



# Qualitative assessment of chicken and vegetable value chains in Harar and Dire Dawa, Ethiopia: Food safety perspectives



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# Qualitative assessment of chicken and vegetable value chains in Harar and Dire Dawa, Ethiopia: Food safety perspectives

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# Acronyms

ASF	Animal-source food
FDG	Focus group discussion
IDI	In-depth interview
KII	Key informant interview
VC	Value chain



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# Executive summary

This report is part of a research project titled 'Urban food markets in Africa – incentivizing food safety using a pull-push approach', led by the International Livestock Research Institute (ILRI). The study was conducted to assess chicken and vegetable production, retailing, processing and consumption practices using a value chain approach in the two major cities of eastern Ethiopia – Harar and Dire Dawa.

Multiple qualitative data collection methods were used. A total of 13 key informant interviews were held with informants working in different local government offices such as trade and industry, health, and agriculture to understand the general overview of chicken and vegetable production, processing, retailing and consumption practices with particular emphasis on food safety aspects. Six focus group discussions were carried out by recruiting women from three groups (high, medium and low income) from each of the two cities. Finally, in-depth interviews were held with a total of 12 chicken producers, 14 chicken retailers, 4 vegetable producers and 12 vegetable retailers in Harar and Dire Dawa.

The results of the study show that beef, mutton, chicken meat, goat meat, camel meat, egg, fish and milk or milk products are the commonly consumed animal-source foods. Common vegetables mentioned by participants known to be consumed in the areas are onion, potato, tomato, lettuce, beetroot, cabbage, green pepper and various green vegetables. Onion, tomato, potato and lettuce were reported as the first, second, third and fourth most highly consumed vegetables in the area. Among vegetables, tomatoes are mainly eaten raw after washing with water and sometimes cooked with other vegetables. Consumption of raw lettuce is also common.

Consumption practices vary according to the socio-economic status of families (based on income or their capacity to buy), season and educational status. The results of the focus group discussions show that high-income families have good knowledge of the nutritional value of food they consume regularly, with clear nutritional criteria for selecting food. This may also be related to the educational status of the participants, among whom the higher-income groups likely also have higher educational status. The low-income families mentioned that they have no regular income and hence they cannot make choices regarding their meal types, and eat simply what is available given their means. Low-income groups usually consume cheap food, especially poor quality vegetables and meat. Chicken meat is consumed only during special events (e.g. religious festivals). On average they eat chicken meat once per three months, and raw vegetables are consumed based on their availability at lower prices, on average once per three to four days. Middle-income groups consume meat and vegetables more than low-income groups. They eat chicken on average at least once every month and also during festivals. Compared with chicken meat, they consume eggs and vegetables more frequently. High-income groups have access to animal-source foods regularly except during the long fasting season, when they are not consumed by Ethiopian Orthodox households. High-income groups eat chicken meat at least once every week and during festivals and based on their need, and the availability of chicken.

Vegetable value chains involve producers, brokers, transporters, retailers and consumers. There are two types of vegetable supply system: the first is from distant producers in the central rift valley of Ethiopia, and the second is from local (rural and peri-urban) producers. In the long-distance chain, different value chain actors such as producers, brokers,

transporters, wholesalers (sometimes exporting to abroad), retailers and consumers are involved. Producers (farmers) supply fresh produce either directly or indirectly to other actors, whereas brokers make connections with wholesalers and farmers and sell the farm produce to wholesalers, who distribute to retailers and sometimes export to neighbouring countries (e.g. Somaliland, Somalia and Djibouti). In between, there are transporters carrying vegetables from the production area to markets in the country and outside of the country, usually by truck. The retailers sell the vegetables to consumers. The local producers in the second system bring their produce directly to the cities.

Chicken value chain actors include producers, collectors, traders and brokers, informal butchers, retailers and supermarkets, hotels and restaurants and consumers. The chicken meat retailers in the two sites receive products from different sources: locally from Harar and Dire Dawa; from larger producers in central parts of Ethiopia (Addis Ababa, Bishoftu, etc.); and through cross-border trade of frozen chicken carcasses from Somaliland and Djibouti.

Diarrhoea (locally called 'cholera'), associated with food safety, was reported as a common disease related to water and food hygiene associated with fruit and vegetables. Tomato, onion and lettuce are commonly eaten raw. Unhygienic slaughter and dressing of chicken in the Dire Dawa markets was identified as a food safety risk. It happens in an illegal way and there is an informal trade in dressed chicken. The main food safety problems are lack of awareness, shortage of water restricting washing, and carelessness and inadequate hygienic practices at all levels of value chain.

The interviewees in the study area were not aware of other food-borne diseases associated with vegetable and chicken and have little knowledge on food safety and hygiene. There is a lack of awareness among producers about the need to supply quality and safe food, and also among retailers with regard to proper transportation, handling and storage. Consumers simply buy food along roads and in dusty places without asking how the food is produced, transported or handled. Some consumers also buy dirty and spoiled food from retailers and traders before washing and eating it raw (vegetables).

As the key informants mentioned, most projects have focused on nutrition and food security rather than food safety and hygiene. There have not been many initiatives that focused on the safety of vegetables and chicken. They made suggestions towards improving food safety and hygiene, particularly on allocating enough funds and facilities in the sectors, assisting with advanced technology for quality production, extending services on awareness creation, and enabling community involvement in producing quality produce. They also suggested that the government should investigate market conditions, provide improved facilities and set standards. While controlling illegal trades and practices (e.g. slaughter) would be advised, supporting formal slaughter will reduce the incentives to slaughter chickens in the informal sector. Further recommendations included using health extension workers to conduct awareness campaigns on food safety and hygiene. Finally, the quality and quantity of the water supply should be improved.

# 1 Introduction

The world is experiencing a high rate of population growth and urbanization in which most of the population is moving to urban areas, and this is increasing over time. This is putting a lot of pressure on agriculture and food production in which provision of adequate and safe food for the population is a real challenge (Kearney, 2010). The effect of urbanization is especially significant in developing parts of the world due to lack of proper planning, and this in turn is creating many challenges. Food safety, as one of the components of food security, is a major problem, particularly in urban areas as food for urban consumers is handled, transported and consumed in bulk and often in an unhygienic way due to lack of basic infrastructure including inadequate water supply and food preservation facilities. Specifically, handling of perishable foods such as animal-source foods (ASF), vegetables and fruit is quite challenging as a result of the greater complexity of value chains (VCs) and distances between production and consumption (Grace, 2015).

Urbanization is rapidly accelerating in Africa and more than 80% of food is marketed through informal VCs. Contemporary food production and processing pass through many stages and food safety issues need to be addressed across whole VCs, from production to consumption.

The health risks of food-borne diseases are quite variable amongst the different urban resident population groups. Those with high income may purchase and consume high-quality and safe foods, while the poor may not have a choice and eat what is available.

The dominance of informal actors in food VCs in LMICs, with the absence of an over-arching management structure or strong regulation, further complicates the control of food safety risks. VC mapping of key food systems can greatly help to generate evidence which can guide efforts towards improving food handling practices and minimizing associated health risks. Therefore, this study aimed to assess chicken and vegetable production, retailing, processing and consumption practices, with a focus on food safety using a VC approach in Harar and Dire Dawa.

## 2 Objectives

The objectives of the study were to understand:

- Typical consumer food purchase, preparation and consumption practices and preferences, and perceptions of food quality and safety related to poultry meat and common vegetables.
- How the main retailer types typically source, transport, store, process and sell poultry meat and key vegetables, and specifically identify food safety issues.
- How producers typically produce and distribute poultry meat and key vegetables, with particular interest in understanding aspects relevant to food safety.

## 3 Materials and methods

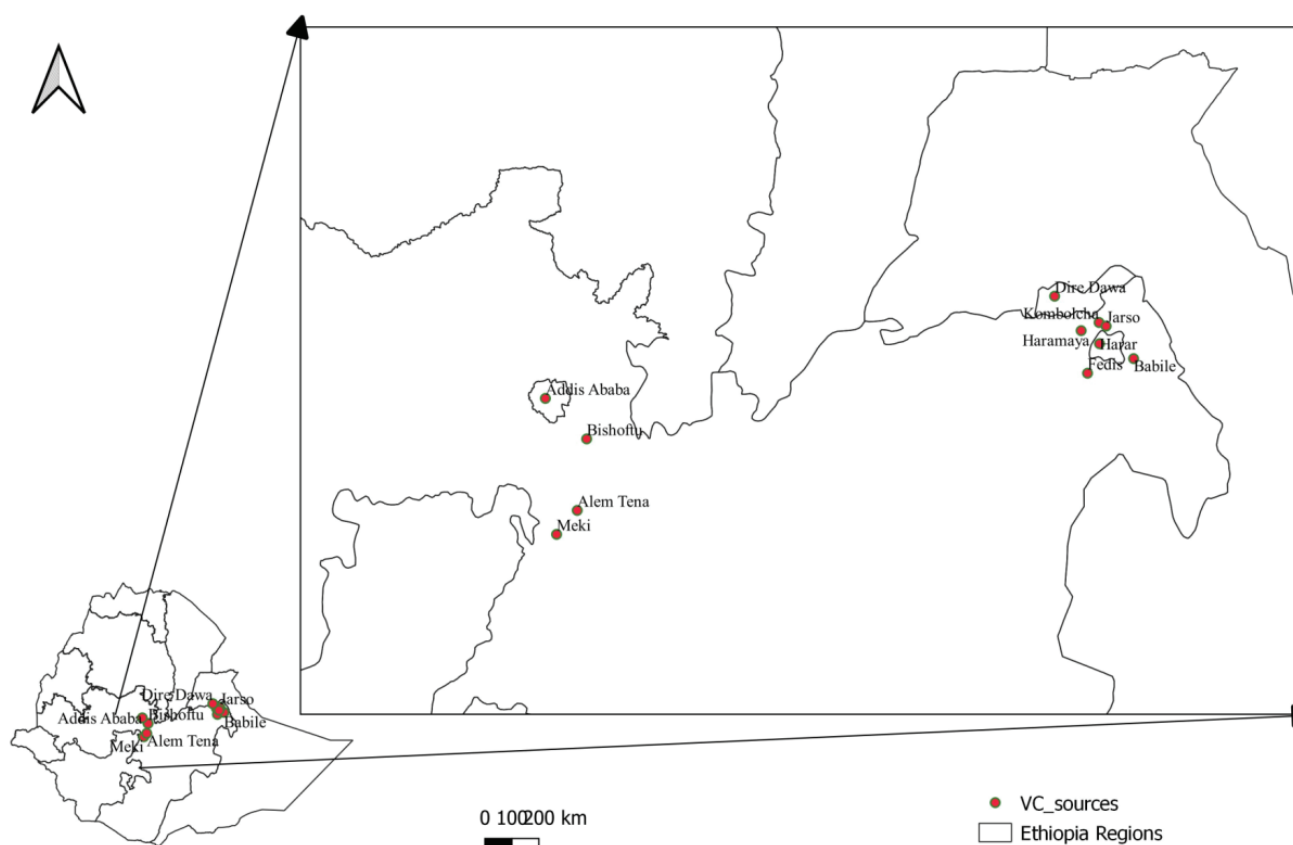
### 3.1 Study areas

This study was conducted in two major cities of eastern Ethiopia: Harar (9.3126°N, 42.1227°E) and Dire Dawa (9.6009°N, 41.8501°E), which are located 515 km and 510 km east of Addis Ababa, respectively (Figure 1). The elevation of Dire Dawa is 1,204 m above sea level and that of Harar is 1,917 m. The city administration of Dire Dawa has 9 urban and 38 rural kebeles (the smallest administrative unit in Ethiopia) with a total population of 466,000 people. Harar city is located in the Harari regional state, and the state is divided into six urban and three rural administrative districts. These administrative districts are further divided into 19 urban and 17 rural kebeles with a total population of 246,000 (Central Statistical Agency, 2019).

In a 2019 count, the total livestock population in the Harari regional state was 71,277 cattle, 6,896 sheep, 69,901 goats, 14,356 donkeys, 779 camels and 97,690 poultry. In Dire Dawa the total number of livestock was 51,958 cattle, 64,332 sheep, 249,393 goats, 644 horses, 416 mules, 24,226 donkeys, 8,207 camels and 118,376 poultry (Central Statistical Agency, 2019).

Dire Dawa city administration and Harari regional state are not major horticultural producers, but rather considered as consumers of fruits and vegetables produced elsewhere and transported to the areas for retailing. Fruits and vegetables are widely marketed and consumed in the two areas. The neighbourhood of Kafira in Dire Dawa contains the wholesale market for vegetables and fruits sourced from local producers and traders coming from Finkile, Haramaya, Kersa, rural parts of Dire Dawa as well as large quantities sourced from further away, especially the central rift valley. The Deker neighbourhood is the large vegetable market in Harar, receiving produce from areas surrounding the city.

Figure 1: The relative location of the study area and different sources of vegetables/chicken.



## 3.2 Data collection

In Q3 and Q4 of 2019 participatory qualitative data collection methods were used, specifically key informant interviews (KIIs), focus group discussions (FGDs) and in-depth interviews (IDIs). Semi-structured question guides (see Appendices 1–10) were prepared based on previous work and used for qualitative data collection following participatory approaches (Carron et al., 2017).

A total of 42 IDIs were held with different VC actors including retailers and producers of vegetables and live chickens or chicken meat. We also conducted a total of 13 KIIs with people working in different local government offices such as health, agriculture, trade, industry and tourism. The selection of professionals to be interviewed was based on knowledge of agriculture and food VCs, specifically poultry and vegetable, focusing on food safety and the consequences associated with food-borne diseases. Key informants on consumption were selected from those people working in the field of food safety and hygiene, health regulation, home economics and health bureaus. Key informants on vegetable and chicken (meat or live chicken) trade and retailing activities were selected from professionals working in different offices (e.g. health regulators, agricultural extension, cooperative promotion and capacity building, tourism and domestic trade promotion). Key informants on the production of vegetables and chicken were selected from experts working in the disciplines of fruit and vegetable production, livestock farming and poultry production. Selection of the key informants was done by visiting the different offices and asking who is responsible for the activities in the offices related to food safety (whether at the level of production, retail or consumption).

Moreover, we conducted six FGDs (three each in Harar and Dire Dawa) with 8–12 female participants in each discussion. Food practices and risks to consumers are likely to differ with socio-economic status. FGDs were carried out by



stratifying the urban residents into three groups: low income, medium income and high income. The income status of the households was obtained from health extension agents in the area. Each focus group consisted of 8–12 women selected as household members likely to be most involved in household food purchase and preparation. The information regarding the income of the selected women for FGDs was obtained from health extension workers. Health extension workers in Ethiopia are responsible for giving basic health advice and services to households in the form of packages. There are different health service packages, among which hygiene is one. As a standard, one health extension worker is expected to follow and give advice to about 500 households. We worked with health extension workers to select urban neighbourhoods typically representing low-, medium- and high-income groups, from which the FGD participants were invited to a central place for the discussion. Typically each FGD lasted 2–3 hours and was facilitated by a hired rural development professionals. Another person assisted the facilitator by taking notes and carrying out the audio recording of the discussion sessions. The specific venue for the FGDs was either a meeting hall of government offices or a hall rented in a hotel for the purpose. The participants were compensated for their time nominally and transport costs were also covered.

The specific places for the interviews were the workplaces of the respondents, and they were visited based on prior appointment. The duration of interviews varied depending on the type of producers and retailers. The characteristics of IDIs, KIs and FGDs are summarized in Table 1.

Table 1: Chicken and vegetable value chain mapping, data collection exercises in Harar and Dire Dawa disaggregated by gender

VC actors	Study site	Data collection method	Target respondents	Number of informants by gender	
				Male	Female
Chicken producers	Harar	IDI	Small chicken producer (<500 flock size)	1	1
			Medium-sized chicken producer (500–1500)	2	0
			Large chicken producer (>1,500)	2	0
		KII	Livestock production expert in Bureau of Agriculture	1	0
	Dire Dawa	IDI	Small chicken producer (<500)	0	2
			Medium-sized chicken producer (500–1500)	2	0
			Large chicken producer (>1,500)	2	0
		KII	Expert in livestock and fisheries development office	1	0
Traders and retailers (live/chicken meat)	Harar	IDI	Street live chicken retailers	2	2
			Mini supermarket selling chicken meat	1	0
			Restaurant serving chicken meat	1	0
		KII	Trade promotion expert	0	1
	Dire Dawa	IDI	Street live chicken retailers	3	0
			Mini supermarket selling chicken meat	1	0
			Both live chicken and meat selling place (with backyard slaughtering)	2	0
			Restaurant/hotel serving chicken meat	1	1
		KII	Trade promotion expert	1	0
Vegetable producers	Harar/ Dire Dawa	IDI	Small vegetable farm	3	0
			Medium-sized vegetable farm	1	0
		KII	Agricultural extension expert	1	0
Vegetable traders and retailers	Harar	IDI	Large retailer using truck (wholesaler using crates)	2	0
			Medium-sized retailer (retailing more than 10 kg)	2	1
			Small street vendor (less than 10 kg)	1	2
		KII	Trade licence facilitator	0	1
	Dire Dawa	IDI	Small street vendor (less than 10 kg)	1	3
		KII	Cooperative promotion expert	1	0
Consumers	Harar	KII	Home economics expert	0	1
			Health regulatory expert	1	0
	Dire Dawa	KII	Food safety/hygiene or public health expert	2	0
			Vegetable expert	1	0
	Harar/ Dire Dawa	FGD	Women from low-income households (1 group in each site)		
			Women from medium-income households (1 group in each site)		
			Women from high-income households (1 group in each site)		

### 3.3 Long-distance value chain assessment

The preliminary results of the qualitative study in Harar and Dire Dawa revealed that the sources of the two commodities, especially vegetables, are the central rift valley and highlands of Ethiopia. Similar qualitative investigations were carried out to focus on two aspects:

- formal poultry slaughterhouse for the handling and processing of chicken meat
- commercial vegetable production.

Specifically, the results of the qualitative investigation covered the vegetable producing corridor of the central highland and rift valley areas of Ethiopia spanning from Bishoftu to Meki (Figure 1). During fieldwork, this corridor was mentioned as the main source of vegetables for the two cities as well as other parts of Ethiopia. Large vegetable producers producing mainly tomatoes and cabbage were visited; among the farms, we interviewed three tomato producers near Meki. In addition, other farms along the corridor were visited, observed and discussed informally without interviewing.

### 3.4 Data analysis

Content analysis of the qualitative data was made by reading the summaries of the IDIs, KIs and FGDs. The themes of the question guides for IDIs, KIs and FGDs were used in the grouping of the contents of the qualitative data during analysis.

## 4 Results

The results of the qualitative study are presented in the following five subsections: (4.1) consumers of chicken and vegetables, which presents the details of how ASF in general and chicken meat in particular are consumed; (4.2) chicken retailers, describing the retail activities of live chicken and chicken meat; (4.3) chicken producers; (4.4) vegetable retailers; and (4.5) vegetable producers.

### 4.1 Consumers of chicken and vegetables

#### 4.1.1 Animal-source food and vegetable availability and use

Different types of food items derived from animals are commonly consumed in Dire Dawa and Harar, including beef, mutton, chicken meat, goat meat, camel meat, eggs, fish, milk and milk products. Common vegetables mentioned by the FGD and KII participants known to be consumed in the areas were onion, potato, tomato, lettuce, beetroot, cabbage, green pepper and various green leafy vegetables (e.g. lettuce, kale, spinach). Consumption practices vary among the different economic groups (low, middle and high income) based on their financial resources, season of cash crop harvesting and educational status. Income status highly influences the consumption practices of the urban community. High-income participants of the FGD had good knowledge of the nutritional value of foods they consume regularly, with clear ideas on their nutritional selection criteria. The low-income groups mentioned that without regular income, they cannot make a choice regarding their meal types and simply eat what is available and at their disposal. Low-income groups usually consume cheap food, especially poor quality vegetables and meat.

Chicken is eaten mostly during festival times in low-income groups, and on average once per three months. It was mentioned that they cannot afford chicken meat every time they want it, but they use eggs occasionally. Raw vegetables are consumed based on their availability at low prices and on average once per three to four days. They do not consider quality, but rather buy low-quality vegetables which are usually cheap.

Middle-income groups consume meat and vegetables more than low-income groups. They eat chicken on average at least once every month and also during festivals. They consume eggs more frequently than chicken meat and eat vegetables at every meal. The high-income groups mentioned that they have access to what they want and can afford it whenever they want. They eat all types of food in their daily meals based on their preferences. They eat chicken meat at least once every week and during festivals, and they also consume eggs every day, based on their interest and the availability of chicken and eggs, except during fasting (for orthodox Christians). It was claimed that they have access and power to purchase fresh vegetables of high quality on a daily basis.

The results of the FGDs showed that onion, tomato, potato and lettuce are the first, second, third and fourth most highly consumed vegetables in the area. Among vegetables, tomatoes are mainly eaten raw after washing with water and sometimes cooked with other vegetables, while consumption of raw lettuce was said to be increasing.

### 4.1.2 Seasonal availability and consumption of chicken and vegetables

Consumption practices vary depending on the season of the year; for example, during the wet season when vegetables are more available consumption increases. Consumption of meat and vegetables increases during festivals. Chicken is available at all times. High-income groups eat chicken when they want, but the price varies from time to time. During the dry season, the price of meat declines due to limited supply of local animals. Especially during Christmas and Easter the demand for meat and vegetables can exceed supply and the price can also increase.

Similarly, chicken meat is supplied in large quantities during public and religious holidays such as Christmas, Ethiopian Easter, Eid Al Adaha and Eid Al Fitr. According to the key informants and discussion participants, eggs are available and consumed more frequently compared with chicken. Low-income groups eat chicken only during festivals. Vegetables are available throughout the year, but the price and amount supplied vary from time to time and prices increase during the dry season. During the dry season, vegetables are much less available compared to the wet season. Small-sized tomato types, which are less preferred by the urban community, are readily available at markets from July to September. The price is relatively low during times with a high supply of vegetables.

### 4.1.3 Sources of chicken meat and vegetable (accessibility and tracing back)

Chickens are brought from urban and rural areas including Oromia regional state near to Harar (Haramaya, Jarso, Kombolcha and Fedis districts of eastern Hararghe zone and also K'ile, Woldia and Sofi districts of Harari regional state, and some private producers around Harar as well). Chickens are sold at local markets, on the street or from individual farmers or retailers. Supermarkets used to sell raw chicken in Harar, but currently the facility is not working in the city. High-income groups pay whatever the cost of the chicken and vegetables are. Roasted whole or half chickens and 'doro wot' (chicken meat stew) are well-known local chicken-based foods. Most of the poultry farms have layers (for egg production), and when old hens stop laying eggs, they are also sold for meat.

Small volumes of vegetables are sourced from eastern Hararghe districts but the major sources, especially for tomato, are from the central and rift valley parts of Ethiopia. Tomato is transported using trucks and marketed in Daker area in Harar and Kafira in Dire Dawa. There are no supermarkets in either city for vegetables, and people get vegetables from small retailers, market and street vendors. Chicken is also obtained from street vendors and sometimes from small shops selling frozen chicken meat supplied from central Ethiopia, and also from Somaliland via informal cross-border trade (the packed frozen chicken meat originates from Brazil). The street vendors in Dire Dawa also sometimes slaughter chickens when they get orders from customers. There are no street vendors in Harar slaughtering and selling chicken meat; rather, it was mentioned that people get dressed chicken meat from Dire Dawa and central Ethiopia. Low-income groups never buy chicken meat from street vendors, while high-income groups commonly use street vendor chicken meat. High-income groups buy live chickens and vegetables from the same market centres from where the poor buy, but they select high-quality vegetables and chickens which are higher in price. Low-income groups buy mixed (low-quality and medium/high-quality) vegetables from the roadside. Dishes are made with vegetables including tomatoes and lettuce, and it was stated that vegetable dishes are prepared more by women than men. Small-scale retailers (street vendors) are also women.

As per the discussions, women are often busy in household activities in which they conduct all food preparation; men are only there in the home to consume ready-to-eat food. It was stated that customarily men are not involved in the preparation of meals at home. Traditional dishes made of chicken such as doro wot are prepared without advanced technology. Tomatoes and lettuce are eaten raw after washing with water, and occasionally detergents or Dettol. Tomatoes are eaten raw in some places after washing with water. Following news of a cholera outbreak at the country

level last year, strict sanitation measures were followed in many homes which included washing fruits and vegetables using water treated with purification chemicals such as Dettol.

It was stated that most chicken used for consumption originates from rural areas and is brought by individual farmers, traders (collectors) or retailers. Freshly slaughtered chicken meat is brought and sold from Dire Dawa to Harar, but this practice is only carried out intermittently. Moreover, it was also stated that frozen chicken meat is transported from cities located in central Ethiopia (e.g. Bishoftu and Addis Ababa) and transported to Harar and Dire Dawa and sold. It was mentioned that some brokers are available to connect live chicken retailers with farmers during festivals. The brokers are not involved in physical handling of chicken but connect the farmers with traders in Harar, Dire Dawa or secondary towns.

#### 4.1.4 Chicken meat and vegetable quality and safety (knowledge, attitudes and practices)

People are not aware of food-borne diseases associated with vegetables and chicken. According to the key informants, there are knowledge gaps among producers to supply quality and safe foods, and also among retailers with regard to proper transportation, handling and storage.

It was perceived by the discussants that chemicals used on vegetable farms can be dangerous for consumers and the environment, especially in the last 2–3 years, associated with pesticides such as DDT and malathion. Producers were not very concerned about health risks associated with chemicals used for vegetable production and preservation. However, consumers and key informants repeatedly mentioned concerns about use of chemicals in vegetable production. The producers can be consumers themselves, but vegetables produced for sale and home consumption can differ in use of chemicals, with smaller amounts used on home-consumed produce. Unsafe vegetables were discussed among low-income groups due to poor handling and consumption practices of vegetables. These groups buy mixed low quality, considering only the price, and they may not wash enough for low-quality products before eating raw vegetables, which can be due to low access to water and sanitation. Also, disposal of low quality vegetables on main roads may cause environmental pollution, as per a health regulatory key informant.

As concluded by key respondents, consumers have less knowledge on food safety and hygiene, and simply buy foods on the road from dusty areas without asking how the food is produced and transported and without knowledge of the retailing conditions. Consumers also buy dirty and spoiled food from retailers and traders, then wash and eat it raw. When there is scarcity, consumers buy what they can get without selection. However, there is a difference based on income status. When economic status is considered, high- and middle-income households perceive the importance of food safety more than low-income households. High-income groups of consumers buy high-quality live chickens and vegetables. Poor people buy and consume food on the roadside. Low-income groups have no refrigerator for food preservation, while some high-income groups keep raw and cooked food together in a refrigerator, which may result in cross-contamination. High-income groups also did not know that the refrigerator is used to preserve cooked chicken. Regarding age-based food access and consumption, adult and child meals are prepared separately among high-income and medium-income groups, while among low-income groups there are no child meals prepared separately; instead all family member share commonly made foods. When gender is considered, women are more concerned than men about food safety.

#### 4.1.5 Options for improvement (initiatives and suggestions to improve food hygiene and safety)

There were variations among respondents regarding the past or ongoing initiatives to improve food hygiene and safety in their towns. In Harar, there are community health workers serving the community in awareness creation and enabling

them to keep the environment safe. There is also counselling on child feeding and environmental sanitation. Similarly, there is a nutrition and sanitation program funded by the Food and Agriculture Organization of the United Nations and Productive Safety Net Programme working in three kebeles of Harar. More projects work on food security than food safety. In Dire Dawa, there are no initiatives that work on vegetable or chicken food safety, but there are projects that work largely on water, sanitation and hygiene.

The key informants provided suggestions regarding improving food safety and hygiene, particularly for chicken and vegetables:

- produce quality production assisted with advanced technology;
- extend service on awareness creation and enable the large community involved in producing quality produce by creating income generating activities for them;
- improve production, collection and transportation as well as supply for markets;
- supply water harvesting geo-membrane tools and use recommended and required pesticides on time; and
- collaborate among chicken and vegetable VC actors concerning food safety.

The key informants put forward recommendations on food production and processing related to different factors by stating that live chicken and vegetable producers should have to know and become aware of how to produce safe food. Emphasis was given to the inappropriate use of chemicals in vegetable production, which can be dangerous for human health and can also pollute groundwater. The key informants further recommended that producers should know about proper utilization of fertilizer and water to ensure the quality and safety of produce and to minimize risks that may affect the health of the community associated with agricultural production. Recommendations forwarded with regard to traders and retailers were related to having good knowledge on how to handle and supply during the transportation and storage of raw materials or foods. Similar recommendations were forwarded connected to the role of consumers to keep food safe, stating that consumers should know the source of food, where it is produced, by whom, how and from where it is supplied. Consumers should handle food properly after they buy it.

The recommendations for the government were related to monitoring the activities of producers, suppliers and consumers by enforcing regulation and quality control measures. It was further noted that the government should focus on awareness creation among the communities on hygienic production, handling and consumption of food. Specifically, the government focus should be on monitoring and regulation of traders and retailers supplying chicken and vegetables, ensuring they supply quality food for the community. In addition, the government also needs to develop and launch projects that work on food safety in general.

The detailed results of the KII with a public health officer working for Dire Dawa city administration are presented as follows. The interview is presented in more detail than others, given that it covered very relevant health and food hygiene aspects which can be of interest to the pull-push research project. The officer mentioned that public health priorities are maternal and child health (including nutrition), water and sanitation, and addiction. They mentioned that addiction is a major health problem in Dire Dawa related to chewing of leaves of the stimulant plant khat and consumption of alcohol. The area is poor, mostly dependent on informal livelihoods, dry and unfertile, and there are many problems associated with poverty (HIV/AIDS, tuberculosis, malnutrition, diarrhoea, skin disease, etc.). It was stated that cholera is one of the water- and sanitation-related health problems in the area which is common due to shortage of water in the city as well as in the neighbouring rural areas. According to the health officer, cholera outbreaks are believed to originate from rural areas where open defecation is common and from camps of internally displaced people. People from rural areas frequently come to urban areas and may live, for example, in markets where food is sold; if infected, they spread infection through defecation to the urban population via contaminated fruit, vegetables and water sources. In addition, cholera can be spread when sick people from rural areas come to the city for medication. From experience, cholera risk increases during the mango harvesting season (June–September), as the fruit can be contaminated and eaten without adequate hygiene;



some sell or give damaged fruit to orphans, who may also scavenge, resulting in them becoming infected. The health officer mentioned that diarrheal diseases in the area can be associated with fruits and vegetables, with mango a major risk, but also avocado, tomato, onion, lettuce and banana, which are eaten uncooked in the form of salads and are common affordable foods for people of low income.

The public health officer mentioned that a recent rapid survey (unpublished) carried out by the Health Bureau of Dire Dawa City Administration in the food and drinks sector (hotels, shops, etc.) revealed hygiene problems, and these were confirmed by further inspections. In general, the main food safety problems in the area according to the health officer are: 1) a lack of awareness among residents regarding hygiene and sanitation; 2) shortage of water, restricting washing (the main water supply in Dire Dawa can be cut off for up to two weeks at a time); and 3) negligence at all levels of VCs. As there are interruptions in the supply of water, households will store water, often in dirty open containers that are accessed by animals, compounding the potential for contamination with animal faeces.

With regard to the handling and consumption practices of chicken meat, it was stated that household slaughter of chickens is common and is often unhygienic. Slaughtering and dressing of chickens used to be more common in the Dire Dawa markets before it was restricted due to hygiene problems; however, it still happens at an illegal underground level and there is an informal trade in dressed chicken. Some restaurants also sell raw or cooked chicken to consumers to take away. Although there is a municipal slaughterhouse in Dire Dawa, people do not bring chickens there to be processed due to cost and convenience issues.

The health officer further noted that hygiene is a problem during holidays when chickens are widely slaughtered and consumed. During these times there is a lack of enforcement of food safety regulations contributing to a high burden of disease, particularly in children. The Eastern Branch of the Ethiopian Food and Drug Administration largely focuses on the regulation of wholesalers.

The following suggestions were forwarded by the health officer as a key informant:

- the government should investigate market conditions and give or require improved facilities and standards;
- there should be better control of illegal trade and practices (e.g. slaughtering);
- subsidizing formal slaughter will reduce the incentives to slaughter chickens illegally in the informal sector;
- health extension workers should conduct awareness campaigns on food safety and hygiene (they already cover aspects on hygiene and sanitation in existing programs); and
- the water supply should be improved in terms of quality and quantity.

## 4.2 Chicken retailers

### 4.2.1 Types of food commodity retailed

The results of the IDIs and KIIs show that chicken meat is sold in minimarkets alongside other food products such as vegetables, fish (tuna), ruminant meat and dairy products. Most retailers that sell only chicken offer it in different forms such as dressed, live or ready to eat (roasted, stewed or fried). In general, live chickens, chicken meat and eggs are among the products sold on the market in the two cities. Restaurants prepare and sell ready-to-eat food such as roasted and stewed chicken, while most shops and minimarkets sell dressed chicken. Whole dressed chicken meat is sold instead of cut pieces.

The numbers of daily customers buying live or dressed chickens vary based on the availability of products, customer interest and the quality of products. For example, customers of live chickens range from 5 to 60, while for ready-to-eat

chicken customers range from 40 to 100 per day. Minimarkets selling dressed chicken also have from 5 to 20 customers daily. Actually, there were two types of customers mentioned: regular and one-time customers. Proportionally many retailers have more one-time customers than regular. It was stated that restaurants also have fewer regular customers, even though there are frequenters. Hotels are mostly regular buyers of chicken from minimarkets and live chicken retailers. Most customers buy during the morning, 0900 to 1100 hours, to prepare for lunch, while there are also some customers in afternoon buying for dinner. Ready-to-eat chicken food is commonly purchased at lunch and dinner time.

The times at which customers buy chicken or chicken meat vary depending on the season (including fasting and holidays), interests of customers and the types of chicken products. These can be determined from the inconsistent response of retailers. Similarly, quantities sold at one time also vary based on interest and supply. For example, customers often buy single or half roasted chickens from restaurants. Low-income groups buy single live chickens during festivals. Customers of high-income groups purchase one to three chickens at a time. The needs of hotels vary, with large quantities purchased at a time and kept refrigerated or frozen. Customers of stewed and roasted chicken regularly buy all days in a week; however, individual customers of live and dressed chickens vary in frequency from one to four days per week. Hotels and restaurants buy dressed and live chickens on average one to two times per week.

Chicken meat is commonly sold packed; however, the kinds of packaging used when selling chicken meat vary depending on the types of products sold. Customers taking away stewed, fried or roasted chicken from restaurants buy it in plastic wrap or aluminium foil and carry it in plastic bags, called 'festa' locally. Retailers who provide chicken slaughtering services put the chicken in large plastic bags and immediately deliver it to hotels and restaurants. However, supermarkets that import packed poultry meat from other places do not add any additional packaging, simply keeping it in cold chain until sold. Buyers of live chickens place much emphasis on the health and nutritional benefits and convenience of chicken. Some also place their primary concerns on the taste and safety of chicken. In marketing of chicken meat, health and nutritional benefits and convenience are seen as the major concerns of customers, and taste is a higher concern than safety.

When selling live, dressed or cooked chicken, retailers cite concern for different factors such as ease of sourcing, price and convenience. Retailers give lower attention to shelf life. On the other hand, live chicken retailers give great attention to consistency of quality, supply, reliability and price. These retailers have little concern for ease of sourcing products.

## 4.2.2 Sources of chicken (accessibility and tracing back)

The chicken meat retailers in the two sites mentioned that they are receiving from three different sources: Dire Dawa (Addis Sefer); central parts of Ethiopia (Hawassa, Addis Ababa, Bishoftu); and cross-border trade from Somaliland and Djibouti. It was mentioned that bad roads and busy traffic make transportation of chicken meat from distant places difficult. Chicken meat from Dire Dawa can, however, be easily transported within the city or to Harar. In terms of availability, chicken from central parts of Ethiopia was described as good but that imported from Somaliland showed high variation from time to time. On the other hand, live chickens were found to be easily available, given that local villages and neighbouring districts are the main sources and in all cases the chickens can be found within a radius of 28–120 km. The districts mentioned to be sources of live chickens are Watar, Dadar, Kersa and Qullubi. Still, transportation is not easy from these places either due to poor roads or insufficient vehicles.

Generally, the majority of the retailers are engaged in live chicken retailing while only a few sell dressed chicken. There are also some individuals involved in both live and dressed chicken retailing by slaughtering chickens in the backyards of their retail locations. Dressed chicken retailers regularly use the same suppliers (as trusted customers) while live chicken retailers buy chickens from various sources; some most often use the same supplier, while others have no regular suppliers. It was indicated that suppliers and chicken retailers create mutual trust over the longer term; the retailer–supplier relationship is one based on trust.

Dressed chicken retailers buy from various sources including local small and large suppliers and regional traders. Live chickens are sourced from local small producers and traders. The following points are different reasons retailers mentioned when selecting live or dressed chickens with regard to the source they chose:

- reasonable price
- distance of transportation considering time and cost
- availability
- quality product (good appearance)
- standard of transportation to deliver to shops
- source reliability
- trust and long-time relation.

The retailers decide what to buy either by themselves or by suggestions from customers. Before they buy live or dressed chicken, retailers consider various criteria of preference. For instance, the retailers of dressed chicken place great emphasis on colour, appearance, size and expiry date, among others, before buying the product. Similarly, live chicken retailers consider appearance, weight, health status, sex and price before buying.

Maintaining hygiene during transportation is not similar for all retailers. Dressed chickens from local markets (observed in Dire Dawa) are put in plastic bags and delivered to customers by car or three-wheeled vehicle ('bajaj'). It was observed that some of the retailers put all dressed chickens (5–20) in one plastic bag, but some of them pack the chickens individually, then put them in one large plastic bag and transport them at room temperature. The time taken for delivery was mentioned to be short (from less than 10 to 30 minutes). On the other hand, it was claimed that the dressed chicken transported from distant places comes already packed individually, boxed and transported in refrigerated vehicles. Live chickens are transported by truck; some of them are caged and transported in partially protected trucks which could expose the chickens to direct sunlight. Some are not caged and transported in open trucks. In general, locally prepared chicken meat is packed in plastic while imported meat comes already packed and is kept in a plastic box before delivery. Live chickens are grouped together and tied by their legs or boxed. They are transported using public taxis and minibuses, without cages and exposed to sunlight.

The time necessary for transportation of live chickens varies according to distance, ranging from 10 minutes up to 6 hours. In all cases, there is no resting place on the way while transported. The entire local chicken VC is as follows:

- producers produce live chicken in rural areas;
- collectors purchase and collect live chickens locally from small markets in different districts of Hararghe zone and other local markets;
- traders and brokers (often only one person along the chain) connect business persons and live chicken sources, then supply live chickens to retailers, or in some cases slaughter the chickens (specifically in Dire Dawa);
- slaughterers receive live chickens from different sources, slaughter and dress them;
- retailers and mini markets dress chicken received from traders or supermarkets for sale to individual customers, hotels or restaurants;
- hotels and restaurants serve consumers by cooking, frying and roasting chicken meat; and
- consumers consume the chicken products.

## 4.2.3 General chicken handling and processing

There are variations in how retailers handled live chickens while keeping them until sale. Many retailers treat the chickens properly by giving them feed and clean water and keeping them under shade. They even sell the chickens to customers with shaded housing. On the other hand, some retailers expose chickens to extreme environmental conditions. They give them feed and water on the roadside, where they market them daily until all of the chickens are sold. Diseased chickens are not separated from healthy ones. The chickens are exposed to sunlight all day, and at night they are taken to housing.

The housing is based on the size of flock, income and type of business. During the night, many of the chickens are kept in housing until they are sold or slaughtered. During the day, some of the retailers keep them on the roadside of the market, then take the unsold chickens back home. As mentioned above, others have a retailer house where they might keep their chickens for 2–3 days and nights. Most retailers sweep the place where they keep their live chickens and sometimes disinfect with kerosene or cover with cartons, while some do not do any cleaning or disinfecting, although there is flaming of the house where chickens spend the night using fire blaze. All of them keep chickens near the roadside to display, where some put them under shade and some keep them out where they can be easily seen by customers on their way to the marketplace. Chickens are not treated with veterinary medications when retailed, and even if treatment starts they are sold and slaughtered during the course of home treatment.

## 4.2.4 Chicken backyard slaughtering and handling practices

During the qualitative study, one informal (backyard) slaughterhouse was encountered which can slaughter up to 150 chickens per day based on demand and availability of live chickens on the market. As per the information we got, the proprietors select chickens of similar body weight and size from live chickens retailed in the house/street vendor market. Weak and diseased chickens are considered first for slaughter (physical observation). Then water is boiled for scalding and defeathering. The chickens are kept and water boiled at the same small house. Two slaughter methods are performed in the house for Muslims and Christians. This backyard slaughter has no legal permission from the government.

The steps of backyard slaughter, differing from a modern slaughterhouse, are as follows:

- first they bring chickens from the place where they are housed at night at the slaughterhouse;
- they cut the necks and keep the chickens in buckets to reduce disturbance and immobilize them;
- they bleed all chickens in the same bucket, then remove them and keep them on the dirty ground (Figure 2);
- they scald chickens one by one in boiling water for one minute, based on the interest of customers at the slaughterhouse;
- they remove the feathers and disposed of these in a bucket;
- there is no slaughtering line – all steps are done at the same place;
- for individuals who request skin, especially for hotels, they leave the skin on, while for those who do not need the skin they remove it without further scalding;
- they remove guts and intestines into a bucket;
- they rinse chickens off under cold water, repeatedly using the same water to wash almost all chickens slaughtered in the same day; and
- they pack meat from 15–20 chickens together in single plastic bags.

It takes 10 minutes to complete slaughtering of one chicken.

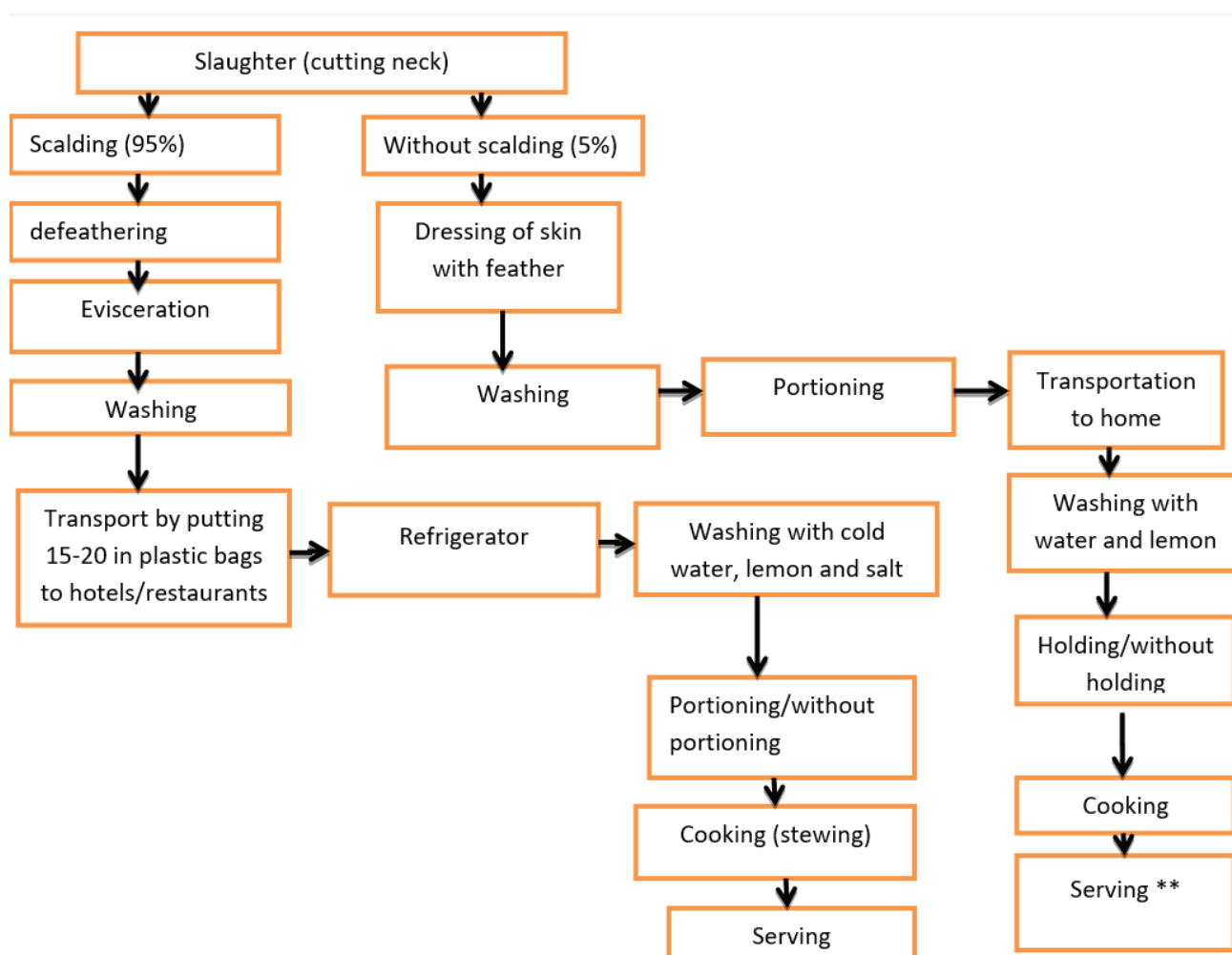
Figure 2: Chickens at a backyard slaughterhouse being bled in the same bucket and then removed and kept on the dirty ground



Photo credit: Jafar Kedir.

Portioning is not done for hotels or restaurants, but some individuals who buy from the backyard slaughterhouse need portioned chicken meat. Cutting and deboning is based on these individual needs. For hotels, they simply supply without deboning, and only the gizzard of the chicken is removed and packed and transported together. Washing is done only once and that is after feather removal and evisceration is completed. For those who need deboned chicken meat, washing is repeated after deboning is completed. Generally chicken meat is not stored, but sent to customers immediately after slaughter. Figure 3 depicts the steps and process of chicken meat handling.

Figure 3: Flow diagram of backyard chicken slaughter and meat preparation.



\*\* Consumers at the household level may serve the meat several times after reheating.

#### 4.2.5 Chicken slaughtering at a formal slaughterhouse in central Ethiopia (long-distance chain)

A chicken slaughterhouse located in central Ethiopia was visited based on information obtained from Harar and Dire Dawa chicken meat retailers during the qualitative investigation in the area, in which it was stated that frozen chicken meat was supplied from central parts of Ethiopia. The slaughterhouse, owned by a private company, is found in Bishoftu, a town located 50 km south of Addis Ababa. According to the information we obtained, the slaughterhouse has a capacity to accommodate slaughtering of 8,000 chickens a day, based on supply of broilers and demand for chicken meat. The broilers are supplied from different poultry farms in Bishoftu, and the slaughterhouse also has its own chicken farm. Different processes in the abattoir are described as follows.

##### Stunning and killing

Chickens are supplied and transferred to the moving shackles. There is no stunning machine; the birds are killed by a sharp knife that cuts the jugular veins and carotid arteries at the neck.

## Scalding and defeathering

Following bleeding, the birds go through scalding tanks. The carcasses then go through the feather-picking machines, which are equipped with rubber 'fingers' specifically designed to beat off the feathers. The blood and feathers accumulated during these early steps are generally collected and rendered to make blood meal and feather meal.

## Removal of heads and legs

The heads of the birds go into a channel where they are pulled off mechanically; the legs of the chickens are removed with a rotary knife at the hock. The carcasses drop off the shackle and are rehung by their hock onto the eviscerating shackle line. The scalding and defeathering steps are separated by a wall from the evisceration steps in order to minimize cross-contamination.

## Evisceration and inspection

Evisceration is conducted in a separate room from the defeathering room. The oil gland is removed from the tail and the vent opened so that the viscera can be removed. Evisceration is done by hand with knives. The carcasses are not inspected during the evisceration process or anywhere on the slaughtering line.

Carcasses and edible offal are further cleaned with water. The viscera are separated from the carcasses, and the edible offal is removed from the inedible offal. The heart, stomach and liver are all considered edible offal and are independently processed. Stomachs are generally cut open and the inside yellow lining of the stomach along with the stomach contents are removed.

The lungs and kidneys are removed separately from the other visceral organs using a vacuum pipe and the carcasses are then washed thoroughly.

The gizzard is opened and cleaned with tap water. The carcasses are inserted in a tank of water to cool and wash them thoroughly, then passed to the packing room. The carcasses and edible offal are washed thoroughly and edible offal is re-inserted in the abdominal cavity. Some of the chicken meat is supplied to butchers without packing (Figure 4), while packed chicken is transported to the chilling room.

## Chilling

After the carcasses are washed and packed, they are chilled to a temperature of 4 to 18°C to obtain frozen chicken meat. After 24 hours, the carcasses are either taken to storage to keep at 4°C or they are taken to supermarkets, restaurants or hotels in different parts of the country.



Figure 4: Unpacked chicken meat on plastic pallets to supply to local supermarkets.



Photo credit: Jafar Kadir.

Regarding hygiene practices in the slaughterhouse:

- people handle chicken meat without wearing gloves;
- machines damage the skin and carcasses;
- unpacked chicken meat is supplied to butchers;
- there are no stunning machines, so incomplete bleeding occurs;
- chicken meat bruises are apparent, which are mainly due to machinery;
- there is no pre- or post-mortem inspector;
- any bird that is not properly bled appears redder after feather removal and is condemned;
- they supply packed chicken meat to different parts of the country, including Harar and Dire Dawa; and
- regarding the VC actors, there are some changes due to the supply of unpacked chicken meat to butchers who sell the product to hotels and restaurants.

#### 4.2.6 Chicken meat handling and processing (live, dressed and cooked chicken)

Concerning storage type and location of storage and how long the chicken meat is stored, it was assessed that most retailers, hotels and restaurants keep chicken meat refrigerated for various times, though there were complaints regarding electric power interruption. Some retailers use generators to maintain the temperature of their refrigerator. Regarding washing of the storage materials, some of them wash their fridge daily, some don't wash their fridge, while some do it once every week. There are also cases in which the fridge is washed when products are finished and before more are taken in. Some keep cooked chicken in casseroles until it is sold. To display their products to customers, some retailers

use transparent refrigerators; however, other retailers have no such facilities, and customers come to them based on previous experience and information. Another concern with respect to working with uncooked poultry is cross-contamination, which can also happen in the fridge. Raw chicken can leak, and the dripping juices can contaminate items nearby or on the shelf below. Retailers never store their chicken meat tightly sealed or keep it on the lowest shelf so that it cannot leak onto anything below it.

Purchased chicken meat arrives at hotels and is received by hotel workers. After checking, chicken meat is washed with lemon and water thoroughly by kitchen workers or the chief for about an hour and some spices are prepared and mixed with clearly washed chicken meat to be cooked in boiling water, then kept in boiling oil for further preparation and roasted well. Finally, prepared and roasted chicken meat is supplied to consumers. They preserve chicken meat in the refrigerator for up to three days when there is no electric power interruption. Lettuce is also prepared alongside the roasted chicken to be offered to consumers.

Some retailers buy processed chicken meat while others buy live chickens and process them. Washing is done using tap water, as well as salt and lemon, and repeated several times. There is no cleaning or disinfection of the equipment used in the processing.

#### 4.2.7 Quality and safety (knowledge, attitudes and practices)

The retailers of chicken meat emphasized the following quality and safety characteristics:

- external appearance including packaging
- size, like large leg size
- weight
- storage duration and expiry date
- smell
- price.

Similarly, retailers of live chickens take notice of many characteristics before buying. These include:

- alertness
- normal colour of comb
- size or weight
- overall appearance and quality of coat
- normal sounds and holding up of neck and wings.

There were different factors suggested to reduce the quality of live chicken or chicken meat.

Live chicken quality was said to be affected by:

- disease
- inappropriate feeding and watering
- poor hygiene management
- parasites
- extreme weather conditions.

On the other hand, chicken meat quality and safety was said to be decreased by:

- improper washing and delay in transportation to hotels
- inappropriate packaging, storage and transportation
- slaughtering of diseased chicken
- disease and trauma
- poor handling practices
- electric power interruption.

Most retailers suggested that these factors make chicken meat less safe to eat. Some of them believed that there is nothing wrong with consumption of roasted meat. Generally most retailers described that disease, inappropriate packaging, storing and transportation and electric power interruption were the main causes of poor quality of chicken meat. Similarly, diseases, parasites, poor management, emaciation, and improper feeding and watering were suggested as the main causes of the poor quality of live chickens which reduce their fitness for food.

Customers also want quality of chicken products. For this reason they look to different organoleptic properties of the products before they buy. Most commonly the customers see size, appearance (colour), storage and preservation, labelling (halal, expiry date, etc.), smell and intactness as important quality determinants before they buy chicken meat. The customers also consider the breed from which the meat is sourced. For instance, hotels want meat of exotic breeds because it is larger in size, soft and heavy. When they buy live chickens, customers are concerned with various aspects including appearance, size and weight, price, alertness, sex, breed, age (size of spurs) and parasite infestations. A few customers ask how the products (chickens/meat) were produced or from where the products were brought, considering where disease outbreaks have happened previously. But most buyers do not ask these questions.

Poor quality (weak chickens, poor quality meat) is responded to in different ways by retailers; some of them discard it and some of them sell it. The retailers of chicken meat are very careful while buying to avoid poor quality meat, and if they get it unintentionally, they reject it or return it to suppliers. This is because communities will not buy either sick live chickens or poor quality dressed chicken. A few sell poor quality chicken meat at low prices to restaurants, hotels or to people to feed their dogs. Weak or diseased chickens are slaughtered rapidly and the meat supplied only to restaurants or hotels. A few people also attempt to treat sick chickens before sale. Low-income customers do not want to buy weak or sick chickens either; they will rather choose chickens of smaller body weight and females for slaughter.

## 4.2.8 Retailers' suggestions for improving safety and hygiene

The most important aspects (most of them related to food safety and hygiene) that chicken meat retailers considered as criteria were listed in order of importance:

- hygiene during processing (worker, equipment, environmental) and handling
- healthiness and free of trauma
- standards of transportation, packaging and storage
- quality of product
- weight and size (which affect the price)
- price (a criterion for different socio-economic groups)
- expiry date (for packed chicken meat).

Regarding the necessity of improvements to food safety and hygiene, many retailers consider that improvements are definitely needed, while some suggested that improvements are desperately needed. There were suggestions that the government needs to do regular inspections in hotels and restaurants and control street food vendors, with regular follow-up. To improve food safety and hygiene, they suggested that consumers could:

- refrain from buying poor quality for the sake of price;
- ask and identify high quality of the product;
- buy healthy chickens;
- know the brand, storage and expiration date; and
- give feed and water for chickens at the moment of retailing.

Similarly, producers could:

- have enough awareness in considering chicken as an economic source and enhancing production scale;
- increase production and enhance product quality;
- keep high quality through regulation and safety guidelines;
- treat diseases and mites;
- keep chickens healthy by vaccination and safe transport;
- manage chickens properly; and
- give improved feed and pure water.

When traders buy from producers, they should buy quality products and keep them safely. In general, retailers suggested that traders should:

- pay the appropriate price for quality products;
- access quality products easily;
- follow standards of transportation, preservation, packaging and storage;
- know the preferences of customers;
- avoid exposure to sunlight;
- refrain from stacking chickens on top of each other at the time of transportation;
- give feed and pure water to live chickens; and
- carefully examine sources of products before buying them.

It was suggested that to improve food quality and safety, retailers also need to:

- improve equipment sanitation and staff and environmental hygiene;
- search for sources of quality product supply and focus on hygiene rather than price;
- make contact agreements with suppliers that fulfil standard packaging, storing and transportation principles;
- monitor daily food menu and sales information to collect customers' feedback;
- improve preservation and storage;
- wash properly during slaughtering;

- clean refrigerators and adjust to appropriate temperature;
- use generators during electric cut-offs;
- dispose of poor quality chicken meat rather than selling;
- prepare cages and shade for displaying;
- treat diseased chickens;
- transport slaughtered chicken meat early;
- keep meat in a good place the moment it comes into their hands; and
- give feed and pure water.

The most important constraints hindering retailers making these improvements were:

- low income and lack of support from the government
- lack of awareness, knowledge and expertise
- lack of feed, equipment, facilities and transportation
- additional costs due to diseases, transportation, electric power cuts, feed and facilities
- difficult sourcing of food products (e.g. frozen chicken)
- buyers' unwillingness to pay more for quality
- extreme environmental conditions favouring diseases and pests
- absence of competitor suppliers leading to high costs of equipment and feed
- lack of display places for products
- lack of formulated feed locally.

Retailers also gave their suggestions of solutions to the challenges in food safety and hygiene:

- awareness creation is needed in VCs and training needed on food safety and hygiene for poultry producers, traders and retailers;
- advanced technological mechanisms should be employed in production, processing and handling;
- there needs to be a focus on paying for quality of products rather than looking for good products at low cost;
- quality products need to be produced and retailed that satisfy customer demand in terms of safety and quality;
- investment must be supported in chicken meat marketing;
- the government should give support to modernize places of slaughter, packaging and transportation; and
- all have to do their part, including the government, non-governmental organizations and the public at large.

According to the retailers' responses there are not many initiatives towards food safety or hygiene improvement already in place, except that the Department of Environmental Health of Haramaya University provides advice on sanitation. To change the current situation of chicken and meat safety and hygiene, retailers suggested what they thought would be most helpful and what needs to be strengthened, including:

- government follow-up and monitoring of safety and hygiene in all poultry VCs from production to consumers
- taking initiative and incorporating advanced technological tools in production to overcome safety, scarcity and food insecurity

- awareness creation from top to bottom across all levels on production quality, enhancing amount of products, safety and hygiene
- implementing market VCs with quality control mechanisms
- projects working on diseases intervention, particularly those engaged in treatment and vaccination of chickens
- support to chicken meat retailer capacity building like fulfilling infrastructure, training and linkage
- health check-ups, follow-up and monitoring by the government.

## 4.3 Chicken producers

### 4.3.1 Farm description

Table 2 below shows the different farm types (according to flock size and purposes of keeping) of those interviewed in the present study in the two cities.

Table 2: Chicken production types in the two study cities\_

City and neighbourhood	Farm type/chicken type and breed if known	Flock size
Dire Dawa (Sefer Selam)	Commercial/layers (Bovan)	700
Harar (NOC)	Commercial/layers (Bovan)	1,900
Dire Dawa (Technique)	Village/layers	190
Dire Dawa	Commercial/layers (Bovan)	2,000
Harar (Dakar)	Commercial/layers (Bovan)	650
Dire Dawa (Sefer Selam)	Commercial/layers and broilers	3,000
Harar (Kebele 18)	Village/layers and broilers	250
Dire Dawa	Village/layers and broilers	150
Harar	Commercial/layers	3,000
Harar	Commercial/layers	1,400
Dire Dawa	Commercial/layers (hybrid)	1,200
Harar	Commercial/layers (hybrid)	972

In most cases the poultry farmers did not report having another farm, while a few of them keep goats along with poultry and very few engage in crop production. Chicken farming is a very important source of income for most of the chicken farm owners. Many of them have no other source of income or employment. However, some engage in small-scale trade and employment along with poultry production. Most of the commercial poultry producers buy commercial feed and prepare it based on the instructions, while some buy this and mix it with locally prepared feed according to their own formulations. There were also producers who prepare chicken feed entirely from local markets based on their own formulations.

The producers keep chickens in housing in most cases, except for a few village producers whose birds are scavenging. Water is one of the most challenging problems mentioned by the producers. The common source of water is tap water and big tanks are used for storage. Some also use water from boreholes. There are also those who use water transported from other places. It is not common to use chicken faeces as fertilizer in the area, as mentioned by many producers, and only sometimes do they sell it to other farmers at a low price for use in crop production. It is very common to dump the faeces into a pit and only remove them after a long period of decomposition.

As per observations and the results of the interviews, there are no means for chickens to come in contact with human excreta, as producers regularly keep chickens housed aside from the few village chickens scavenging outside. There is no practice of testing animal feeds and none of the producers conduct laboratory tests of feeds for poultry supplied from central Ethiopia. There is no periodic sending of feed samples to laboratories for analysis of nutrient content (e.g. moisture, amino acids, total fat, crude protein, phosphorus, calcium) or for comparison with the suppliers' guarantees. As a result, some chickens have died due to feeding. The prices of raw materials vary according to the source of supply and region, yet prices of mixed feed remain excessively high even at times when the prices of the major components fall by more than 50%. The main feeds given to chickens are alfalfa meal (high protein, good for winter); maize (a mainstay for chickens, stored whole); soybean cake (for protein); and wheat middlings, oats and barley (less than 15% of the total diet together). Village backyard chicken producers give their chickens locally available grains such as maize.

Regarding biosecurity, many of the farms have no restrictions on visitors, but some others have footbaths with a solution of disinfectant chemicals at the farm gate. Similarly, many farms have no hygienic barrier, although a few of them do and some have whole farm fences. It was only a few producers who practice rodent control programmes in which they use rodenticide and construct housing to prevent rodent access. In general, there are no strong measures regarding biosecurity of the farms.

There is no sharing of equipment between the farms, except that some of them share egg trays and feed. It was observed that there are no known numbers of flock density per area and not much consideration is given to this. Generally, some farms are dense and others moderately dense. At the end of their production layers are sold for meat; however, there is no known practice of feed withdrawal periods when chickens are intended to sell for meat. Producers only reduce layers' feed and give additional vegetable feed to completely stop egg laying.

### 4.3.2 Chicken availability (seasonality) and value chain mapping

The poultry producers in the area get their chicks from various sources. Many of them get day-old chicks from central part of the country, mostly from Bishoftu (e.g. Alemma farm) and some also from Ethio-Chicken companies. Most of them don't know how the chicks have been kept before they reach them. What they know is only that day-old chicks are kept in crates and boxes, loaded on open trucks and transported to them.

Regarding seasonality in production and market, the producers raised different opinions. The respondents were not much aware of the seasonality of chicken diseases or mortality, but in a few cases it was mentioned that spring and autumn are when chicken diseases and mortality are common. There was no consistent information regarding medication (vaccination) of chickens, which could be due to a lack of record keeping or because farmers might not want to disclose fully their disease treatment strategies. Similarly, it was not possible to get information from the farmers on the drug withdrawal period and its effect on human health through the food chain.

The age at which producers sell chickens varies based on the type of production, body gain and market demand. In commercial chicken production, layers finishing their production are used for meat when they start to show a decrease in egg production (in 1–2 years). However, traditional village cocks are ready for market in 6–9 months. Some rearing broilers sell them based on body gain and market demand (associated with festivals). Chickens are often sold to local communities at market or at the farm, while some are sold to restaurants and hotels. There are also intermediary retailers that in turn sell to restaurants and hotels. Old layers are sold at the end of their production according to the number to be removed and number of hens the producer has, which varies from 300 to 800 birds per batch. However, it was mentioned that the farmers also sell culled chickens when they are no longer needed, on average ranging from 5 to 40 per batch depending on the size of farm. The majority of producers sell to local consumers directly, some of them sell to brokers (traders) and retailers, and a few of them sell to hotels.



### 4.3.3 Chicken quality and safety (knowledge, attitudes and practices)

Producers engaged in keeping layers expressed high concern related to health of the birds, yield, water and feed quality, and quality of eggs including weight, internal colour, taste, shell quality and cleanness. Most of the producers shared an understanding that feed quality and diseases affect the production and productivity of their birds. According to the farmers, buyers of chickens have their own judgments regarding the quality of chickens which include weight, age, size, alertness and how the birds are handled. It was stated that buyers don't raise concerns related to how the chickens are produced, especially if the chickens are intended for meat, but some producers get such questions from customers who need the poultry for production purposes. These customers ask producers selling hatched chicks about previous health status, vaccination, age, and feeding and watering status of their chickens.

### 4.3.4 Producers' suggestions for improving safety and hygiene

To improve chicken food safety and hygiene, producers commonly suggested the following points:

- proper house management
- proper feeding and watering, vaccination and biosecurity
- isolation of sick chickens
- early treatment of the sick.

Some of the challenges which may stop them from achieving these are:

- lack of facilities and infrastructure (e.g. water, marketplace, housing)
- lack of support from the government (e.g. provision of space for production and extension services, access to supplies)
- lack of knowledge, awareness and supply of vaccination and poultry feeds.

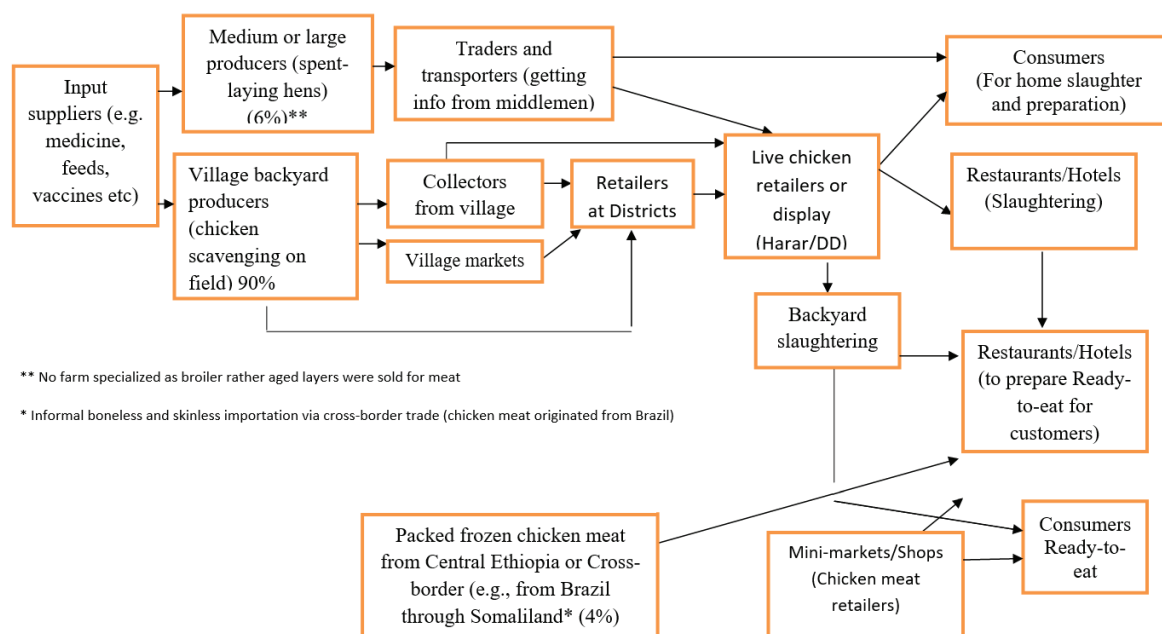
Many points to improve the situation were suggested by producers, and on government support many of them stressed that the government should provide necessary infrastructure, facilities and training and create awareness to curb the problems. Some also added that effective management, biosecurity, and maintaining the health of chickens on the farm can mitigate the problems. Producers commonly suggested as the most helpful things to ensure food safety:

- support from the government
- effective vaccination, feeding and watering
- effective management
- biosecurity.

Finally, even though initiatives have already been undertaken to address food safety (e.g. food hygiene promotion by health extension agents as part of nutrition programs), many of the producers had no awareness regarding these initiatives. Some, however, mentioned concerns on the limited availability of training regarding improving production, quality and resource utilization, in which the farmers were very interested to get further support related to increasing production capacity rather than specific food safety issues.

Overall, the VCs of chicken meat and live chickens are summarized in Figure 5.

Figure 5: Flow chart of chicken value chains in eastern Ethiopia focused on food safety.



## 4.4 Vegetable retailers

### 4.4.1 Vegetable availability and use

Vegetable retailers considered in the study area sell different vegetables. Most of them sell tomato, and some also sell onion and potato; a few additionally sell green pepper, parsley, eggplant and lemon. It was observed that almost none of the small- or medium-sized retailers prepare ready-to-eat meals at their retail shops for sale, and only a few of them prepare foods such as salads or food for their own use. As a result, in many retail shops the possibility of cross-contamination between cooked and raw products was not observed; they do not keep raw and cooked food together. There is, however, a probability of contamination between healthy raw and physically damaged or unhygienic raw tomatoes, especially during the rainy season and conditions of high humidity. Mostly retailers sell tomatoes, but a few also sell leafy vegetables such as lettuce, kale and spinach. The number of customers visiting the retailers depends on the size of their business: many of them average 30–40 customers per day, while some have only 2–5 customers per day, and there were also those receiving 100–200 customers per day. The proportions of regular customers vary from retailer to retailer. Many have 10–40 regular customers per day and a larger number of one-time customers.

Vegetables are sold throughout the day, but the morning is the busiest time of the day when customers buy vegetables. Most retailers buy vegetables according to their interests and business size. Similarly, the measurement used in selling also vary. Some use wooden or plastic boxes or plastic bags, and others use kilograms. In general, regular customers such as hotels, big retailers and traders buy greater volumes than those buying for their own consumption. No consistent volume of sales exists among the retailers where the minimum is 1 kg and maximum is 150 kg, alongside informal measurements such as boxes or crates.

When they sell vegetables, retailers have no specifically designed or fabricated packaging materials. Rather, they put vegetables into different containers including plastic bags, plastic containers, and wooden and plastic boxes. Plastic bags of different sizes are the common material used by customers to carry vegetables when buying from producers or retailers.

Vegetable customers consider different characteristics of products, and there is little variation in their preferences. Figures 6 and 7 below depict various conditions of vegetable (specifically tomato) retailing activities.

Figure 6: Tomato handling and retail activities.



**Keys:** (a) roadside retailing, (b) sorting and storage according to the level of maturity, (c) ripened tomato ready for local sale, (d) sorting out and packing of tomato on floor

(a) Roadside retailing. (b) Sorting and storage according to level of maturity. (c) Ripened tomatoes ready for local sale. (d) Sorting out and packing tomatoes on the ground.

Photo credits: (a)–(c), Mitiku Wamile; (d), Mukerem Taha.



Figure 7: Roadside retailing of various vegetables showing different maturity stages.



Photo credit: Jafar Kedir.

Table 3 below shows the ranks of different customers' preferences for different aspects of vegetables as perceived and mentioned by the retailers.

Table 3: Customers' preference criteria in the purchase of vegetables as mentioned by retailers

Products	Criteria					
	Taste	Safety	Health/nutritional benefits	Convenience	Price	Size
Tomato	2	2	4	5	2	5
Onion	1	4	4	4	3	
Potato	5	4	4	4	2	
Lettuce	5	4	5	5		

NB: 1 = least preferred; 5 = highly preferred.

Retailers themselves also consider various factors when choosing vegetables from their sources. Table 4 displays average concerns for each criterion for three different vegetables.

Table 4: Retailers' criteria when selecting and purchasing vegetables from suppliers

Products	Criteria					Other perceived quality parameter*
	Shelf life	Easy sourcing product	Supply or reliability	Consistent quality	Good price	
Tomato	4	2	3	3	3	5
Onion	5	3	3	3	2	
Potato	5	4	4	3	2	

NB: 1 = least important for retailers when choosing; 5 = most important; \* ripened tomato ('locally called Gomera').

## 4.4.2 Sources of vegetables (accessibility and tracing back) and value chain mapping

The vegetables are sourced from a wide variety of places found at different distances. Table 5 shows specific places and the average rank of easiness of transportation and availability in terms of quantity.

Table 5: Retailers' vegetable sources (accessibility and tracing)

Products	Source (name of woreda/ kebele/ specific market)	Approximate distance from the retailer shop (km)	Easiness in terms of transportation	Availability in terms of quantity of the products
Tomato	Bishoftu	450	4	4
	Arba Minch	800	4	3
	Daker	8	2	2
	Arategna	1	2	2
	Alamata (Woldia)	1,500	1	1
	Dufti (Afar)	1,000	3	3
	Meki and Koka	500	4	4
	Awash and Metahara		5	3
	Bahir Dar		5	3
	Dessie		5	3
	Bakko		1	2
	Mojo		4	3
	Alamxena		4	2
	Gonder		1	2
	Harar (Areteгна)	80 m	5	4
	Dire Dawa (Kefira)	Just beside	5	5
Onion	Awash and Metahara		5	2
	Dire Dawa (Kefira)	Just beside	5	5
	Harar (Areteгна)	80 m	5	4
Potato	Dire Dawa (Kefira)	Just beside	5	5
	Harar (Areteгна)	80 m	5	3
Green pepper			5	5
Parsley				
Eggplant	Dire Dawa (Kefira)	Just beside		
Lemon				

NB: For easiness in terms of transportation, 1 = very difficult, 5 = very easy; for product availability, 1 = scarce, 5 = abundant.

The retailers buy vegetables from a number of different suppliers based on the time of harvesting, season, price and availability. Most of them buy from one to three suppliers and/or producers, while some also buy from more than three. Some of them use the same supplier(s) while others use different suppliers. Many of them have no formal fixed contract with suppliers; rather, their relationship is based on common understanding and trust, which includes oral consent or agreement. Retailers buy vegetables from different sources which include brokers, local traders, small producers, regional producers and local investors or youth cooperatives. They prefer to buy from these sources due to one or more of the following reasons:

- accessible and affordable price
- good quality vegetables
- ease of transportation
- supply large amounts catering to retailer demand
- affordable to consumers from low- and medium-income groups.

For many retailers these sources are the preferred options because they can get high-quality products, affordably, at short distance, with easy cost transactions and at any time they want; otherwise, they do not have alternative reliable sources in the locality. While some retailers buy from sources which they do not prefer, they do so because of a lack of other options. Generally, retailers come to buy from sources in many ways – many of them by their own selection or choice, some on the recommendation from other traders or retailers, and others on the recommendation of brokers.

Most retailers buy from their sources themselves, whereas some make deals with brokers who buy from the sources. Retailers consider different things when they buy vegetables, including:

- quality, colour and appearance
- availability
- price
- customer demands and ease of transportation
- shelf life
- absence of disease
- absence of mechanical and pest damage.

The majority of retailers get what they need from suppliers, but some do not when there is high demand due to retailers coming from other places. In all cases vegetables are transported by truck or car, many having no refrigeration system during transport. However, there are generally protections from direct sunlight by truck coverage. Most often vegetables are boxed in local material like cardboard boxes and wooden boxes specifically for tomatoes, and these are stacked on top of each other where possible. Most commonly wooden and plastic crates, cardboard and covering plastic are the materials used for packaging when vegetables are transported.

The time required for transportation depends on the places from where the vegetables are purchased and the status of traffic. Most of the products (especially onions and tomatoes) are transported from central parts of Ethiopia, requiring about 12 hours of transportation time for most of the retailers. In long-distance transport, it was indicated that there is no in-between storage of the vegetables. Some retailers also buy from nearby farmers.

Different stakeholders involved in VCs from producers to retailers include:

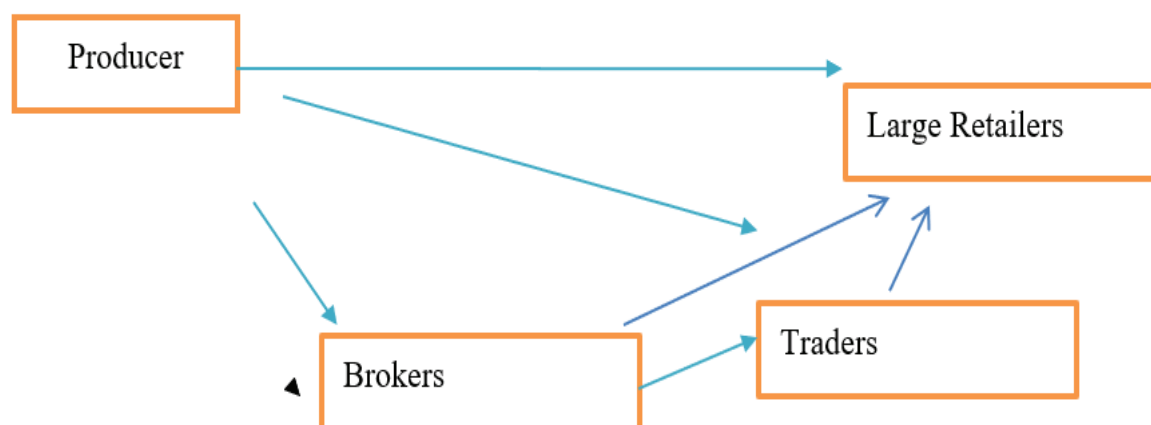
- vegetable producers (mostly in central Ethiopia) use different kinds of pesticides on their farms and also

immediately before sale;

- brokers connect producers and retailers, negotiate prices with both sellers and buyers, transport products, grade, pack, and connect with middlemen and traders; and
- large retailers buy in bulk from brokers in Meki or Bishoftu.

Different stakeholders involved in handling vegetables on their way to retailers are illustrated in Figure 8.

Figure 8: Relationships between retailers and producers in vegetable value chains.



#### 4.4.3 Vegetable handling and processing

In retailing processes, vegetables pass through different conditions between purchase and sale that may affect their nutritional quality and food safety. Transporting, sorting, packaging and storing are some important aspects of these processes. Most often retailers transport the vegetables at night to display them at the market early in the morning. Upon arrival at the market, the vegetables are spread over the ground, windows are opened to facilitate air circulation, and then vegetables are separated based on quality, size and level of maturity (mature or immature) and covered with carton to make them ripen normally (Figure 6). Retailers also use poisonous substances such as rodenticide to control rodents when these are present in or around vegetable storage areas. Usually, they do check and remove abnormal tomatoes to reduce cross-contamination of healthy ones. They dispose of badly rotten and damaged tomatoes in the garbage disposal. Most often people buy discarded tomatoes for their animals. Fresh products are checked for quality and healthiness and sorted by the large (wholesale) retailers; then small retailers buy these in cartons and sell them to consumers by arranging small amounts of products on the roadside in front of themselves to show them to customers, using umbrellas as shade from exposure to sunlight and to keep the vegetables safe until sold. Consumers buy from the large and small retailers according to their preference.

Large retailers keep vegetables in storage spaces while medium retailers remain in their shops with vegetables displayed on shelves or in cartons, crates or large sacks. Many of the retailers do not clean or disinfect where they store the vegetables. Those storing in warehouses regularly clean these spaces to prevent flies, while retailers keeping vegetables in crates simply rinse their shops occasionally with clean water. Large retailers mostly display their vegetables in trucks and try to sell them all in a single day. If they do not manage to do so, they continue on the second day, and if yet not finished store vegetables at the warehouse and sell them from there. Retailers with shops usually put vegetables on wooden shelves or in cardboard boxes and mostly keep them in front of the shop under shade to display them to customers. Those who sell on the roadside arrange and sort the vegetables every morning to display to passers-by. Their customers are travellers along the road.

At night, most of the retailers cover their vegetables, both inside and in front of the store, and those who keep them under shade outdoors cover them with plastic sheets and keep guard overnight with private security. Small retailers who sell vegetables on the roadside return the vegetables into cardboard boxes or big sacks to keep overnight in their homes. For display, many of them do not do anything other than keeping vegetables in the open in the store or containers. They continuously sort out and put the most attractive vegetables on the top in the most visible places. Some also clean their vegetables by hand and using a cloth to make them more attractive and appealing.

#### 4.4.4 Quality and safety (knowledge, attitudes and practices)

Knowledge, attitudes and practices of retailers on quality and safety aspects were assessed. The most important aspects of quality for them, and the rank of average suggestion, are depicted in Table 6.

Table 6: Criteria for vegetable selection in retailing activities

Quality aspects	Rank
Appearance	1st
Nutritional quality	2nd
Size	3rd
Price	4th
Healthiness (no risk of causing health problems)	5th
Shelf life	6th

As retailers explained, the main causes for poor quality of vegetables, from most to least serious, are:

- prolonged exposure to weather, especially heavy sunlight and heavy rainfall
- inappropriate storage and transportation
- diseases and insect pests
- late harvesting and inappropriate packaging
- late and inappropriate treatment on the farm
- lack of facilities to store and refrigerate
- poor farming practices
- poor handling and hygiene practices along the VC
- lack of consideration for quality during product collection
- mechanical damage.

These can make the commodity in question less safe to eat, since mostly they deteriorate product quality and resulting in spoilage. Nutritional quality, appearance, freedom from damage, size and taste are important features that customers use to judge the quality when they buy vegetables. While buying, consumers do not ask how vegetables were produced. Most retailers sell poor-quality vegetables to immediate users such as hotels, small restaurants and people of low economic status. Some of them also use such produce by themselves for home consumption. Some also discard poor produce or give it to animals.



#### 4.4.4 Retailers' suggestions for improving safety and hygiene

Retailers agreed that food safety and hygiene need long-term improvement, because there is insufficient awareness at the current level. It was stated that awareness creation among retailers about food safety and hygiene is very important to bring improvement in the long term, and in some cases urgent improvements were recommended. To improve hygiene and safety of vegetables, the following points were suggested by the retailers which consumers can implement:

- select on quality of produce, not just on price;
- use lemon when eating raw vegetables;
- wash raw vegetables appropriately and thoroughly before eating;
- get training on food safety and hygiene;
- focus on extra quality and safe food sources;
- develop knowledge to use quality products;
- select high-quality produce and use appropriate packaging;
- buy tomatoes which are free of damage;
- separate healthy from unhealthy vegetables; and
- properly store and handle vegetables after buying.

Similarly, the things that producers could do to improve hygiene and safety of vegetables included:

- select the appropriate land before producing;
- use appropriate and recommended chemicals to apply to vegetables;
- monitor the produce on the farm;
- harvest the produce in a hygienic way and on time;
- apply improved and advanced technology for quality produce;
- maintain safety and hygiene of produce in production fields;
- train on how to keep quality of produce;
- develop awareness regarding product collection, storage, packaging and prioritization of what to supply based on market interests;
- follow appropriate harvesting times and storage after harvesting;
- separate diseased and non-diseased produce;
- work for quality and safety rather than only for income; and
- use pure water for irrigation and cleaning of vegetables.

Suppliers, traders or brokers could do the following to improve hygiene and safety of vegetables:

- buy good produce and provide quality produce to retailers;
- improve storage, handling of produce, marketplace hygiene and sanitation at all levels;
- maintain the quality of vegetables on the way from traders to retailers;
- supply quality produce by keeping them safe along each chain;

- use proper transportation without delays and keep produce quality during storage;
- do not buy abnormal or diseased tomatoes;
- carefully separate good vegetables from bad;
- use good packaging materials; and
- buy quality produce from producers rather than only looking for cheap prices.

The retailers in a similar way suggested the following to improve hygiene and safety of vegetables:

- buy good produce and provide quality produce to consumers;
- carefully handle produce in hygienic and safe ways;
- use appropriate standard packaging, grading and storage;
- sort mechanically damaged from normal produce from time to time;
- clean the store and open up the space every day for air circulation;
- prevent rodent access to vegetables;
- sell only fresh produce and dispose of the mechanically damaged and deteriorated; and
- transport produce using refrigerated trucks and storage.

The most important constraints that can hinder retailers in following the suggestions above include:

- lack of capital, facilities, expertise and support
- difficulty in sourcing commodities of appropriate standard
- lack of enough marketplace and chain
- lack of awareness and attitudes towards hygiene
- difficulty of providing what customers need regarding quality and time
- unwillingness of buyers to pay more to cover additional costs for improvements
- lack of awareness and demand from the consumer.

Ideas forwarded as solutions that could improve the situation, considering issues with consumers, producers, suppliers, traders, brokers and retailers, included:

- most of the work should be done at the farm level;
- producers need to use improved production mechanisms;
- producers need awareness and training regarding how to keep quality of what they are producing until it reaches the market;
- awareness creation is required among all participants in the VC;
- middlemen, traders and suppliers need to give greater attention to safety and quality of vegetables rather than aiming only for income;
- consumers need education about food safety and quality;
- consumers should be aware of and focus on quality and safe food rather than being concerned with physical appearance and cheap prices only;

- the government should follow up, pay attention to hygiene and sanitation, and offer subsidies for improving facilities related to transportation of vegetables from producers to retailers and then consumers;
- awareness creation is needed at all levels;
- monitors or experts should be implemented and put in charge of addressing this problem; and
- in all VCs, proper handling, transporting and storing is necessary.

It was found that no initiatives have been taken to address the issues towards food safety or hygiene improvement for the retailers related to vegetables. However, retailers would like to see projects on vegetable safety and hygiene go forward which:

- provide training to the community on hygiene and food safety.
- enhance market accessibility and act on controlling quality to enhance food safety.
- create awareness and deliver knowledge about food safety at all levels in the VC.
- strengthen market accessibility of quality produce, as seen from other countries on television.
- focus on production of ensured vegetable safety.
- enforce regulations to ensure safety and quality of vegetables.
- create awareness for the whole society, if possible, about food safety and hygiene, provision of refrigerated transport systems, cold storage mechanisms, etc.
- work towards creating cooling facilities during supply (transportation).

## 4.5 Vegetable producers

### 4.5.1 Farm description

Farmers in the study area produce and sell a diversity of crops (sorghum, maize, khat), fruits (banana, papaya, mango, guava), vegetables (tomato, onion, green pepper, cabbage) and tubers (potato, sweet potato, cassava). In most cases, tomato, khat and papaya are ranked high in importance. Table 7 below depicts responses of vegetable producers regarding the crops, vegetables and fruits that they produce and sell. The top high priority vegetables identified were tomato, potato, green pepper and onions (Table 7).

Table 7: Types of crops, fruits and vegetables produced locally in the surroundings of the two cities

Commodity	Rank*	Women's income	Quantity produced
Crops (including leafy)			
Maize			
Sorghum	2 <sup>nd</sup>		
Khat	2 <sup>nd</sup>		50 kg
Fruit			
Banana			50–70 boxes
Papaya			10–20 kg
Mango			10 kg
Guava			
Vegetables and tubers			
Tomato	1 <sup>st</sup>		50–70 plastic crates per production
Onion			
Green pepper	3 <sup>rd</sup>		Around 100 kg
Potato	1 <sup>st</sup>		
Sweet potato			
Cassava	2 <sup>nd</sup>		

NB: Ranking was made according to importance to household income.

Along with vegetables, they keep animals such as cattle, goats, sheep, donkeys and bees. Relatively many of them keep cattle with a greater number (around seven on average) than other animals. They keep up to four goats at maximum. Most of these animals have access to the vegetable fields of farmers, while others have occasional access. Most producers have other income and employment besides farming, as farming itself cannot fulfil their basic needs. Some have shops such as khat shops. A few are government employees. Some only depend on farming for income, while for others their non-farming activities are more or less important to household income than farming. They produce vegetables both for marketing and household consumption, and for both they produce vegetables in the same places.

Vegetable fields are located far away from human latrines, and even far from households, often by more than a kilometre. There are no human latrines around the farms. Producers do not use human excrement as fertilizer for vegetable production, although some of them use animal manure as fertilizer, even up to a day before harvesting. The sources of irrigation water they use are mostly wells located near the fields, especially when there is no rain. Some also uses pond water during the dry season and river water when it rains. Some of these water sources are also used to water their animals, but some drink from different sources such as the river.

## 4.5.2 Availability (seasonality) of priority vegetables

Year-round vegetable production is practiced, but the amount and type of vegetables produced varies by season. The most commonly grown vegetable in the area is tomato; some also produce onion and green pepper. January to March is the predominant season known for production and marketing of these vegetables. Another good season for tomato production is the summer season from October to December. After harvesting, vegetables have varying periods of lasting time before deterioration; according to producers' suggestions tomatoes and green peppers should be sold soon after harvesting, otherwise they will perish, while onions can sometimes stay up to months before sale without deteriorating. The farmers use animal manure to fertilize their vegetables fields. Table 8 describes the sources of manure for farmers and when these are applied.

Table 8: Manure utilization for vegetable and crop production

Type of manure (species)	Source (household, elsewhere)	Application period
Cattle	Household and some elsewhere	During ploughing, planting, growing and harvesting
Sheep and goat	Household and elsewhere	During ploughing, planting, growing and harvesting
Chicken	Elsewhere	All seasons
Horse	Elsewhere (neighbour)	Rarely

The time period from application of manure until harvesting of vegetables varies based on the type of vegetable, its life span in the field, farmer interest and availability of manure. In most cases, the minimum time ranges from one to three months, although application of manure is found possible even up to a day before harvesting. To prevent pests from damaging vegetables, farmers use different types of pesticides such as DDT, malathion, mankozeb, 99% poisonous locally called 'hatatam' and 'sivin', and in some cases acaricides. They use insecticides up to two days before harvesting tomatoes, and some suggested that washing vegetables before using them is good when this is the case. Farmers perceived that these are hazardous chemicals posing a serious health threat to consumers if vegetables are eaten unwashed and raw (although they did not acknowledge that washing may not remove all the chemicals because of some of them can penetrate the whole vegetable).

Regarding the period lapsed between applications of chemicals and ripening for consumption, many farmers are not sure about the exact time to stop applying pesticides. Some do it up to the early vegetative stage and a few also do it until three days before marketing and consumption. It was suggested that it is better to wash vegetables before consumption given that diseases can be contracted from the contaminated products. The farmers are not sure of the source of the chemicals they use for pest control, as they buy these from both formal and informal markets. They were hesitant regarding the sources and safety of the chemicals.

During application and handling of the chemicals, most of the farmers do not use or follow recommended safety measures. A few of them use boots and masks during application and wash their hands with water and soap after, and also protect children from touching and coming close to where chemicals are applied. Many farmers pointed out that if the chemicals are not handled correctly, they cause some signs of illness such as headaches and suffocation (respiratory arrest), and they added that they are dangerous for children. However, some of them did not even consider these harmful effect. If they got sick, they would not assume that it was caused by the chemicals; they assume the chemicals are normal for them and they search for other causes.

The farmers get their seeds from different sources: from the government development agency, informal and formal markets, and also by recycling seed from themselves or other neighbouring farmers from previous seasons. Buying from the informal market and recycling their own seed are the most common sources of seed in the study area.

### 4.5.3 Vegetable quality and safety (knowledge, attitudes and practices)

Farmers have to some extent attempted to produce quality vegetables. They are most concerned with nutritional quality, health, appearance and yield when they judge the quality of the vegetables. However, they also take size into account. They consider quality production mostly for the sake of market price and consumption safety.

Diseases, pests, over-raining, insufficient watering, poor storage and poor grading systems are what they suggested as the main causes of poor quality vegetables. They also believed that any of these can make the priority vegetables less safe to eat. The farmers also understand the concerns of their buyers, and particularly what quality aspects buyers look for. In this case they determined that buyers of the vegetables judge the quality by appearance, size, freedom from damage by

pests, and health in order from greatest to least concern. On the other hand, most buyers do not ask farmers how they produce the vegetables, and few ask them what chemicals were used on the vegetables or when.

#### 4.5.4 Vegetable VC mapping (production)

Table 9 below shows the actors involved in handling of tomato (a priority vegetable in the study) focusing on the involvement of various people on the way to consumers, what processes they are subjected to and over what timeline.

Table 9: Actors involved in the handling of tomato along the value chain

VC actors	Questions	Roles or characteristics
On farm	After harvest how are they stored and for how long?	<ul style="list-style-type: none"> <li>Some collect and keep at one place in the field or in cartons and boxes for around two days; no packing and transporting</li> <li>Some kept in the same plastic container used for harvesting to take it to the main road or town for sale; sorting will be done if not sold on the day of harvesting</li> <li>A few harvest and store for 24 hours in the field or under shade, then grade and put in boxes according to size</li> </ul>
	Where do you sell them and to whom?	<ul style="list-style-type: none"> <li>Mostly on farm; some also took tomatoes to towns such as Babile</li> <li>They sell to brokers and retailer in Harar and Babile, or local traders in the village who send to towns such as Babile, Jijjiga and Awaday</li> <li>They also sell direct to consumers</li> </ul>
	How are they packaged?	<ul style="list-style-type: none"> <li>A few packaged tomatoes in plastic bags</li> <li>Some packaged in plastic and wooden crates</li> <li>A few have no common storage other than keeping in sacks, cartons etc.</li> </ul>
	How are they transported?	<ul style="list-style-type: none"> <li>Car</li> <li>Human labour</li> <li>Cart</li> <li>Public bus</li> </ul>
In order, list all the people who own or trade the vegetable after it leaves the farm:		

VC actors	Questions	Roles or characteristics
Off farm	Local traders	<ul style="list-style-type: none"> <li>• Transport to town for sale to town traders/retailers within a day</li> </ul>
	Town traders	<ul style="list-style-type: none"> <li>• Transport around 100 km to Babile from Babile-Obosha, the second marketplace</li> <li>• Clean, pack and store vegetables</li> <li>• Sort and sell to retailers or other traders</li> <li>• Bring to those receiving (located in other towns) within 1–2 days</li> </ul>
	Large retailers	<ul style="list-style-type: none"> <li>• Sort and sell to small retailers and consumers within 1–3 days</li> <li>• Sell within Babile or some 185 km away from Babile</li> <li>• Keep vegetables in clean places (storage)</li> </ul>
	Small retailers	<ul style="list-style-type: none"> <li>• Buy from large retailers</li> <li>• Sell within 1–3 days</li> <li>• Sell to consumers in small shops and along roadsides</li> </ul>
	Hotels	<ul style="list-style-type: none"> <li>• Buy from retailers or traders and prepare ready-to-eat food to sell to consumers</li> <li>• Found in towns</li> </ul>
	Consumers	<ul style="list-style-type: none"> <li>• Very near to hotels and retailers</li> <li>• Select good quality produce</li> </ul>

### 4.5.5 Producers' suggestions for improving safety and hygiene

Regarding food safety and hygiene in vegetables, producers and buyers were concerned with some different aspects as listed in Table 10.

Table 10: Food safety concerns of vegetable producers and buyers

Food safety concerns	
Producers	Buyers
Quality	Appearance
Safe chemicals and their application	Size
Watering regularly	Price
Appearance	Quality
Applying manure as fertilizer	Proper transportation
Early harvesting	Disposing of deteriorated vegetables
Packaging	Free from insects, pests and mechanical damage
Yield	Clean marketplace
Free from insect pests	Packaging
Free from diseases	
Storage	

For producers to improve vegetable food safety, the farmers suggested many points including:

- follow safety measures for application of chemicals, appropriate handling and cleaning of vegetables;
- use clean water for irrigation;
- pay attention to produce starting from land preparation to post harvest;
- properly water and apply manure to produce quality tomatoes;

- sort and supply good condition tomatoes for sale;
- use safe chemicals and proper application on diseased vegetables;
- harvest vegetables early; and
- create collaboration with local government development agents.

They listed several challenges hindering them from improving vegetable food safety:

- there is difficulty in sourcing farm inputs of appropriate standard;
- chemicals, fertilizer and seeds are not supplied to them on time;
- the price of chemicals is high and sometimes they do not work;
- there is a lack of standard transportation and other facilities;
- there is a lack of knowledge, expert advice and training on how to produce quality and safe vegetables;
- additional costs are high;
- a well-designed marketing system is lacking for producers to sell their commodities on the day of harvesting at a good price;
- buyers are unwilling to pay more with additional costs;
- there is no collection or place where farmers can assemble their produce, sort, grade and sell to retailers, traders and wholesalers; and
- poor quality seeds result in poor yields.

Similarly, producers suggested solutions they thought of that could improve the situation:

- producers should use good quality seed;
- producers should focus on appropriate harvesting practices and identification of potential buyers;
- farmers should work in unions for arrangement of basic necessary infrastructure and facilities;
- there should be licensing of chemical and seed suppliers;
- village collectors and wholesalers should give due attention to better transportation infrastructure and produce handling and management;
- retailers should manage the situation through storing produce under shade or in cool areas;
- improvements are needed to storage and common marketplaces;
- the government should support transportation, preservation and storage facilities;
- consumers should buy quality vegetables and handle them properly by sorting every day;
- consumers should select good quality produce and stop eating raw vegetables;
- capacity building and advisory services should use appropriate chemicals; and
- awareness creation should be pursued among all VC actors.

As producer, what would be most helpful to them would be:

- safe chemicals for managing pests and diseases
- availability of market chain



- awareness regarding quality production
- on-time seeds, fertilizers and chemicals
- standard storage for produce
- expert advice on production of vegetables, starting from land preparation to post harvest management.

To address food safety, different initiatives have already been undertaken by:

- local government development agents
- local educated personnel
- previously benefitted producers
- an Israeli non-profit organization called Fair Planet focusing on seed improvement.

However, initiatives largely targeted how to increase their production and supply for market, not on the hygienic handling of vegetables, except on how to use chemicals. Similarly, the expert advice had targeted how to increase production rather than hygienic production and the period of training was very short in duration.

## 4.6 Long-distance chain: Producers in the central rift valley and highlands of Ethiopia

The results of the qualitative investigation in central Ethiopia involving interviews, informal observations and discussions are presented as follows. The rank of vegetables produced in the area, according to household income, is tomato, onion, cabbage and chilli pepper. On the farms visited, vegetables are the main source of income for the farmers. We interviewed large vegetable producers owning 4–30 ha land. There are different farms producing vegetables, both supplying local consumers and largely transporting to other parts of Ethiopia, including Harar and Dire Dawa. Farmers produce vegetables and sell them to traders directly on farm or via brokers. There are also local vegetable collectors in the area who buy leftover produce from the farmers on farm and sell to traders on the roadside.

The farmers producing vegetables in the area have oxen for ploughing the land and other farm animals such as donkeys, goats, sheep and cows. It was observed that farm animals and wild animals have access to some of the vegetable fields. It was stated in some of the farms with fences that animals are allowed to enter only after the vegetables are completely harvested. Some farmers have additional sources of income by ploughing land, while others are solely dependent on income obtained from selling vegetables. They also supply to local consumers and consume their own produce. We were told that low quality vegetables (for example damaged tomatoes) are sold to local retailers and consumers. Leftover vegetables from transportation trucks are sent to local markets for sale and also used for home consumption. Some of the large vegetable producers have human latrines on their farms which are approximately one metre from vegetable fields. None of the farmers use human manure as fertilizer.

Sources of irrigation water were mainly lakes and rivers. Moreover, shallow groundwater sources are also used for irrigation using motorized pumps. Pumping from lakes, hand-dug wells and boreholes is common in the area, largely developed with support from non-governmental organizations. Use of groundwater for irrigation in the production of vegetables is rising in the area depending on the availability of water at the lake shores and riversides and the availability of various sizes of water pumps in the area. It was also observed that some farms store water during the rainy season for use during the dry season. Both farm and wild animals have access to lakes used for irrigation. Animal manure is used as fertilizer in addition to synthetic fertilizer to increase production. It was mentioned that animal manure is used as fertilizer mostly during the rainy season, and not applied during the dry season when irrigation is used, given that it is assumed to reduce the moisture of the soil. Manure is applied during preparation of land by ploughing during the rainy season.

Poultry manure is brought from commercial poultry production areas such as Butajira, Mojo and Bishoftu and applied to farms at one-month intervals after seedlings are planted, two times during the dry and rainy seasons. It was stated that especially during the rainy season it is perceived that poultry manure application makes the soil well drained. Vegetables, particularly tomato, can be harvested one month after poultry manure application. It was observed and learned during fieldwork in the areas that farmers are not aware of the possible health risks associated with poultry and animal manure application; rather, they emphasised the advantages of manure for better production of attractive tomatoes for marketing.

Farmers use different chemicals for production of vegetables, buying from what they stated were licensed shops selling chemicals. However, as per our observation and discussions, safety measures are not followed during handling and application of different chemicals, and farmers are not aware of the health risks associated with chemicals. They do not know that chemicals can make people ill if not handled correctly.

The major market chain actors identified include input suppliers (seed, cattle and poultry manure, chemicals, fertilizer), vegetable producers, farmer traders, wholesalers, brokers, retailers and consumers. Vegetable market actors (brokers) do all types of businesses in the market chain without any license. It was mentioned that brokers are the ones who determine the market and where to sell based on requests from traders. As a result, the vegetable market is dependent on brokers, who restrict the decision-making power of farmers to sell their products direct to wholesalers and large traders. This can reduce the farmers' bargaining power and market access which subsequently affects their income.

The farmers supply high-quality produce (fresh, large and good condition without any bruises) to Addis Ababa; the second and following quality of harvest is supplied to other parts of the country based on requests from traders. Low-quality produce (such as damaged tomato, called 'caccabaa' in Afaan Oromoo) is sold to local consumers. Local consumers are supplied by small vegetable producers and damaged tomato from medium and large vegetable producers. Generally, low-quality produce is sold to local consumers, and low-income households buy the lowest-quality vegetables from farmers at the lowest prices.

According to farmers' opinions, large, shiny tomatoes with attractive skin condition and without any bruises are criteria considered in the quality assessment of tomato. The major causes of poor quality are diseases, water shortage during the dry season, inappropriate land for vegetable production, and inappropriate application of chemicals. The farmers mentioned that people who buy from farmers judge the quality of tomatoes by physical observation for size, colour and absence of mechanical damage. Buyers evaluate the visual appearance but do not often ask how the vegetables are produced.

It was mentioned that the farmers don't follow chemical and fertilizer withdrawal periods; they can harvest a day after application of chemicals on vegetables. Most of the farmers apply chemicals from the time of planting until harvesting. The following chemicals were listed as used in the production of vegetables (most of them with their trade names). According to the farmers the chemicals are purchased from licensed agrochemical shops:

- Glider
- Wuxal Macromix
- Indofil M-45
- TUTAN 36% SC (fungicide)
- FARRATE
- acetamiprid
- alphacypermethrin
- penconazole (fungicide).

The farmers handle chemicals without wearing masks, boots or protective clothes. They do not know safety measures that should be followed during the application of chemicals, and do not know that applied chemicals can affect people if not handled correctly. Farmers are mostly concerned with quality, especially producing healthy tomatoes (without whitish colouration, spots or ulcers on the surface) of good appearance and size. Figures 9–11 depict examples of chemicals used in the area in tomato production.

Summary of potential key food safety risks during farm observation:

- the majority of the producers prepare their land by plough with oxen draught power, which may lead to vegetables being contaminated by animal faeces;
- the majority of the producers use water that comes from lakes used by humans for bathing and swimming, and where farm and wild animals also have access; and
- chemicals in the form of pesticides and fungicides are used indiscriminately, and the extent could be high beyond what was observed.

Figure 9: Alphacypermethrin as insecticide.

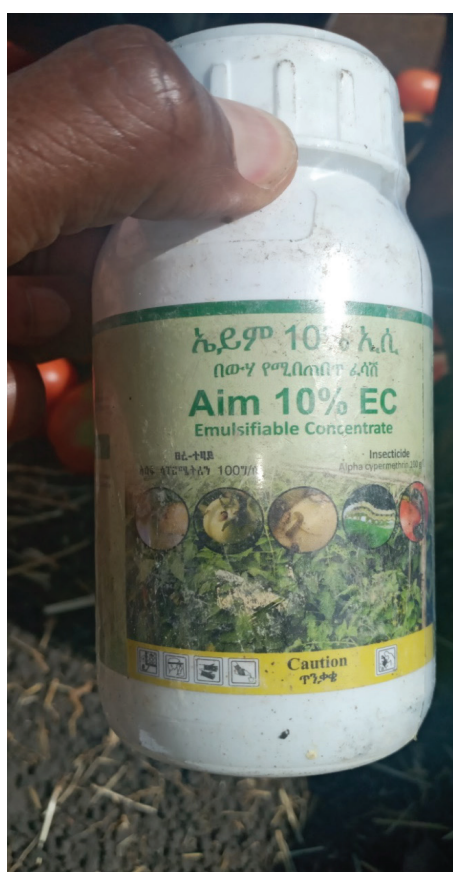


Photo credit: Mitiku Wamile.

Figure 10: Acetamiprid as insecticide



Figure 11: Penconazole as fungicide.

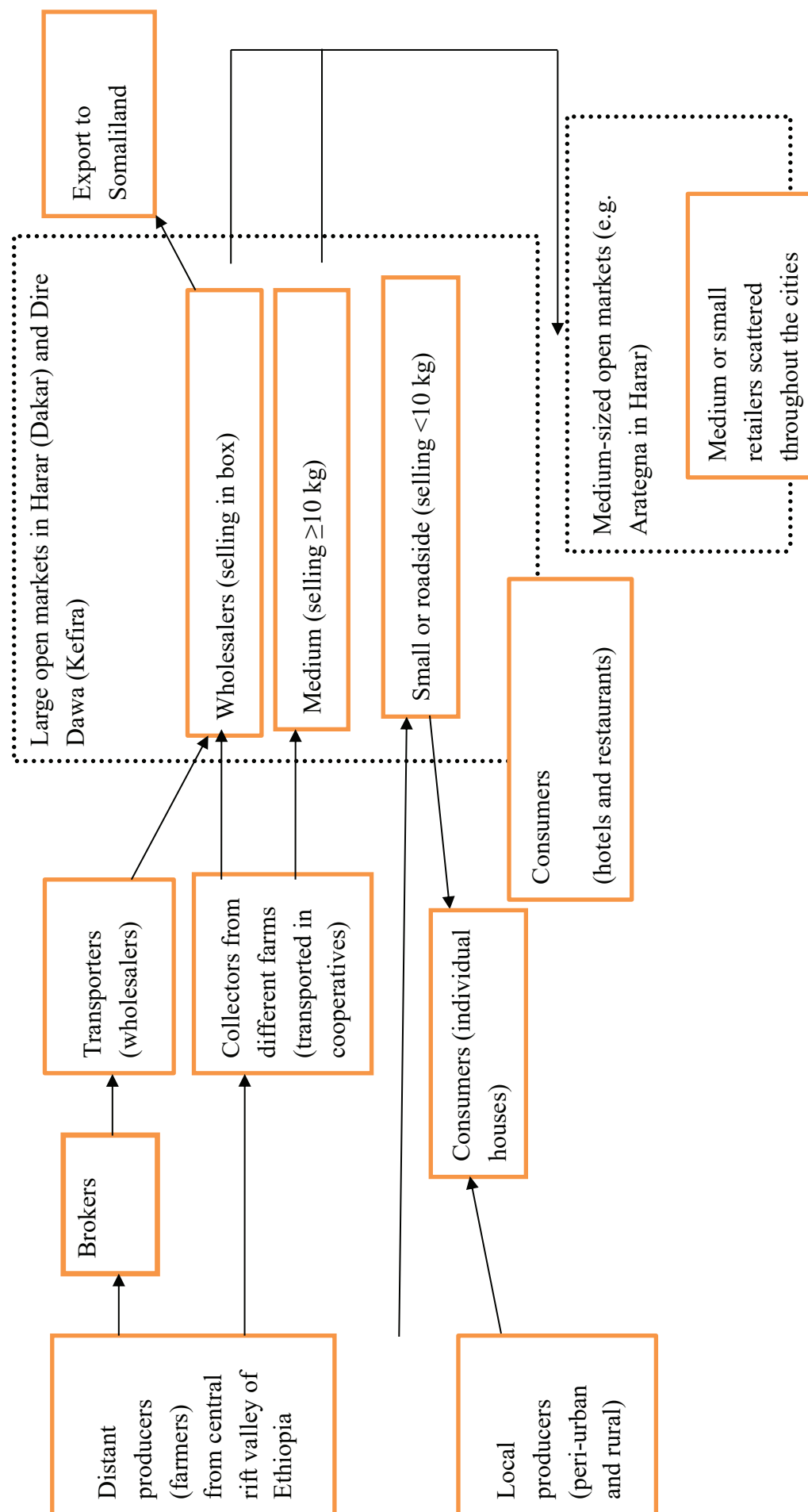


Photo credit: Mitiku Wamile.

#### 4.6.1 Summary of vegetable value chain mapping

Figure 12 depicts the VC map of vegetables in Harar and Dire Dawa (production to consumption).

Figure 12: Summary vegetable value chain map.



## 5 Key differences between Harar and Dire Dawa

Generally, the two cities (Harar and Dire Dawa) have similar vegetable and poultry meat handling and consumption practices. The two cities receive vegetables from the central rift valley of Ethiopia. However, the qualitative study identified key differences between the cities, as summarized in Table 11.

Table 11: Different vegetable and poultry handling and consumption practices in Harar and Dire Dawa

Variables	Harar	Dire Dawa
Agro-climatic conditions	<ul style="list-style-type: none"> <li>Midland to highland area where crop and vegetable production is practised locally</li> </ul>	<ul style="list-style-type: none"> <li>Lowland area with not much crop or vegetable production</li> </ul>
Ready-to-eat foods	<ul style="list-style-type: none"> <li>Street foods are not common</li> <li>No restaurants</li> </ul>	<ul style="list-style-type: none"> <li>Street foods are common and most people like to eat outside the home (especially a dish prepared from potato)</li> <li>The team of investigators found two restaurants selling roasted chicken</li> </ul>
Backyard chicken slaughter	<ul style="list-style-type: none"> <li>No backyard slaughter for sale of chicken meat</li> </ul>	<ul style="list-style-type: none"> <li>One backyard slaughtering place supplying chicken meat to hotels, individual households and restaurants preparing roasted chicken</li> </ul>

## 6 Summary

The following points can be summarized regarding poultry and vegetable VCs in Harar and Dire Dawa.

- The present qualitative investigation revealed that ASF and especially chicken meat is often consumed at home, prepared in the form of doro wot. It was stated that consumption of chicken meat is especially common during holidays.
- Consumption of ASF and vegetables varied among people of different economic status, season of the year, religious holidays and (for Ethiopian Orthodox households) fasting seasons.
- Out of the home consumption of chicken meat (in restaurants) was not common, especially in Harar. In Dire Dawa two restaurants were serving roasted chicken.
- The priority vegetable in the present study (tomato) is consumed raw, semi-cooked or cooked.
- Live chicken marketing is the most common retail outlet through which people buy chickens, slaughtering these at home. One location for backyard slaughter of chicken was found in Dire Dawa.
- Poor awareness about vegetable safety was found to be common among producers, who rather focus on how to increase their yield.
- Producers have a high perception of potential health risks associated with use of chemicals.
- Long-distance VC actors in central Ethiopia, where large-scale vegetable production is common (with irrigation or without), dominate as suppliers of vegetables in eastern Ethiopia.
- Formally slaughtered and frozen chicken is transported to the area from central Ethiopia.

## 7 References

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## 8 Appendices

### 8.1 Appendix 1. Consumer key informant interview question guide

Completed By:                      Date:                      Location:

Position of KII:                      Age:                      Sex:

1. Food availability and use
  - a Please explain the commonly eaten ASF and vegetables dishes by your community?  
How often do they eat chicken? How often do they eat raw vegetables?
    - 1 Low incomes households
    - 2 Middle income households
    - 3 High income households
2. How does your consumption and availability of chicken and vegetables vary over the year?
3. Where do people get vegetables and chicken from (market, shops, restaurants...), how does this vary with income and gender?
4. Considering household processing and preparing of chicken and vegetable dishes, what is done by men?
5. Can you describe different people (VC actors) involved in producing and supplying chicken and vegetables, farm to fork?
6. What is your opinion of the quality and safety of chicken and vegetable consumed in your community? What are the main food safety risks, which demographic groups are most vulnerable – why?
7. Are typical consumers concerned about food safety, give an example?
8. Are there any past or ongoing initiatives to improve food hygiene and safety, describe?
9. What are your suggestions for improving food safety and hygiene?

## 8.2 Appendix 2. Chicken retailer key informant interview question guide

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_ Location: \_\_\_\_\_

Position of KII: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_

### 1. Food availability and use

a Where do people get chicken from, live and meat (market, shops, restaurants...), how does this vary with income and gender?

1 Low incomes households

2 Middle income households

3 High income households

### 2. How does demand and supply of chicken to consumers vary over the year?

### 3. Can you describe different people (VC actors) involved in producing and supplying chicken, farm to fork?

### 4. What is your opinion of the quality and safety of chicken (live and meat) sold in your community? What are the main food safety risks, which type of retailer are the highest risk in terms of chicken food safety – why?

### 5. Are typical chicken retailers concerned about food safety? what aspects of quality are chicken retailers most concerned about?

### 6. Are there any past or ongoing initiatives to improve food hygiene and safety, describe?

### 7. What are your suggestions for improving food safety and hygiene (particularly chicken)?

### 8. What is the biggest challenge facing chicken retailers, both live and meat?

## 8.3 Appendix 3. Chicken producer key informant interview question guide

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_ Location: \_\_\_\_\_

Position: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_

1. Describe the types of chicken production or business in your area, consider farm size and type?
2. Can you tell me about the different management practices, considering how chickens are housed, what they are fed, water sources?
3. What is your opinion on chicken production and hygiene practices, considering biosecurity, housing, feedings, water sources, veterinary care?
4. Could you tell me about the seasonal events in the annual chicken production cycle, considering times of production, marketing, disease for small and large scale producers?
5. Could you now tell us about where farmers get their chickens from (hatching eggs, home breeding, chicks, older birds)?
6. What medicines do small and large producers typically give their birds (parasites, vaccination, antibiotics,...)?
7. What do producers do with sick and dead birds and chicken faeces?
8. Can you describe different people (VC actors) involved in producing and supplying chicken, farm to fork?
9. What is opinion of the quality and safety of chicken products? What are the main food safety risks?
10. Can you describe different people (VC actors) involved in producing and supplying chicken and vegetables, farm to fork?
11. What is opinion of the quality and safety of chicken and vegetable consumed in your community? What are the main food safety risks, which demographic groups are most vulnerable – why?
12. What are your suggestions for improving food safety and hygiene?
13. Are there any past or ongoing initiatives to improve chicken hygiene and safety, describe?
14. What are the main challenges for chicken producers locally?

## 8.4 Appendix 4. Vegetable retailer key informant interview question guide

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_ Location: \_\_\_\_\_

Position of KII: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_

### 1. Food availability and use

a. Where do people get vegetables from (market, shops, restaurants...), how does this vary with income and gender?

1 Low incomes households

2 Middle income households

3 High income households

2. How does demand and supply of vegetables to consumers vary over the year (include tomato)?

3. Can you describe different people (VC actors) involved in producing and supplying vegetables, farm to fork?

4. What is your opinion of the quality and safety of vegetables sold in your community? What are the main food safety risks, which vegetable dishes are highest risk, which type of retailer are the highest risk in terms of vegetable food safety – why?

5. Are typical vegetable retailers concerned about food safety? what aspects of vegetable quality are they most concerned about?

6. What are your suggestions for improving vegetable food safety and hygiene?

7. What is the biggest challenge facing vegetable retailers?

## 8.5 Appendix 5. Vegetable producer key informant interview question guide

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_ Location: \_\_\_\_\_

Position of KII: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_

1. Describe the main vegetables grown in the area and type of producers, prioritise VEG 1+2?
2. For the typical producer what will be the most important sources of income (vegetables, other farm income, alternative income source...)?
3. What is your opinion on vegetable producer food safety and hygiene practices, considering cleanliness of irrigation water, manure, chemical application?
4. Could you tell me about the seasonal events in the annual tomato production cycle, considering times of production, marketing, pests and disease and other key inputs or events?
5. What chemicals do producers (small and large) typically use on their vegetables, what are the safety issues related to these chemicals and what is the level of producer knowledge about the safety measures related to these chemicals?
6. Can you describe different people (VC actors) involved in producing and supplying PRIORITY VEG (include tomato), farm to fork?
7. Can you tell me how the vegetables (tomato) are packaged, stored, transported as they move along the VC, particularly considering food safety and hygiene standards? (e.g. cleanliness of packaging and vehicles, times)
8. What regulations are in place to enforce vegetable hygiene standards? How are these enforced (consider strengths and weaknesses)?
9. What is your opinion of the quality and safety of vegetables? What are the main food safety risks?
10. What are your suggestions for improving PRIORITY VEG food safety and hygiene?
11. What are the main challenges for vegetable producers locally?

## 8.6 Appendix 6. Consumer focus group discussion checklist

1. Food availability and use – list and rank
  - a. ASF
    - i. Question: What kind of ASF is commonly eaten in your area and how often?
    - ii. Top 5 – Ranking best to worst – tasty, price, convenience, healthiness, safety
  - b. Vegetable
    - i. Question: What kind of vegetables are commonly eaten in your area and how often?
    - ii. Any eaten raw?
    - iii. Top 5 – Ranking best to worst – tasty, price, convenience, healthiness, safety
2. Food consumption – seasonal calendar
  - c. How does your consumption and availability of chicken vary over the year?
  - d. How does your consumption and availability of Top 5 vegetables vary over the year?
1. Where the vegetables TOP 5 and chicken is obtained – Venn diagram
  - a. Where are do you obtain chicken from?
    - i. Source – name, type, preference – why, more
  - b. Where are do you obtain vegetables from?
    - i. Source – name, type, preference – why, more
  - c. Can you describe different people involved in producing and supplying chicken, farm to fork?
    - i. Are you interested or concerned about this? Explain.
  - d. Can you describe the different people involved in producing and supplying vegetables, farm to fork?
    - i. Are you interested or concerned about this? Explain.
3. Chicken and vegetable quality and safety – list/ranking [quality = a better product e.g. taste, appearance, shelf-life... – safety = it may make you sick]

- e. How do you judge the quality and safety of chicken?
  - i. What aspects of quality and safety are important to you and why? Rank
- f. How do you judge the quality and safety of vegetables?
  - i. What aspects of quality and safety are important to you and why? Rank

4. Vegetables and chicken preparation and consumption – Flow diagram/calendar

- g. How do you purchase, store, handle, process and prepare chicken after you purchase?
  - i. Record times – identify gender roles
  - ii. What about purchased chicken meat?
- h. How do you purchase, store, handle, process and prepare tomatoes and TOP 2 vegetables after you purchase?
  - i. Record times – identify gender roles
- i. Mixing
  - i. How are raw and cooked vegetables prepared and served with chicken (cross-contamination of cooked foods by raw foods)?

5. Chicken and vegetable – who eats what and why? Flow diagram

- j. Is there any difference in who eats different chicken dishes or parts of chicken and why?
  - i. Age (elderly, children <5yrs) women/men, pregnant, poor, other...
- k. Is there any difference in who eats different vegetables and why?
  - i. Age (elderly, children <5yrs) women/men, pregnant, poor, other...

6. Consumer suggestions for improving safety and hygiene – problem opportunity matrix

- l. What are your biggest food safety and hygiene concerns? (→3 concerns)
  - i. In general
  - ii. Specifically for chicken
  - iii. Specifically for tomatoes
- m. How should this be improved

- 
- i. Consider producers, traders, consumers
  - ii. What stops you from taking these measures?
  - iii. Who should take action?
  - iv. Do you know of anybody already working on this?
    1. Have they been successful and why?
  - v. What food safety and hygiene projects would you like to see on the future?



## 8.7 Appendix 7. Chicken retailer in-depth interview question guide

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_ Location: \_\_\_\_\_

Age (in years): \_\_\_\_\_ Sex: \_\_\_\_\_ Educational status: \_\_\_\_\_

### Part A. Chicken availability and use

1. What products do you sell? (list for all)
  - a) Chicken: live chicken or meat or both?
  - b) Other products?
2. Are you also preparing ready-to-eat meals at this retail shop for sale? List and describe the foods [only applicable for supermarket and restaurants].
3. Among the listed products, which one do you sell the most? [only applicable for supermarket and restaurants].
4. How many customers do you serve in a day in average?
5. What proportion of your customers are regular customers and what proportion are customers that only buy once? (approximately)
6. What are your busiest times of day when most costumers buy from you?
7. When people buy chicken or chicken meat, how much do they tend to buy at a single time?
8. How many times per week does an average customer buy chicken: live or meat)?
9. In what kind of packaging do you use when selling chicken meat [only supermarket]?

I would like to know about the preferences of your customers regarding the products you are selling here. What criteria do people consider when buying live chicken or chicken meat here? Please, rank the criteria in the order of best to worst considering different factors customers consider when deciding what to buy or foods to eat or to take to their home. Let's consider taste, safety, health/nutrition benefits, convenience and price. What other factors should we add to the list? [You may add 1–2 other factors]. You can rank each criterion using numbers (1 = worst, 5 = best)

List of products	Criteria					Others
	Taste	Safety	Health/nutritional benefits	Convenience	Price	
Live chicken						
Chicken meat						
Eggs						

10. What factors are most important to you as a retailer when choosing to source chicken/chicken meat: Rank these factors [if no clear response prompt with e.g. shelf-life, ease of sourcing product, supplier reliability, consistent

quality, good price]. What other factors should we add to the list? [You may add 1–2 other factors]. You can rank each criterion using numbers (1 = worst, 5 = best)

List of products	Criteria	Others
	Shelf-life    Easy sourcing product    Supply or reliability    Consistent quality    Good price	

Part B. From where do you obtain your chicken (accessibility and tracing back)?

I would like to ask you the sources from which you get the products you are selling (chicken: live or meat)?

Note for interviewer: Write the list of the products mentioned before in the following table and ask for specific places from which the retailer will get (source). Give us the name of the source, approximate distance from your place (in km), how easy to get transportation (rank: 1 = very difficult, 5 = very easy; how available the product you want (rank: 1 = scarce, 5 = abundant)

List of product	Source (name of woreda/kebele/specific market)	Approximate distance from the retailer shop (km)	Easy in terms of transportation	Availability in terms of quantity of the product at the source

- Chicken: Do you purchase live chickens or chicken meat?
- From how many suppliers do you purchase chickens/chicken meat?
- Do you always use the same suppliers?
- Do you have fixed contracts with your suppliers?

Think about the last time you bought from here

- What type of source did you buy from? (local trader, regional trader, small producer, large producer, other...)
- Why do you buy here?
- Is it your preferred option? Why or why not?
- Who recommended or may be influenced you to buy from here?
- Who went to buy from here?
- What were the things that you considered before buying? [actually I asked you this generally but I want to know for this specific case]
- Did you get what you wanted? If not why?
- How are the products transported? Please describe in detail – e.g. by car, truck, other way? Are the products transported refrigerated? Are they covered from direct sun light? Are they stacked on top of each other? Are they boxed?
- In what packaging are the products transported? Crates, bags, bulk, other?
- How long is the transport (hours/km)?
- Is there in-between rest place during the transport of live chicken?
- Can you describe all the producers/traders/middlemen involved in getting this product to you starting with the producer (e.g. giving role of each enterprise/individual involved and approximate location)?

## Part B2: VC mapping

Who else handles the chickens/chicken meat on their way to yourself, what processes are they subjected to and over what timeline?

Interviewer: Could you, in order list all the people who own/trade the live chickens/chicken meat after it leaves the farm, what they do with the live chickens/chicken meat, then who they sell them to: include all VC actors until the item is with the final consumer. Record how long each person keeps the items for and any processing they do to the item (e.g. slaughter, preserving...). There may be more than one VC that the retailer participates in – record what percentage of items come from different VCs, differences in profitability for the different VCs have them as retailers and seasonality.

## Part C. Chicken meat handling and processing

How do conditions between purchase and sale affect nutritional quality and food safety? How does gender affect preparation and consumption?

(For live chicken retailer)

- I. Could you describe how you handle the live chicken starting from the moment you bought them until the moment you sell them to the consumer?
  - i. Where do you keep?
    - a. What type and location of keeping and how long is it stay?
    - b. Do you clean and disinfect the place you keep your live chicken (yes/no, how, how often)?
  - ii. How are your live chickens displayed?

(For chicken meat retailer)

Interviewer: Now that we've talked about where you purchase live chicken/meat, we'd like to ask some questions about how it is typically prepared at your s [e.g. sorting, storing, washing, processing, cooking]. We'd like you to walk us through what happens from when you purchase the fresh vegetables, live chicken or chicken meat until you sell them on and the time that passes between each step in the process.

1. Could you describe how you handle the products starting at the moment you buy them until the moment you sell them to the consumer?
2. Where do you store?
  - a. What type and location of storage and how long is it stored?
  - b. Do you clean and disinfect whatever you use to store the products in (yes/no, how, how often)?
3. How are these products displayed?
4. Do you do anything to keep the products presentable and appealing when on display?
5. Are these foods preserved? How and how long?
6. Do you refrigerate your products?
7. How often do you experience electricity power cuts and what is the typical duration?
  - a. record the i) minimum, ii) maximum and iii) most common length of power cuts?
8. Are the products processed? What kind of processing do you perform?

- a. Chicken meat: slaughter of chickens? Dressing (removal of internal organs)? Deboning? Cutting in pieces? Adding spices? Cooking? How do you do this?
- b. Chicken meat: cutting? Cleaning? Washing? How do you do this?
- c. What is the source of water that you use?
- d. Can you describe if any cleaning and disinfection of processing equipment takes place (yes/no, how, how often, what disinfectant)?

#### Part D. Quality and safety (knowledge, attitudes and practices)

How do retailers perceive quality and safety?

Interviewer: Now we would like to understand some of the main issues around quality and safety you face as retailers. First, let's start by discussing quality of live chicken/chicken meat. What are some of the attributes you look for to determine the quality of the product in question?

9. What aspects of quality are most important for you and why? [Make note of responses and rank].

[Prompt for nutritional quality, size, yield, appearance.]

10. What are the main causes of poor quality?
11. Can any of these make the commodity in question less safe to eat?
12. What are the main causes of poor quality? [Rank]
13. How do the people who buy your product judge quality?
14. Do the people who buy your chicken/meat ever ask how they were produced and if so, what are their most important concerns?
15. What do you do with poor quality (weak) chicken/poor quality meat? For example, is there a tendency for selling at lower price? Do people buy also?
16. What types of people in the community are more or less likely to buy poor quality chicken/meat?  
[Probes: the poor, elderly]

#### Part E. Retailers suggestions for improving safety and hygiene

Research questions addressed: How do retailers perceive hygiene and safety?

Interviewer: We would like to hear your ideas about food safety and hygiene

[Consider one at a time chicken/chicken meat as appropriate].

17. To what extent possibly customers are concerned about food safety and hygiene? [1 = not at all concerned, 2 = concerned, 3 = very concerned]
18. What particular aspects of food safety and hygiene are customers most concerned about [e.g. list at least 3 concerns and rank them]?

- 
19. What particular aspects of food safety and hygiene do you think are most important (list at least 3 and rank them and explain the choices made)?
  20. [If above customer and retailer concerns differ] Can you explain why there are differences in what you think is important and what you believe customers think is important?
  21. As a retailer to what extent do you think that improvements to food safety and hygiene are needed? [1 = not needed, 2 = slight improvements would be good but not essential, 3 = improvements are definitely needed, 4 = improvements are desperately needed]
  22. I would like to know further the roles of producers, potential middlemen (suppliers), retailers and consumers in hygiene and safety improvement of chicken or chicken meat. Let's focus on the concerns listed in my previous questions regarding hygiene and safety. Please, tell me their roles. We can start with this first problem to know the roles of above mentioned groups, for example.
    - a) What could consumers do to improve this?
    - b) What could producers do to improve this?
    - c) What could suppliers/traders/middlemen do to improve this?
    - d) What can you do as a retailer to improve this?
  23. What challenges hinder you from doing this? [if no clear response then prompt e.g. difficulty sourcing commodities of appropriate standard, additional costs, buyers are not willing to pay more to cover additional costs, lack of facilities, expertise, support or other resources...],
  24. What solutions can you think of that could improve the situation (considering addressing issues with consumer, producers, suppliers/traders/middlemen and retailers) including what should be done, who should do it, and how it could get done?
  25. What initiatives towards food safety or hygiene improvement are you aware of that have already been done to address this issue? What was the level of success/failure of the initiative, and if it failed why did it fail? and if it succeeded why did it succeed?
  26. What projects on chicken/meat safety and hygiene would you like to see go forward? What would be most helpful for you as a retailer?

## 8.8 Appendix 8. Chicken producer in-depth interview question guide

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_ Location: \_\_\_\_\_

Name of Producer: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_

### Part A. Describe the farm

1. What type of chickens do you have
  - a. Breed (village, commercial/hybrid/other...)
  - b. Type (layers, broilers, mixed, other)
2. How many chickens do you have at the moment
3. What other farm animals do you have & how many
4. Do you produce other crops, veg, fruit? (yes/no)
  - a. Please list, say what you use them for (home consumption, sell, animal feed,...) and rank for economic importance
5. How important is chicken farming to household income? (main income source, not main income but still important, not that important)
6. Do you have another income/employment besides farming? (yes/no – if yes record)
  - a. Is this more or less important to household income than farming?

### Management

7. Do you give your birds feed (if so what do you feed and when, where do you get feed from)?
8. Are your chickens housed regularly (night, a certain time of year, all the time)?
  - a. If yes, briefly describe housing
9. What is the source of water for your birds?
10. Do you use the chicken faeces for anything?
11. Do chickens access human latrine/toilet areas?

[If on farm – take pictures of the farm including hens and any hen housing]

Additional questions for large commercial farms (employ farm staff – 1000 birds)

12. Have you ever conducted laboratory tests of the feeds (for commercial farms)
13. Are there biosecurity measures for when visitors visit your farm?
14. Do you have a hygiene barrier at your farm?
15. Do you have a rodent control programme at your farm (for commercial farmers)?
16. Do you share equipment with other farms?
17. What is the flock density?
18. What is the feed withdraw period before selling your chicken?

Part B. Chicken availability and production during the year (availability)

Could you now tell us about where you get your chickens from? *Record the different sources if more than one.*

Could you describe how birds are kept before they reach you?

Could you describe how they are transported to you?

1. How does chicken production vary by season? How do markets vary by season?

	Q1 Jan-Mar	Q2 Apr-Jun	Q3 Jul-Sept	Q4 Oct-Dec
Chicken disease/mortality				
Medication/vaccination given				
Feed availability				
Get chickens				
Get hatching eggs				
Chickens sold				
Household consumption				

Do any of the medicines affect whether or not a treated chicken or its eggs can be eaten for a number of days after treatment?

Part C. Chicken quality and safety (knowledge, attitudes and practices)

Research questions addressed: How do producers perceive quality and safety?

1. What aspects of quality are you most concerned with and why? [Make note of responses and rank.]
  - a. [Prompt for nutritional quality, size, yield, appearance, taste, good condition, healthy]
2. What are the main causes of poor quality?
  - a. Can any of these make chicken meat less safe to eat?

3. How does the buyer of your chickens judge the quality of your chickens?
4. Do the people who buy your chickens ask how they were produced and if so, what are their most important concerns?

#### Part D. VC mapping

Research question addressed: Who else handles the birds on their way to consumers, what processes are they subjected to and over what timeline?

At what age are the birds when sold?

Who do you sell them to?

How many do you sell at a time?

How often do you sell chickens (weekly, monthly,...)?

In order list all the people who own/trade the chickens (live or as meat) after it leaves the farm, what each person does with the chickens, then who they sell them to: include all VC actors until the item is with the final consumer.

	VC actor	Comment	How are chickens transported and for how long?
1	Farm	-----	
2			

#### Part E. Producers suggestions for improving safety and hygiene

Research questions addressed: How do producers perceive hygiene and safety?

What particular aspects of food safety and hygiene in chicken/chicken meat are producers and buyers most concerned about [e.g. list at least 3 concerns and rank them]?

Food Safety Concerns		
	Producer	Buyer
1		
2		

What can you do as a producer to improve chicken food safety?

What challenges stop you from doing this? [if no clear response then prompt e.g. difficulty sourcing commodities of appropriate standard, additional costs, buyers are not willing to pay more to cover additional costs, lack of facilities, expertise, support or other resources...]

What solutions can you think of that could improve the situation (considering addressing issues with consumer, producers, suppliers/traders/middlemen and retailers) including what should be done, who should do it, and how it could get done?

What would be most helpful for you as a producer?

Finally, what initiatives are you aware of that have already been done to address food safety?

Was it successful or not and why?



## 8.9 Appendix 9. Vegetable retailer in-depth interview question guide

Completed By:                      Date:                      Location:

Name:                                      Age (in years):

Sex:                                      Educational status:

### Part A. Vegetables availability and use

1. What are the products sold at your retailers' shop? (list for all)
  - c) Vegetable (list)
  - d) Other products?
2. Are you also preparing ready-to-eat meals at this retail shop for sale? List and describe the foods.
3. Is there a potential risk for cross-contamination? For example, is there a chance of keeping raw and cooked food together?
4. Among the listed products, which one do you sell the most?
5. How many customers do you serve in a day in average?
6. What proportion of your customers are regular customers and what proportion are customers that only buy once? (approximately)
7. What are your busiest times of day when most costumers buy from you?
8. When people buy these vegetables, how much do they tend to buy at a single time?
9. How many times per week does an average customer buy the vegetables?
10. In what kind of packaging do you sell the products to your customers for vegetables?
11. I would like to know about the preferences of your customers regarding the products you are selling here. What criteria do people consider when buying products from here? Please, rank the criteria in the order of best to worst considering different factors customers consider when deciding what to buy foods to eat or to take to their home. Let's consider taste, safety, health/nutrition benefits, convenience and price. What other factors should we add to the list? [You may add 1–2 other factors]. You can rank each criterion using numbers (1 = worst, 5 = best)

List of product	Criteria					Others
	Taste	Safety	Health/nutritional benefits	Convenience	Price	

What factors are most important to you as a retailer when choosing to source vegetables: Rank these factors [if no clear response prompt with e.g. shelf-life, ease of sourcing product, supplier reliability, consistent quality, good price]. What other factors should we add to the list? [You may add 1-2 other factors]. You can rank each criterion using numbers (1 = worst, 5 = best)

List of product	Criteria					Others
	Shelf-life	Easy sourcing product	Supply or reliability	Consistent quality	Good price	

Part B. Where the vegetables are obtained from (accessibility and tracing back)

I would like to ask you the sources from which you get the products you are selling (vegetables)?

Note for interviewer: Write the list of the products mentioned before in the following table and ask for specific places from which the retail will get (source). Give us the name of the source, approximate distance from your place (in km), how easy to get transportation (rank: 1 = very difficult, 5 = very easy; how available the product you want (rank: 1 = scarce, 5 = abundant)

List of product	Source (name of woreda/ kebele/specific market)	Approximate distance from the retailer shop (km)	Easy in terms of transportation	Availability in terms of quantity of the product at the source
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Vegetables: Do you purchase vegetables?

- From how many suppliers do you purchase vegetables?
- Do you always use the same suppliers?
- Do you have fixed contracts with your suppliers?

Think about the last time you bought from here

- What type of source did you buy from? (local trader, regional trader, small producer, large producer, other...)
- Why do you buy here?
- Is it your preferred option? Why or why not?
- Who recommended or may be influenced you to buy from here?
- Who went to buy from here?
- What were the things that you considered before buying? [actually you I asked you this generally but I want to know for this specific case]
- Did you get what you wanted? If not why?
- How are the products transported? please describe in detail – e.g. by car, truck, other way? Are the products transported refrigerated? Are they covered from direct sun light? Are they stacked on top of each other? Are they boxed?
- In what packaging are the products transported? Crates, bags, bulk, other?
- How long is the transport (hours/km)?
- Is there in-between storage during the transport?
- Can you describe all the producers/traders/middlemen involved in getting this product to you starting with the producer (e.g. giving role of each enterprise/individual involved and approximate location)?

## Part B2: VC mapping

Who else handles the vegetables on their way to yourself, what processes are they subjected to and over what timeline?

Facilitator: Could you, in order list all the people who own/trade the vegetables after it leaves the farm, what they do with the vegetables, then who they sell them to: include all VC actors until the item is with the final consumer. Record how long each person keeps the items for and any processing they do to the item (e.g. preserving...). There may be more than one VC that the retailer participates in – record what percentage of items come from different VCs, differences in profitability for the different VCs have them as retailers and seasonality.

## Part C. Vegetable handling and processing

How do conditions between purchase and sale affect nutritional quality and food safety?

Interviewer: Now that we've talked about where you purchase vegetables we'd like to ask some questions about how it is typically prepared at your shop [e.g. sorting, storing, washing, processing, cooking]. We'd like you to walk us through what happens from when you purchase the fresh vegetables until you sell them on and the time that passes between each step in the process.

12. Could you describe how you handle the products starting at the moment you buy them until the moment you sell them to the consumer?
13. Where do you store?
  - a. What type and location of storage and how long is it stored?
  - b. Do you clean and disinfect whatever you use to store the products in (yes/no, how, how often)?
14. How are these products displayed?
15. Do you put them somewhere else at night?
16. Do you do anything to keep the products presentable and appealing when on display?
17. Are these foods preserved? How and how long?
18. Do you refrigerate your products?
19. How often do you experience electricity power cuts and what is the typical duration?
  - a. record the i) minimum, ii) maximum and iii) most common length of power cuts?
20. Are the products processed? What kind of processing do you perform?
  - a. Vegetables: cutting? Cleaning? Washing? How do you do this?
  - b. What is the source of water that you use?
  - c. Can you describe if any cleaning and disinfection of processing equipment takes place (yes/no, how, how often, what disinfectant)?

How does gender affect preparation and consumption? Who prepares, who consumes what?

## Part D. Quality and safety (knowledge, attitudes and practices)

How do retailers perceive quality and safety?

Interviewer: Now we would like to understand some of the main issues around quality and safety you face as retailers. First, let's start by discussing quality of vegetables [tomato and leafy vegetable. What are some of the attributes you look for to determine the quality of the product in question?

21. What aspects of quality are most important for you and why? [Make note of responses and rank].

[Prompt for nutritional quality, size, yield, appearance.]

22. What are the main causes of poor quality?
23. Can any of these make the commodity in question less safe to eat?
24. What are the main causes of poor quality? [Rank]
25. How do the people who buy your product judge quality?
26. Do the people who buy your vegetables ever ask how they were produced and if so, what are their most important concerns?
27. What do you do with poor quality vegetables? For example, is there a tendency for selling at lower price? Do people buy also?
28. What types of people in the community are more or less likely to buy poor quality vegetables? [Probes: the poor, elderly]

#### Part E. Retailers suggestions for improving safety and hygiene

How do retailers perceive hygiene and safety?

Interviewer: We would like to hear your ideas about food safety and hygiene

[Consider one at a time vegetables [tomato + leafy vegetable] as appropriate].

29. To what extent possibly customers are concerned about food safety and hygiene? [1 = Not at all concerned, 2 = concerned, 3 = very concerned]
30. What particular aspects of food safety and hygiene are customers most concerned about [e.g. list at least 3 concerns and rank them]?
31. What particular aspects of food safety and hygiene do you think are most important (list at least 3 and rank them and explain the choices made)?
32. [If above customer and retailer concerns differ] Can you explain why there are differences in what you think is important and what you believe customers think is important?
33. As a retailer to what extent do you think that improvements to food safety and hygiene are needed? [1 = not needed, 2 = slight improvements would be good but not essential, 3 = improvements are definitely needed, 4 = improvements are desperately needed]
34. I would like to know further the roles of producers, potential middlemen (suppliers), retailers and consumers in hygiene and safety improvement of vegetables. Let's focus on the concerns listed in my

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previous questions regarding hygiene and safety. Please, tell me their roles. We can start with this first problem to know the roles of above mentioned groups, for example.

- e) What could consumers do to improve this?
  - f) What could producers do to improve this?
  - g) What could suppliers/traders/middlemen do to improve this?
  - h) What can you do as a retailer to improve this?
35. What challenges hinder you from doing this? [if no clear response then prompt e.g. difficulty sourcing commodities of appropriate standard, additional costs, buyers are not willing to pay more to cover additional costs, lack of facilities, expertise, support or other resources...],
36. What solutions can you think of that could improve the situation (considering addressing issues with consumer, producers, suppliers/traders/middlemen and retailers) including what should be done, who should do it, and how it could get done?
37. What initiatives towards food safety or hygiene improvement are you aware of that have already been done to address this issue? What was the level of success/failure of the initiative, and if it failed why did it fail? and if it succeeded why did it succeed?
38. What projects on vegetable safety and hygiene would you like to see go forward? What would be most helpful for you as a retailer?

## 8.10 Appendix 10. Vegetable producer in-depth interview question guide

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_ Location: \_\_\_\_\_

Name of Producer \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_

### Part A. Describe the farm

1. What crops, vegetables, fruit do you produce and sell commercially (e.g. only those that are an important source of income).
  - a. Rank according to importance to household income
  - b. Record if item important to the woman of the house's income? (Yes or No)
  - c. Include PRIORITY VEG 1 & 2 and record approximate quantity produced/year

Commodity	Rank	Women income	Quantity produced

2. What farm animals do you have & how many?
3. Do farm animals or wild animals have access to the vegetable fields? (yes or no)
4. Do you have another income/employment besides farming? (yes/no – if yes record)
  - a. Is this more or less important to household income than farming?
5. If you sell vegetables for income do you grow these vegetables differently and/or in a different place to vegetables that you eat at home?
6. Are vegetables produced near human latrines/toilets (how far)?
7. Do you use human manure on your vegetable fields? (yes or no) If yes describe
8. What source of irrigation water do you use? Well? River? Rain-harvesting? Other?

[FACILITATOR: DOES WATER LOOK CLEAN consider IF IT SEEMS WELL SEPARATED FROM LATRINES OR FARM ANIMAL WASTE]

– take photos of irrigation sources and vegetable farm –

9. And do farm or wild animals use this water source as well?

[If on farm – take pictures of the farm including VEG 1&2, include tomato, growing or harvested if present]

---

Part B. PRIORITY VEG 1 & 2 availability and production during the year (availability)

2. How does vegetable production vary by season? How do markets vary by season?

	Q1 Jan-Mar	Q2 Apr-Jun	Q3 Jul-Sept	Q4 Oct-Dec
Vegetable 1				
Vegetable 2				

NB: p = production; m = marketing; c = consumption.

Do you use animal or human manure made from faeces to fertilise your vegetables?

Please describe what is applied and when, describe the source of this manure (which species, produced from own household only)?

Types of faeces (species)	Source (household, elsewhere)	Application period
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What is the minimum time after application of manure until you harvest VEG 1&2?

Do you apply pesticides? Please describe?

Do any of chemicals applied mean that the vegetables cannot be eaten for a period after application?

Do you know the source of the chemicals you use for vegetable production?

Are there safety measures that should be followed when handling these chemicals? If Yes, describe

Can any of the chemicals applied make people ill if not handled correctly? If yes, describe.

What is the sources for your seeds? (recycled seed, buy regularly from informal sources, formal market,...)

## Part C. Vegetable quality and safety (knowledge, attitudes and practices)

Research questions addressed: How do producers perceive quality and safety?

5. What aspects of PRIORITY VEG quality are you most concerned with and why? [Make note of responses and rank.]
  - a. Prompt for nutritional quality, size, yield, appearance, taste, good condition, healthy]
6. What are the main causes of poor quality?
  - a. Can any of these make PRIORITY VEG less safe to eat?
7. How does the buyer of your vegetables judge the quality of your vegetables?
8. Do the people who buy your vegetables ask how they were produced and if so, what are their most important concerns?

## Part D. VC mapping

Research question addressed: Who else handles the PRIORITY VEG 1 on their way to consumers, what processes are they subjected to and over what timeline?

	VC actor	Comment	
1	Farm	After harvest how are they stored and for how long? Where do you sell them to and to whom? How are they packaged? How are they transported?	
	Outside farm	In order list all the people who own/trade the VEG 1 after it leaves the farm, what each person does with the VEG: include all VC actors until the item is with the final consumer.	Time Veg with that VC actor Distance to next VC actor
2			
3			
4			
5			

## Part E. Producers suggestions for improving safety and hygiene

Research questions addressed: How do producers perceive hygiene and safety?

What particular aspects of food safety and hygiene in vegetables are producers and buyers most concerned about [e.g. list at least 3 concerns and rank them]?

Food Safety Concerns	
Producer	Buyer
1	
2	

What can you do as a producer to improve vegetable food safety?

What challenges stop you from doing this? [if no clear response then prompt e.g. difficulty sourcing commodities of appropriate standard, additional costs, buyers are not willing to pay more to cover additional costs, lack of facilities, expertise, support or other resources...]

What solutions can you think of that could improve the situation (considering addressing issues with consumer, producers, suppliers/traders/middlemen and retailers) including what should be done, who should do it, and how it could get done?

What would be most helpful for you as a producer?

Finally, what initiatives are you aware of that have already been done to address food safety?

Was it successful or not and why?



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