es): _____
Telephone number(s): _____

A5.1 May we contact you by email or phone for future research studies? ☐ Yes ☐ No

A6. Age in years: _____

A7. Level of formal education attained:
☐ Never went to school
☐ Some primary school
☐ Completed primary school
☐ Some secondary school
☐ Completed secondary school
☐ Vocational training
☐ Certificate
☐ Diploma
☐ University degree
☐ Post-graduate degree
☐ Adult literacy
☐ Other: _____

A8. Gender:
☐ Female ☐ Male

A9. In what region do you reside? (*Indicate "not applicable" if you reside outside of Tanzania*)
_____

A10. Do you reside in a rural or non-rural area?
☐ Rural ☐ Non-rural (peri-urban or urban)

B. General perceptions of the food system

B1. Think of how the food system functions in Tanzania in terms of the availability, affordability, and safety of food in Tanzanian markets.

B1.1. With respect to **fish**, how do you rate the status in each dimension?

	Very poor	Poor	Neither poor nor good	Good	Very good	Don't know
Availability of fish	☐	☐	☐	☐	☐	☐
Affordability of fish	☐	☐	☐	☐	☐	☐
Food safety of fish	☐	☐	☐	☐	☐	☐
Stability of fish	☐	☐	☐	☐	☐	☐

B1.2. With respect to **vegetables** (such as tomatoes, peppers, onions, or green leafy vegetables), how do you rate the status in each dimension?

	Very poor	Poor	Neither poor nor good	Good	Very good	Don't know
Availability of vegetables	☐	☐	☐	☐	☐	☐
Affordability of vegetables	☐	☐	☐	☐	☐	☐
Food safety of vegetables	☐	☐	☐	☐	☐	☐
Stability of vegetables	☐	☐	☐	☐	☐	☐

B2. To what extent do you agree with each statement below?

	Completely disagree	Somewhat disagree	Somewhat agree	Completely agree	Not applicable/Don't know
In the next 10 years, modern markets will replace traditional food markets as the major source of **affordable** food in Tanzania.	☐	☐	☐	☐	☐
In the next 10 years, modern markets rather than traditional markets will be the major source of **safe** food in Tanzania.	☐	☐	☐	☐	☐

B3. In your opinion, to what extent do the issues below represent challenges for the **affordability of fish** in Tanzanian markets? *Select 3 challenges that are most serious/important and 3 challenges that are least serious.*

	Most serious challenges	Least serious challenges
Low productivity of capture fisheries or aquaculture	☐	☐
High cost of inputs (e.g., feed, equipment)/Low quality of inputs	☐	☐
Poor quality of infrastructure, such as roads	☐	☐
Availability or high cost of electricity	☐	☐
Availability or high cost of infrastructure, such as high-quality storage facilities	☐	☐
Corruption along the value chain (e.g., informal payments)	☐	☐
Formal taxes and other fees beyond production costs	☐	☐
Dishonesty or greed among the middle-men along the value chain	☐	☐
Lack of competition in the market (e.g., few sellers)	☐	☐

B4. In your opinion, to what extent do the issues below represent challenges for the **affordability of vegetables** in Tanzanian markets? *Select 3 challenges that are most serious/important and 3 challenges that are least serious.*

	Most serious challenges	Least serious challenges
Low productivity of vegetable farms	☐	☐
High cost of inputs (e.g., fertilizer, equipment)/Low quality of inputs	☐	☐
Poor quality of infrastructure, such as roads	☐	☐
Availability or high cost of electricity	☐	☐
Availability or high cost of infrastructure, such as high-quality storage facilities	☐	☐
Corruption along the value chain (e.g., informal payments)	☐	☐
Formal taxes and other fees beyond production costs	☐	☐
Dishonesty or greed among the middle-men along the value chain	☐	☐
Lack of competition in the market (e.g., few sellers)	☐	☐

B5. In your opinion, to what extent do the issues below represent challenges for the **safety of fish** sold/purchased in Tanzanian markets? *Select 2 challenges that are most serious/important and 2 challenges that are least serious.*

	Most serious challenges	Least serious challenges
Fish are treated with antibiotics and/or consume things with toxins.	☐	☐
Lack of infrastructure (e.g., clean water points) to maintain food safety and adhere to food hygiene regulations on the part of agrifood system actors	☐	☐
Lack of knowledge regarding food safety on the part of agrifood system actors	☐	☐
Weak food safety legislation (i.e., the provisions prescribing enforcement responsibilities and penalties for violations are generally weak)	☐	☐
Lack of specific guidelines for achieving food safety in informal food markets (street food vending)	☐	☐
Dishonesty (neglect, negligence, or deceit) on the part of fish traders, processors, and vendors	☐	☐

B6. In your opinion, to what extent do the issues below represent challenges for the **safety of vegetables** sold/purchased in Tanzanian markets? *Select 2 challenges that are most serious/important and 2 challenges that are least serious.*

	Most serious challenges	Least serious challenges
Unclean water used in irrigation	☐	☐
Lack of infrastructure (e.g., clean water points) to maintain food safety and adhere to food hygiene regulations on the part of agrifood system actors	☐	☐

Lack of knowledge regarding food safety on the part of agrifood system actors	☐	☐
Weak food safety legislation (i.e., the provisions prescribing enforcement responsibilities and penalties for violations are generally weak)	☐	☐
Lack of specific guidelines for achieving food safety in informal food markets (street food vending)	☐	☐
Dishonesty (neglect, negligence, or deceit) on the part of vegetable traders, processors, and vendors	☐	☐

B7. If the government could increase its spending on programs to improve the **affordability and/or safety of fish** in Tanzanian markets, which of the following areas do you think should be the highest and lowest priority for additional investment? *Select 3 programs that are most important (highest priority) and 3 programs that are least important (lowest priority).*

	Highest priority	Lowest priority
Increase productivity of fishers or fish farmers through research and/or training	☐	☐
Provide subsidies or cash transfers to fishers/fish farmers and MSMEs post-production to improve productivity, reduce post-harvest losses, and adopt safety practices	☐	☐
Oversight/monitoring of producers (fishers/fish farmers) and MSMEs operating in the fish value chain (post-production)	☐	☐
Infrastructure improvements to reduce transportation costs	☐	☐
Infrastructure-based efforts to reduce food loss/waste (e.g., cold storage)	☐	☐
Provision of hygiene-related infrastructure, such as clean water points and waste disposal in markets	☐	☐
Address corruption (reduce informal payments)	☐	☐
Facilitate the marketing and trade of fish to better ensure that fishers and fish farmers have a market for their produce	☐	☐
Reduce bureaucracy for operations of farmers and MSMEs along the fish supply chain (e.g., formal taxes, costs of business formalization)	☐	☐

B8. If the government could increase its spending on programs to improve the **affordability and/or safety of vegetables** in Tanzanian markets, which of the following areas do you think should be the highest and lowest priority for additional investment? *Select 3 programs that are most important (highest priority) and 3 programs that are least important (lowest priority).*

	Highest priority	Lowest priority
Increase productivity of vegetable farmers through research and/or training	☐	☐
Provide subsidies or cash transfers to vegetable farmers and MSMEs post-production to improve productivity, reduce post-harvest losses, and adopt safety practices	☐	☐
Oversight/monitoring of producers (vegetable farmers) and MSMEs operating in the vegetable value chain (post-production)	☐	☐
Infrastructure improvements to reduce transportation costs	☐	☐
Infrastructure-based efforts to reduce food loss/waste (e.g., cold storage)	☐	☐

Provision of hygiene-related infrastructure, such as clean water points and waste disposal in markets	☐	☐
Address corruption (reduce informal payments)	☐	☐
Facilitate the marketing and trade of vegetables to better ensure that farmers have a market for their produce	☐	☐
Reduce bureaucracy for operations of farmers and MSMEs along the vegetable supply chain (e.g., formal taxes, costs of business formalization)	☐	☐

B9. In your view, who should be primarily responsible for, or should lead efforts around, the following: *Select one option per row.*

	Individual farmers	Individual MSMEs (post-production)	MSME associations	Individual consumers	Government	Other
Making sure agrifood system actors (e.g., farmers, traders, processors, transporters) are aware of good food hygiene practices	☐	☐	☐	☐	☐	☐
Making sure consumers are aware of good food hygiene practices	☐	☐	☐	☐	☐	☐
Making sure agrifood system actors (e.g., farmers, traders, processors, transporters) are following good food hygiene practices	☐	☐	☐	☐	☐	☐
Making sure food that is sold in markets is safe for consumption	☐	☐	☐	☐	☐	☐
Making sure freshwater bodies and wetlands are not contaminated with pollutants	☐	☐	☐	☐	☐	☐
Regulating the methods for catching fish	☐	☐	☐	☐	☐	☐

B9.1 For each item for which you indicated that "other" should be primarily responsible in B9, please specify the other agency or entity:

	Other (specify)
Making sure agrifood system actors (e.g., farmers, traders, processors, transporters) are aware of good food hygiene practices	
Making sure consumers are aware of good food hygiene practices	
Making sure agrifood system actors (e.g., farmers, traders, processors, transporters) are following good food hygiene practices	
Making sure food that is sold in markets is safe for consumption	
Making sure freshwater bodies and wetlands are not contaminated with pollutants	
Regulating the methods for catching fish	

B10. In your view, for each function below, what are the roles of women and men in the fish and vegetable value chains in Tanzania? *Select one option per row.*

Product	Function	Women are more engaged than men	Men are more engaged than women	Women and men are equally engaged
Fish	Supply of inputs for capture/production	☐	☐	☐
	Production (capture fisheries)	☐	☐	☐
	Production (aquaculture)	☐	☐	☐
	Processing	☐	☐	☐
	Trading (wholesale)	☐	☐	☐
	Retailing	☐	☐	☐
	Transportation	☐	☐	☐
Vegetables	Supply of inputs for production	☐	☐	☐
	Production	☐	☐	☐
	Processing	☐	☐	☐
	Trading (wholesale)	☐	☐	☐
	Retailing	☐	☐	☐
	Transportation	☐	☐	☐

B11. (Optional) Please use this space to clarify any of your responses in this section or point out anything that is missing in this questionnaire.

_____

C. Perceptions of legislation and government-led activities

C1. By your assessment, how familiar are you with the following policies/bills?

	Very familiar	Somewhat familiar	Not at all familiar
The Agricultural Sector Development Program II (ASDP II)	☐	☐	☐
The National Agricultural Policy (2013)	☐	☐	☐
The National Environmental Policy (2021)	☐	☐	☐
The National Multi-sectoral Nutrition Action Plan (2016-2021; 2021-2026)	☐	☐	☐
The Micro, Small, and Medium Enterprise Policy (2021-2025)	☐	☐	☐
The National Fisheries Policy (2015)	☐	☐	☐
The Food Safety Act in Tanzania	☐	☐	☐
Tanzania Finance Act of 2022	☐	☐	☐
The Seed Act of 2003	☐	☐	☐
The Agricultural Marketing Policy (2008) of the United Republic of Tanzania – Ministry of Industry, Trade and Marketing	☐	☐	☐

C1.1. If "somewhat" or "very" familiar, do you perceive this policy/bill to adequately support MSMEs that operate in the value chains for fish and vegetables?

	Yes	No	Don't know
The Agricultural Sector Development Program II (ASDP II)	☐	☐	☐
The National Agricultural Policy (2013)	☐	☐	☐
The National Environmental Policy (2021)	☐	☐	☐
The National Multi-sectoral Nutrition Action Plan (2016-2021; 2021-2026)	☐	☐	☐
The Micro, Small, and Medium Enterprise Policy (2021-2025)	☐	☐	☐
The National Fisheries Policy (2015)	☐	☐	☐
The Food Safety Act in Tanzania	☐	☐	☐
Tanzania Finance Act of 2022	☐	☐	☐
The Seed Act of 2003	☐	☐	☐
The Agricultural Marketing Policy (2008) of the United Republic of Tanzania – Ministry of Industry, Trade and Marketing	☐	☐	☐

C2. To what extent do you agree with each statement below?*

	Completely disagree	Somewhat disagree	Somewhat agree	Completely agree	Not applicable/ Don' t know
There is continuous dialogue related to policy on food availability, affordability, safety, and nutrition issues between **my stakeholder group** and government sector representatives (or other levels of government).	☐	☐	☐	☐	☐
My stakeholder group's perspectives in these policy dialogues are listened to and considered closely by government (or other levels of government).	☐	☐	☐	☐	☐
My stakeholder group communicates and interacts frequently with other stakeholder groups in an effort to improve the availability, affordability, and safety of nutritious foods.	☐	☐	☐	☐	☐
I, personally, communicate and interact frequently with people in other stakeholder groups in an effort to improve the availability, affordability, and safety of nutritious foods.	☐	☐	☐	☐	☐

**Note: Due to a programming error, Table C2 was not asked completely to all targeted respondents; therefore, the results for this table are not summarized.*

D. Knowledge of food safety and agricultural MSMEs

D1. To your knowledge, which practices result in chemical contamination of fish that can lead to food infection, long-term diseases (such as cancer), or death? *Select all that apply.*

☐ Use of chemicals in fishing
☐ Use of chemicals for preservation
☐ Mixing of antibiotics with fish food

☐ Smoking with sawdust
☐ Use of ice and cold chain technologies for preservation
☐ Use of poisons, i.e., herbicides/pesticides
☐ Don't know

D2. To your knowledge, which practices result in chemical contamination of vegetables that can lead to acute poisoning, long-term diseases (such as cancer), or death? *Select all that apply.*

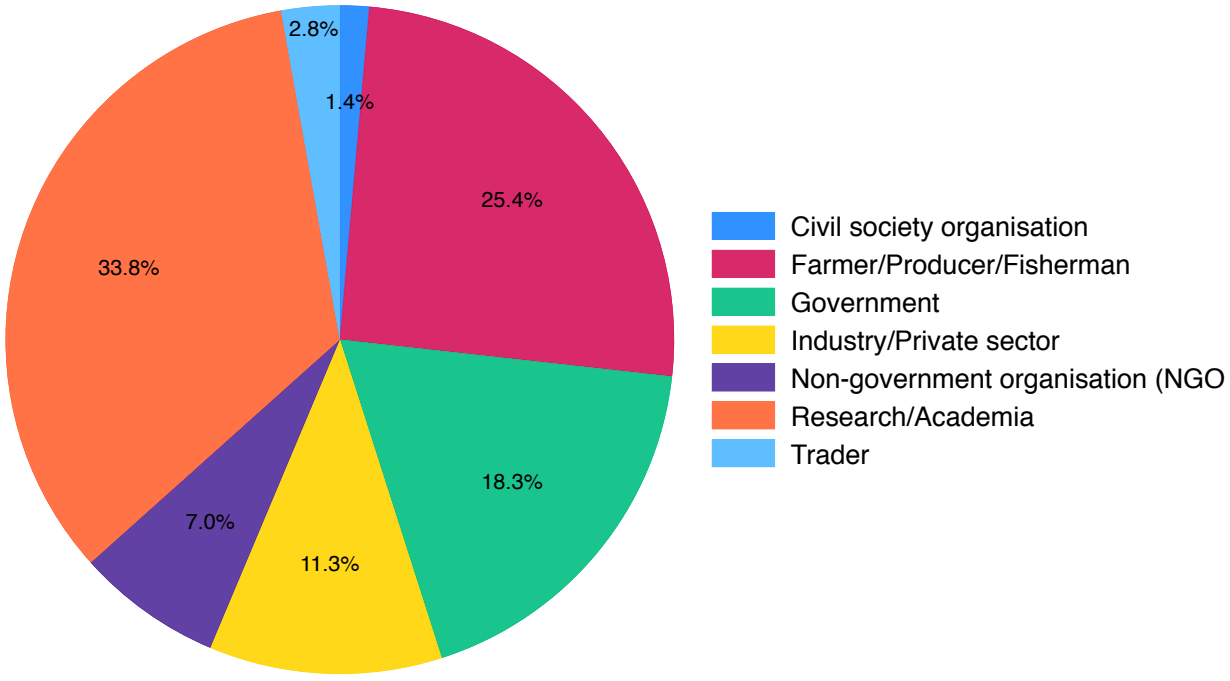
☐ Use of chemicals to aid ripening
☐ Washing with detergent
☐ Storing vegetables in plastic crates
☐ Inappropriate use of pesticides/herbicides
☐ Inappropriate use of chemical fertilizers
☐ Don't know

Thank you!
Your participation in the survey is appreciated.

ANNEX 2: SUMMARY OF VALIDATION EXERCISE

On 16th November 2023, RSM2SNF conducted a stakeholder perception survey validation exercise in Dar es Salaam, Tanzania. The event took place at the Jangwani Sea Breeze Resort and followed the inauguration of the RSM2SNF Tanzania National Advisory Committee. The validation exercise had a total of 71 people in attendance (39 male and 32 female), with 16 people attending in-person and 55 participating online. About 34% of attendees were representatives of research/academia, 25% were farmers/producers, and 18% were representatives of government.

Figure A1. Validation exercise attendance by stakeholder group



The objectives of this validation event were to (1) share the stakeholder perceptions survey findings with stakeholders who had completed the survey, (2) gather agri-food stakeholders' insights regarding the survey findings and interpretation, and (3) examine key findings from the survey to guide subsequent project activities.

Mr. Gideon Boniface (the RSM2SNF project assistant in Tanzania) presented the results of the stakeholder perceptions survey in Swahili, highlighting several key findings: (1) Overall, respondents judged the market for vegetables more favorably than that of fish; (ii) For both fish and vegetables, the high cost of inputs for production was regarded as the greatest challenge for affordability; (iii) The quality of the environment (e.g., water quality) was viewed as a threat to food safety; (iv) The greatest priorities for both fish and vegetables were interventions to raise productivity of producers; (v) Provision of subsidies or cash transfers for producers and post-production MSMEs was preferred; (vi) When respondents considered the priorities of food affordability and safety, they seemed to prefer efforts to bring down prices rather than improve safety; (vii) Men seem to be more engaged in the provision of inputs for production (for both fish and vegetables) and far more engaged in the production/capture of fish; (viii) On the other hand, women were viewed as more engaged than men in the retailing of fish and vegetable; (ix) Women were more engaged than men in vegetable production; (x) Overall, women

seemed to be more engaged in all nodes of the vegetable value chain compared to fish; and (xi) A fairly small share (13–29%) of respondents characterized themselves as "very familiar" with any policy/bill.

Figure A2. Stakeholders in Morogoro Region attending the event online

Note: The above photo displays a group of stakeholders from Morogoro Region as they gathered to watch the validation event online.

Following the presentation, the attendees were asked three questions to reflect upon: (i) What results resonate with you? (ii) What results are surprising you? (iii) How can we make sure the survey results are reflected in (and incorporated into) the RSM2SNF project?

Participants responded to these questions with some offering comments and others posing new questions. A sample of the feedback received is as follows.

There were suggestions for the project to…

- Consider carefully the food quality and safety of GLVs, particularly in regard to the excessive use of pesticides in farming.
- Research the avenues available for addressing the use of hazardous chemicals in fishing.
- Research ways to minimize post-harvest loss (PHL) that occurs along the fish value chain.
- Research ways to ensure that commodities remain nutritious as they reach consumers.
- Give attention to the role and experiences of disabled people, as they are also part of the food value chain.

Participants posed several questions:

- How will the project engage with issues of environmental pollution/degradation in farming?
- How can we work together to promote consumption of these nutritious foods?
- Are youth, in particular, aware of the importance of these foods?

- Why are representatives of the private sector more aware of some issues captured in this survey than the public sector?

Participants also offered several observations and/or opinions:

- While discussing whether there was a need for subsidized manure, some expressed the view that farmers should not depend on subsidized manure as they focus on commercial farming.
- When it comes to food safety, there is a need for awareness to be created among consumers rather than just producers, as consumer behavior influences the practices of farmers.
- Farmers are facing the dual challenge of high prices for inputs and what is perceived as dishonest conduct from brokers/middlemen.

To conclude the stakeholder perceptions survey validation event, Prof. Isaac Minde thanked all participants for their attendance and vigorous participation. He assured attendees that the RSM2SNF project would take their views into consideration and would continue to engage with them as the project moves forward.