

EatSafe: Evidence and Action Towards Safe,
Nutritious Food

Food Safety Attitudes and Practices in A Traditional Food Market in Hawassa, Ethiopia: A Quantitative Formative Assessment

September 2022

This EatSafe report presents evidence that will help engage and empower consumers and market actors to better obtain safe nutritious food. It will be used to design and test consumer-centered food safety interventions in informal markets through the EatSafe program.

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Agreement Officer Representative

Lourdes Martinez Romero

For additional information, please contact:

- Richard Pluke, EatSafe Chief of Party, rpluke@gainhealth.org
- Caroline Smith DeWaal, EatSafe Deputy Chief of Party, cdewaal@gainhealth.org

Global Alliance for Improved Nutrition
1201 Connecticut Ave NW Ste 700B-2
Washington, D.C. 20036

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ACRONYMS AND ABBREVIATIONS

Below is a list of all acronyms and abbreviations used in the report.

ANOVA	Analysis of Variance
CAPI	Computer-assisted personal interviewing
EatSafe	Evidence and Action Towards Safe, Nutritious Food
FBD	Foodborne Disease
FES	Focused Ethnographic Study
GAIN	Global Alliance for Improved Nutrition
LMIC	Low- and middle-income country
KAP	Knowledge, attitudes, and practices
PPI	Poverty Probability Index
QFA	Quantitative Formative Assessment
SD	Standard deviation
SES	Socioeconomic status
USAID	United States Agency for International Development
USD	U.S. Dollars

EXECUTIVE SUMMARY

Feed the Future's EatSafe: Evidence and Action Towards Safe, Nutritious Food program is a USAID-funded, five-year program to enable lasting improvements in the safety of nutritious foods bought and sold in traditional food markets. In Ethiopia, EatSafe focuses on three fresh vegetable commodities: kale, lettuce, and tomatoes. In conjunction with other Phase I (Formative Research) activities in Hawassa, Ethiopia, this quantitative formative assessment sought to understand knowledge, attitudes, and practices (KAP) relevant to food safety and drivers of food purchasing choices in one traditional food market. In July and August 2022, EatSafe surveyed 300 consumers and vendors (N=150 each). Key findings from these two cross-sectional surveys are summarized below.

Demographics. Most fresh vegetable vendors (87%) are women, while both men and women shop at the market. Amharic is the most common language spoken in surveyed households, more so among consumers (79%) than vendors (58%), followed by Wolayita, more common among vendors (37%) than consumers (11%). Based on the Poverty Probability Index, a sizeable minority of households is likely to live below the international \$3.20/day poverty line, with a significantly higher proportion for vendors (26%) than consumers (19%). These proportions are lower when referring to the Ethiopia national poverty line of 7,184 Ethiopian Birr/day (7% and 11% for vendors and consumers, respectively).

Consumers. Consumers chose a particular vendor based on food quality, price, personality of the vendor, and the safety of the food. Once at the market, consumers compare on average three vendors before making a purchasing decision. Deciding to purchase from a “regular vendor” is fairly common. Though consumers generally believe that vendors sell safe food, they acknowledge differences in food safety between vendors. Consumers do not commonly discuss food quality or safety with vendors at the market, and rarely express complaints, but they associate visual and sensory cues to poor food safety.

Vendors. Vendors chose their suppliers by price, food quality, food cleanliness/safety, and how suppliers treat them. Working at the shop is the primary income-generating activity for most vendors (97%) and most do not have other staff (76%). Over half of vendors (58%) vary the commodities they sell by season. On average, vendors source food from nine suppliers, mostly wholesalers (89%), and repeat purchase from the same suppliers are common (78%). Vendors are generally not worried about foodborne disease (73%), but they expressed interest in learning more about bacteria or microbes and how negative health effects such as diarrhea can be related to consumption of contaminated food.

Media use. Both consumers and vendors primarily watch satellite and network television for entertainment. A majority but not all consumers (61%) and vendors (73%) own a smartphone. A larger proportion of men than women personally owned a mobile phone. Sources of information consumers and vendors trust on health issues included medical

professionals (92% and 95% respectively). Similarly, medical professionals were the top trusted information sources on food safety issues. Friends and family were also an important source of food safety information.

Gender dynamics. While most behaviors and attitudes were not significantly different between women and men, for both consumers and vendors, there are clear gender differences in roles and social norms. Women are primarily responsible for deciding what food to buy, purchasing and preparing food for the household. Women vendors have been vending at the market for a longer time than their male counterparts. Women vendors have supplies delivered to their shop more commonly than men vendors. Male vendors had more customers on average visit their shop on a typical day than woman vendors.

In traditional markets, people make decisions about food every day – for instance, how important is food safety is when sourcing products (vendors) or when choosing which food to purchase (consumers). In this way, both consumers and vendors exhibit demand for safe food products. In these spaces, training and education on food safety best practices can increase people’s awareness on the importance of safety in purchasing and preparing safe, nutritious foods. In Phase II of the program, EatSafe will develop and implement market-based interventions that seek to increase knowledge about these very topics – ensuring the interventions are culturally specific and gender-sensitive.

1. INTRODUCTION

Ethiopia, a low-income country quickly transitioning to a lower-middle-income country (LMIC), falls into the category of countries for which food safety concerns are generally at their most critical. This is due to rapid economic, demographic, and dietary change, but the country still has limited food safety management capacities (1). Global estimates support this assertion; the Food Epidemiology Reference Group, a working group of the World Health Organization, found that the African region that includes Ethiopia had the second highest per capita burden of foodborne illness, in disability-adjusted life years, with most of this being due to diarrheal disease agents (2).

In Ethiopia, traditional markets – the open-air markets where millions of people in LMICs regularly buy and sell nutritious, fresh vegetables and animal-source foods – often lack proper infrastructure and are largely unregulated by food safety authorities (3). Market vendors lack food safety training and consumers have little no representation via advocacy associations (4). These factors heighten the risk of foodborne disease (FBD); thus, traditional markets represent an important opportunity for intervention to improve food safety.

Feed the Future's EatSafe (Evidence and Action Towards Safe, Nutritious Food) aims to improve food safety in LMICs, with a specific focus on nutritious foods sold in traditional markets. In Ethiopia, EatSafe operates in Hawassa, the largest urban area in the Sidama Region. EatSafe in Ethiopia focuses on three key commodities: lettuce, tomatoes, and kale.

1.1. ASSESSMENT OBJECTIVE AND REPORT STRUCTURE

As part of EatSafe's Phase I (Formative Research) in Ethiopia, EatSafe conducted a cross-sectional survey assessment to understand consumers' and vendors' knowledge, attitudes, and practices (KAP) relevant to food safety and drivers of food purchasing choices, as well as demographics and contextual information on food purchasing and vending behaviors in a traditional food market in Hawassa, Ethiopia.

This report is structured as follows: First, it describes the structure and characteristics of the target traditional market (Section 2), followed by a brief description of the assessment methodology (Section 3) and respondent demographics (Section 4). After presenting in-depth results of both surveys individually (Section 5, consumers, and Section 6, vendors), gender considerations (Section 7) and relevant comparisons between consumers and vendors (Section 8) are summarized. It concludes with insights to inform the design of food safety interventions during Phase II of EatSafe in Ethiopia (Section 9).

2. MARKET INFORMATION

The target market is relatively large in size, with over 3,000 stalls selling a variety of goods (e.g., cleaning products, electronics, clothing, scrap metal) and foods (primarily raw

commodities with some ready-to-eat foods). The market is open every day from 9 AM – 11 PM, with peak days Monday and Thursday. Like other traditional markets, running water is not available but jerrycans can be brought into the market from nearby. Paid toilets are available but in poor condition.

While the market itself has a clearly delineated perimeter and most stalls are permanent structures, the main vegetable section also has impermanent stalls that are not raised off the ground, made of sticks and tarps, with dirt flooring. Additionally, vegetable vendors use carts, bowls, and cloths on the ground to sell outside the formal market perimeter (see **Figure 1**). These vendors, many of whom are women, operate without licenses and are likely to have a different status in the market compared to licensed vendors.



Figure 1. Photographs of target traditional market in Hawassa, Ethiopia

In an initial reconnaissance visit to the market that included a vendor count, EatSafe observed the sale of at least 30 different food products. The fresh vegetables most commonly sold are tomatoes, followed by potatoes, cabbage, and carrots. Kale, one of EatSafe’s key commodities, is most commonly available during or after the rainy season, in the months of June and July. Lettuce is also another fresh vegetable commonly available in the market, though the vendors are fewer in number compared to other food products.

3. METHODS

This section summarizes the assessment methodology, with detailed methods described in [Appendix 1](#) and full survey tools are available upon request. Ethical approval for the study was received from the local Institutional Review Board, the Sidama National Regional Health Bureau, Public Health Institute.

EatSafe administered individual structured surveys to two groups of respondents, recruited from the target market, including:

- **Consumers:** those who have primary or shared responsibility for purchasing food for their household, and shop for at least one key commodity in the target market at least once a month on average.
- **Vendors:** those who sell at least one of the key commodities at the target market at least one day per week for the past three months.

Data collection occurred during July and August 2022. Both consumer and vendor surveys contained the following modules: demographics; market behaviors; perception and attitudes about food safety and gender; and sources of information. Surveys were translated into Amharic, allowing respondents to select their language of preference. Analogous data collection and analysis methods were used to administer surveys to both respondent groups. The most salient findings are presented in this report.

4. RESPONDENT DEMOGRAPHICS

During the market count, it was found that out of 164 vendors in the market, 87% of them were women. EatSafe also interviewed 150 consumers and 150 vendors in the target market, totaling 300 respondents (**Table 1**). Respondent quotas (i.e., gender for consumers; gender and commodity sold for vendors) were determined using the preliminary estimates of total market size. Among vendors, most (93%) respondents were the owner of the shop.

The average age of the consumers and vendors surveyed in this study was 32 and 33 years old, respectively. The majority of respondents, vendors (73%) and consumers (63%) were married. Over half of consumers (52%) and vendors (63%) reported that they completed education to end of secondary (5th – 12th grade). Households of consumers and vendors had an average of 4.7 and 5.1 members respectively (range: 1 to 11 for both). The average number of children <5 years old for consumers and vendors per household was 0.5 and 0.6 respectively (range: 0 to 4 for both consumers and vendors). The average number of household residents between the ages of 5-18 for consumers and vendors was 1.2 and 1.5 respectively (range: 0 to 5). Amharic was the most common language used in the household, slightly more so among consumers (79%) than vendors (58%), followed by Wolayita, which was higher among the vendors (37%) than consumers (11%). Informal observations revealed that, as compared to other markets in the area, more vendors belong to the Wolayta group, a minority in the region.

Table 1. Consumer and Vendor Demographics

	VENDORS (N=150)	CONSUMERS (N=150)
SEX		
Men	22 (15 %)	52 (35 %)
Women	128 (85 %)	98 (65 %)
AGE		
Mean (SD)	30.5 years (11)	32 years (10)
Median (Min – Max)	28.5 years (18 – 75)	30 years (18 – 78)
MARITAL STATUS		
Married	109 (73 %)	94 (63 %)
Not married	32 (21 %)	47 (31 %)
Divorced	3 (2 %)	4 (3 %)
Widowed	6 (4 %)	5 (3 %)
EDUCATION ¹		
Primary (0 - 4 th Grade)	32 (21 %)	12 (8 %)
Secondary (5 th Grade - 12 th grade)	94 (63 %)	78 (52 %)
Post-Secondary	5 (3 %)	44 (29 %)
Post-Secondary (TVET) ²	4 (3 %)	9 (6 %)
Never attended school (illiterate)	12 (8 %)	3 (2 %)
# OF HOUSEHOLD RESIDENTS		
Mean (SD)	5.1 (2)	4.7 (22)
Median (Min – Max)	5 (1 – 11)	4 (1 – 11)
# OF HOUSEHOLD RESIDENTS <5 YEARS OF AGE		
Mean (SD)	0.6 (0.8)	0.5 (0.7)
Median (Min – Max)	0 (0 – 4)	0 (0 – 2)
LANGUAGE ³		
Amharic	87 (58 %)	118 (79 %)
Sidama	6 (4 %)	12 (8 %)
Wolayita	55 (37 %)	16 (11 %)

Over half of interviewed consumers and vendors (67% and 58%, respectively), were head of their household. Nearly all of surveyed individuals had access to electricity (98% vendors and 99% consumers respectively). To characterize the socioeconomic status of respondents, EatSafe used variables related to household assets to compute the Poverty

¹ Note: Seven respondents are excluded from the table and described here instead. Two respondents (N=1 each consumer and vendor) indicated they only had kindergarten, nursery, or pre-school education. One consumer indicated they had informal education (i.e., they can read and write but have never attended any school). Four respondents (N=2 each consumer and vendors) had non-regular education (e.g., adult literacy program, satellite schooling, or religious education).

² TVET refers to technical and vocational education and training.

³ Six respondents' primary language were Kenbatigna (N=1 each consumer and vendor), Guragegna (N=1 each consumer and vendor), Oromiffa (N=1 consumer), and sign language (N=1 consumer).

Probability Index (PPI) using the international poverty line of \$3.20/day, and a specific Ethiopian national poverty line (Ethiopia NPL) of 7,184 ETB/day (see [Appendix 1](#) for methodology).⁴ At the \$3.20/day poverty line (**Figure 2A**), the mean probability of poverty was 19% and 26%, for consumers and vendors, respectively. Using the Ethiopia NPL, estimates were lower: 7% and 11% for consumers and vendors, respectively (**Figure 2B**). These percentages correspond to the proportion of the population expected to be living in poverty. While a substantial proportion of the population would be considered impoverished according to the international \$3.20/day poverty line, the proportion of the population considered impoverished by national standards is low. There was no difference observed across gender, but the poverty rate was significantly higher for vendors than consumers across both lines ($p < 0.0001$).

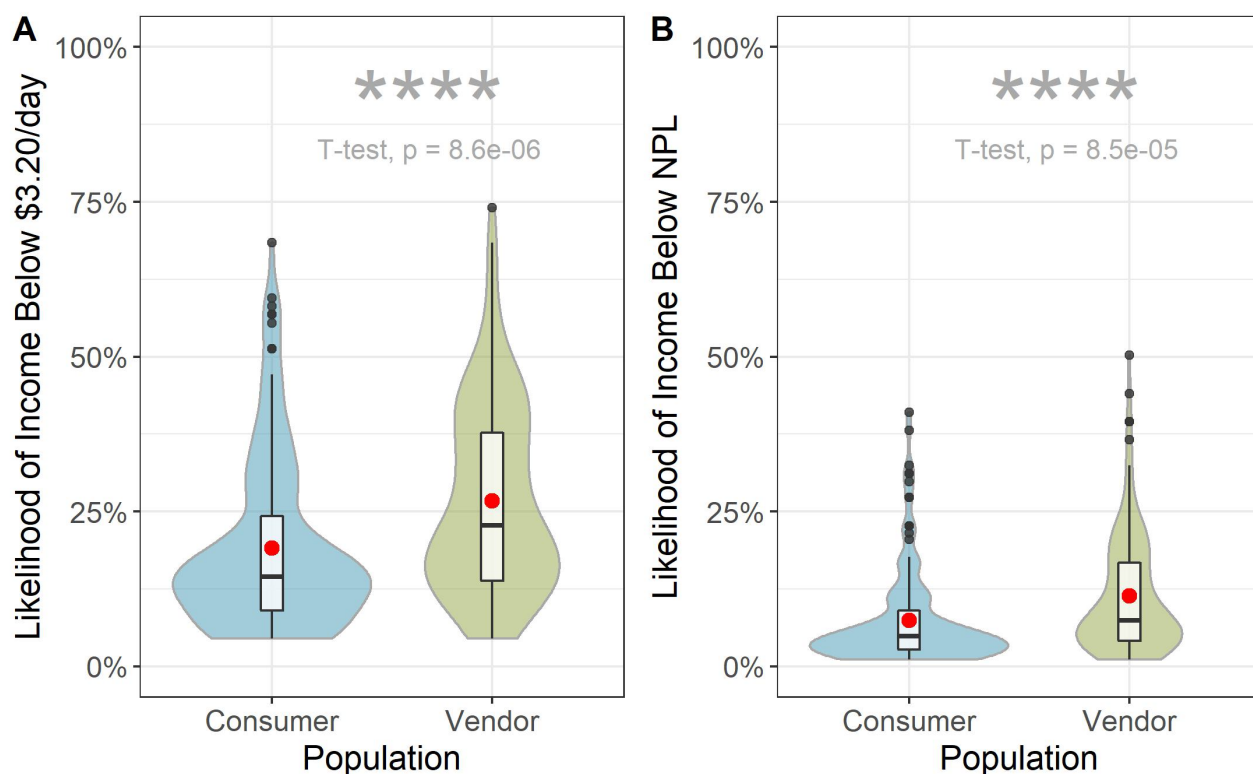


Figure 2. Probability of poverty according to (A) international \$3.20/day poverty line; (B) Ethiopia-specific NPL

⁴ Red points correspond to group mean probability of poverty. Asterisks signify statistical significance of $p \leq 0.0001$. In **Figure 2A**, mean probability for consumers was 19% ($\pm 14\%$ SD; median 15%, IQR: 10%-25%), and 26% for vendors ($\pm 14\%$ SD; median 20%, IQR: 10%-35%). In **Figure 2B**, mean probability was 7% ($\pm 9\%$ SD; median 5%, IQR: 3%-10%) for consumers and 11% for vendors ($\pm 10\%$ SD; median 8%, IQR: 5%-15%).

5. RESULTS: CONSUMER SURVEY

This section reviews consumer behaviors and attitudes that can inform the design of food safety interventions. These include food-related gender roles in the household; food shopping patterns at the market; key characteristics that consumers seek when deciding which food to buy and which vendors to buy from; signals/cues used to identify unsafe food; interactions and communications with vendors; beliefs or perceptions related to food safety in the market.

Unless otherwise stated, trends are aggregated by gender because results were similar between men and women, and percentages refer to the whole consumer group (N=150).

5.1. GENERAL FOOD PURCHASING BEHAVIORS AND ATTITUDES

Household roles in food purchase and preparation. The majority of consumers surveyed indicated that they were the primary decisionmakers on what food was purchased for the household (83%, N=146). Most women (compared to men) were primarily responsible for buying food for the household (67%) as well as being the primary decision maker to decide what food is purchased (87%). There was a significant difference between the proportion of women and men who reported to do these tasks (p-value=0.02 and p-value = 0.04 respectively, Fisher's test two-sided). Most women surveyed were also the primary food preparers for the household (90%, N=88), while most men surveyed did not prepare food (13%, N=7), pointing to clear gender roles (p-value <0.01, Fisher's exact two-sided test). A larger percentage of men surveyed owned livestock than women (37% and 8% respectively, p-value < 0.01, Fisher's two-sided test).

The primary foods purchased at the study market included leafy greens and tomatoes followed by legumes and roots or tubers (purchasing at least one key commodity was a criterion for enrollment, see [Appendix 1](#)). Differences in purchasing of leafy greens, grains or flours and milk or dairy were noticed between men and women with women shopping for these products more frequently (**Table 2**). These differences were significant (p-values < 0.02, Fisher's exact two-sided).

Table 2. Consumers' purchasing behaviors

Foods ⁵	RESPONSES		RESPONSES, BY GENDER	
	N	% ¹	MEN N (%) ²	WOMEN N (%) ²
Tomatoes	139	93 %	49 (35 %)	90 (65 %)
Leafy greens	126	84 %	38 (30 %)	88 (70 %)
Roots/tubers	80	53 %	26 (33 %)	54 (68%)
Legumes	66	44 %	19 (29 %)	47 (71 %)
Eggs	25	17 %	7 (28 %)	18 (72 %)
Poultry	21	14 %	6 (29 %)	15 (71 %)
Grains	17	11 %	1 (6 %)	16 (94 %)

¹ Total percentages reflect the full sample size (N=150).

² Percentages by gender reflect the sample (N) per commodity, which varied, as respondents could skip questions or provide multiple answers per question.

Choosing markets. Most consumers purchase food from a local traditional market (89%), compared to other locations like a supermarket (4%). The main reason that the study respondents visit the target market is its convenient location (67%). Study respondents were satisfied with the market (85%) as well as overall vendor options (84%). Over half (57%) of respondents felt secure at the market (i.e., physical or personal safety, “not being worried about harassment, theft, or assault”); 18% felt somewhat secure.

Shopping practices. Most respondents had been shopping at the target market in Hawassa for more than three years (91%); likewise, 74% visited once a week, and 21% visited more than once a week. More of the study respondents visit the market in the morning between 8 AM – 12 PM (36%), or in the early afternoon between 2 PM – 5 PM (29%) than any other time of the day. During a typical shopping trip, respondents report having plenty of time (81%) to shop and visit around 4 vendors (SD ± 2) per visit. Consumers generally know what they need (80%) and most do not keep a written shopping list (only 32% do). The main purpose for visiting the market is to buy food (93%) instead of other activities such as talking to friends (6%). Additionally, most consumers reported to never talk to other customers about food purchasing decisions (37%). Bartering with vendors at the market was not common (25%).

Choosing vendors. Regularly buying food from the same vendor is common, and consumers repeatedly visit the same shops, particularly for vegetable purchasing (52%). Of the consumers that compare vendors (N=116), at least sometimes compare vendors of leafy greens and tomatoes (65% and 77% respectively) but compare vendors of other commodities much less (35% for roots/tubers, 29% for legumes, and 4%-9% for grains, poultry, eggs, or milk/dairy products). Consumers compare about 3 vendors before deciding

⁵ Fish was not purchased at the market by any of the individuals surveyed as there is a separate fish market in Hawassa. Only women consumers (6%, N=9) bought milk or dairy products.

to purchase, suggesting a desire to compare options. Consumers chose a particular vendor based on food quality, price, personality of the vendor, and the safety of the food (**Figure 3**).

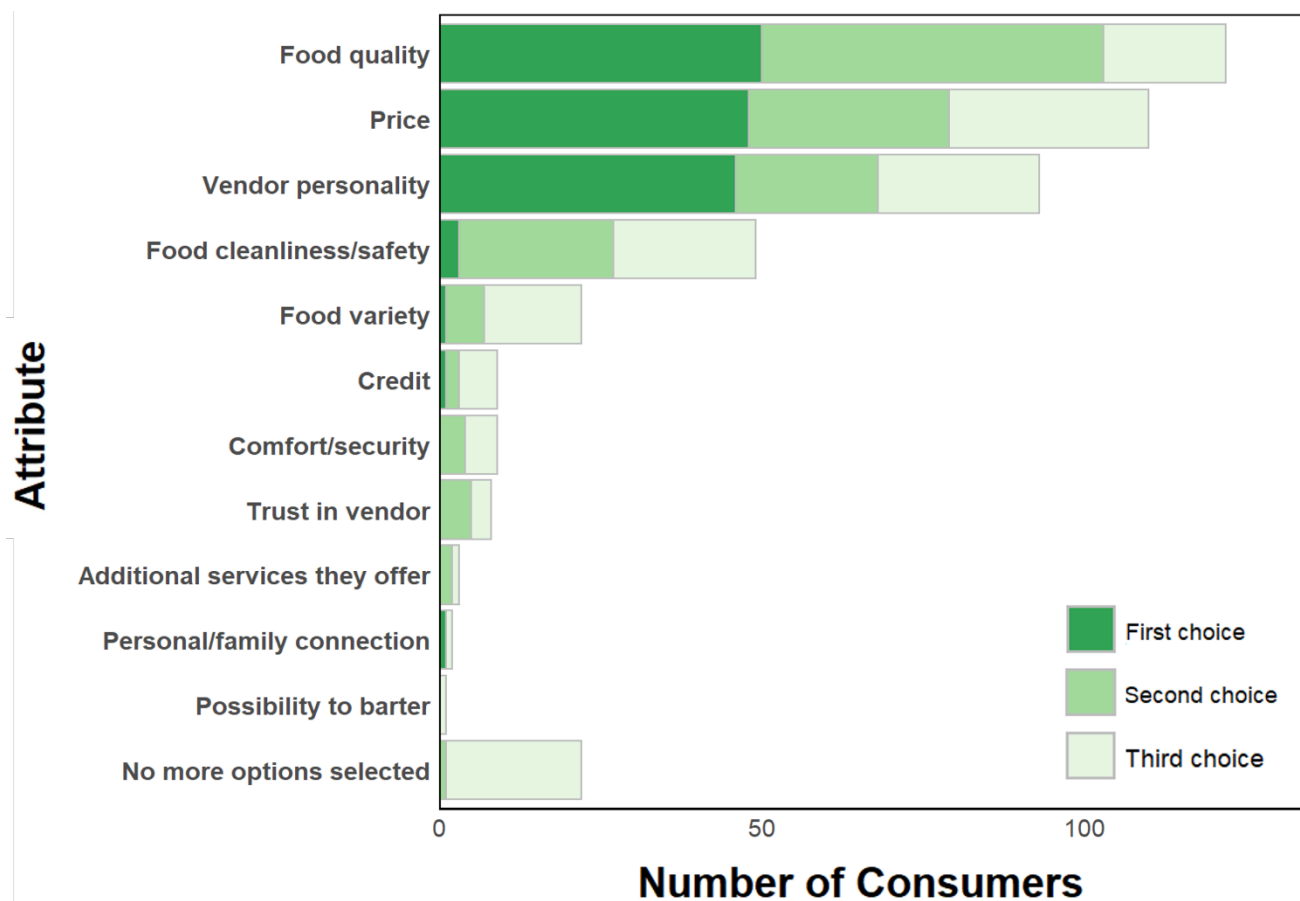


Figure 3. Reasons consumers choose to purchase food from a particular vendor⁶

Perceptions of vendors. Nearly all consumers listed a characteristic that they use to assess the hygiene behavior of vendors in managing their shop (99%). Characteristics that they listed included that vendors take care of their shop (shop cleanliness), know where their produce came from, and know how the produce is/was handled.

Perceptions about food purchased at the market. Half of interviewed consumers were satisfied with the food bought at the market, while about one-third were very satisfied. Additionally, half were completely satisfied with the healthiness of their household food. The most important attributes used to select food items were freshness (74%), safety (10%), nutritional content/healthiness (6%), and price (5%). When consumers were asked about the most important attributes of food for their small children (< five years old), answers differed: freshness (52%), safety (15%), healthiness/nutritional content (13%), and balanced or

⁶ Note: This question gave the option for respondents to provide three answers. Answers were recorded in the order of being mentioned. “First choice” means that this attribute was mentioned first.

varied diet (7%). For the majority of households, children under five years old never, or only occasionally consume the same food as the rest of the household (56%, N=62).

5.2. FOOD SAFETY KNOWLEDGE, AWARENESS, AND ATTITUDES

Overall, the top five ways that consumers defined food safety were:

1. Maintaining the cleanliness of the food;
2. Healthfulness/nutritional value of food;
3. Maintaining the quality of the food;
4. Food that has not spoiled; and
5. Food free of germs and bacteria.

Individuals stated that signs of unsafe food include spoilage or rotting (31%), changes in flavor (12%), changes in texture (11%) or infested with pests or insects (8%).

Most consumers, about half, did not believe that individuals get sick from eating kale, lettuce, and/or tomatoes (**Table 3**). Overall, consumers believe that vendors sell safe food, but they acknowledged there were differences in food safety between vendors.

Table 3. Consumer perceptions related to food safety

PERCEPTION	RANK				
	STRONGLY DISAGREE	DISAGREE	NEITHER	AGREE	STRONGLY AGREE
People get sick from eating kale	19%	55%	10%	15%	1%
People get sick from eating lettuce	15%	61%	11%	13%	1%
People get sick from eating tomatoes	15%	47%	13%	23%	2%
Food safety differences exist between vendors	3%	10%	11%	65%	10%
Trust that vendors sell safe food	3%	15%	10%	63%	9%
Prefer to buy from vendors that have a food safety certification or license (if available)	6%	28%	5%	49%	13%

Only 9% (N=14) consumers reported having had a foodborne illness in the year prior to the interview. Generally, the foodborne diseases (FBDs) individuals were most concerned about included diseases caused by microbial pathogens (e.g., typhoid fever, amoebas).

5.3. FOOD SAFETY CHOICES AND BEHAVIORS

Food quality was the most important food attribute that consumers look for when deciding which vendor to visit, while food safety was reported less often (**Figure 3**).

Over half (58%) of respondents were neutral about market cleanliness, perceiving the market as “not too clean but not too dirty.” For the remaining respondents who stated the market is very dirty, dirty, or not too clean but not too dirty (42%; N=123), reasons that can make the market dirty included waste, disposal of leftovers, mud, and vendors not cleaning their area after selling products – each ranging from 12%-20%.

Additionally, most consumers stated that in general market cleanliness was not a reason for choosing which market to buy from (76%), although a similar proportion felt that it was necessary to check the personal hygiene of a vendor. Consumers evaluate cleanliness or hygiene of a vendor by their orderliness or organization, open surfaces on a vendors’ counter, and if these surfaces are clean (**Figure 4**). Actions that consumers stated that vendors can take to improve food safety include maintaining the quality of and selling a good quality product (37%) and cleaning the area in and around their shop (28%).

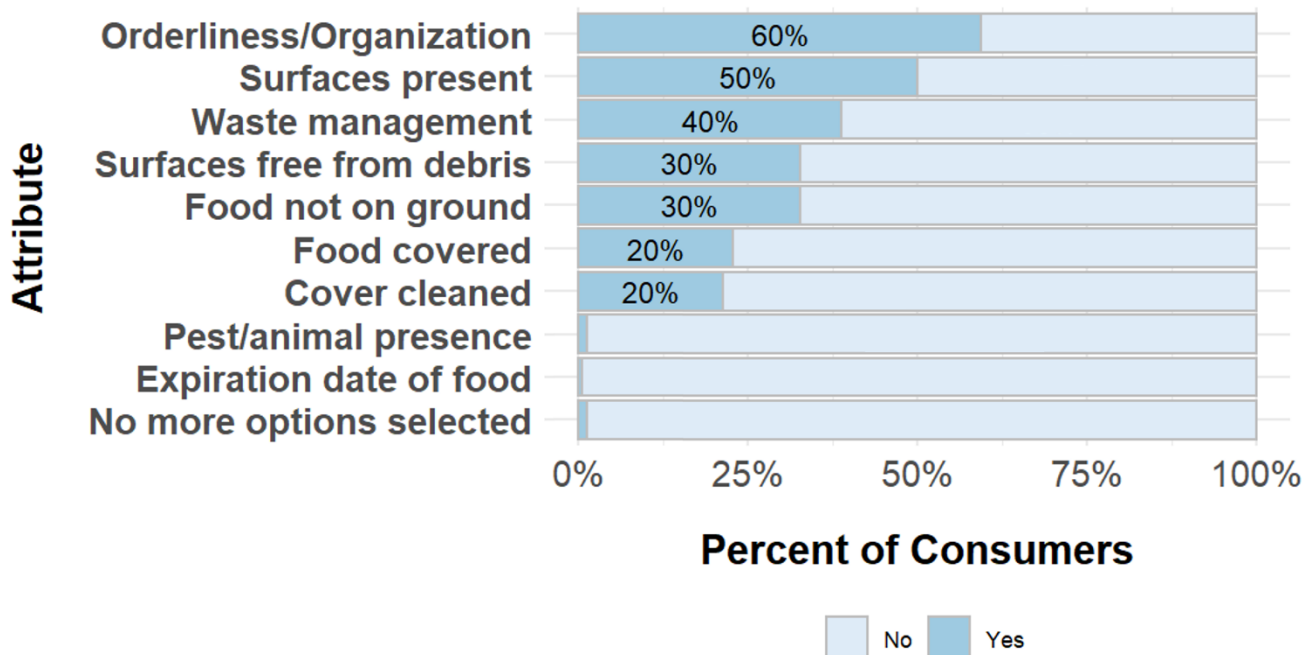


Figure 4. Factors consumers consider when evaluating vendors’ cleanliness

Three-quarters of respondents stated they would not purchase a food item if they were unsure about its safety. They also stated that if a product appeared unsafe, they would consider purchasing it if it had a low price. Consumers would prefer to buy from vendors with a food safety certificate or license, if one was available (**Table 3**).

Consumers mainly express the demand for particular food products through purchase choices, and sometimes through verbal communication. Most consumers reported they have never stopped buying from a particular vendor (53%), while 39% said they occasionally or sometimes do stop. The most common reasons consumers stop purchasing from a particular vendor were food quality, price, and the vendor-customer relationship. Most consumers (76%) reported never talking to a vendor about food quality. Of the remaining 24% of respondents (N=36) who discussed food quality with vendors, 64% were likely to initiate conversations about food safety; when discussing particular items, tomatoes and leafy greens were most often discussed (86% and 67%, respectively; N=36).

Most consumers (71%) never complained to vegetable vendors about their food purchases. Of the remaining 29% of consumers who reported complaining to vendors (N=44), characteristics discussed included options for types or varieties of products, blemishes, and sizes and shapes, all ranging from 32%-41%. These findings suggest only a minority of consumers are comfortable voicing their concerns to vendors.

Consumers noted they adopt some risk reduction measures at home during food preparation. For instance, nearly all respondents (99%) wash kale; further, it is rarely eaten raw, as 63% cooked or boiled it before eating.

5.4. INFORMATION SOURCES AND MEDIA USE

Most consumers reported owning a cell phone (95%). Among those that own cell phone, 57% have a basic or feature phone and 61% a smartphone. All of the men surveyed personally owned a mobile phone, while 8% of the women surveyed did not own a mobile phone (p-value=0.05, Fisher's exact two-sided test). The mean number of cellphones in their households was 2.6 (SD \pm 1.6). Most individuals owned a television (79%), while slightly fewer owned a radio (61%).

About half of surveyed consumers have access to the internet, and the majority of individuals that have access to internet use their smartphones to access internet (96%, N=63 of 66). The internet was accessed primarily at home (82%, N=54 of 66). Facebook (88%), Telegram (68%) and YouTube (53%) are the most regularly used social media platforms by the surveyed individuals that has access to internet (N=66).

Consumers trust medical professionals (92%) to provide reliable information on health issues. Consumers obtain information on food safety from medical professionals (67%), friends or family (63%), food packaging or labels (47%), experts on media (33%), and internet/social media (29%) (**Table 4**).

A majority of consumers (90%) reported that they had no specific issues they would like to know regarding food in the last year. Questions that the remaining respondents had about whether a certain food was safe or unsafe to eat included: "How do worms form in the stomach?", "What causes food to spoil or become contaminated?", "What are the agents

that contaminate foods?”, “What causes typhoid?”, “How do you achieve a balanced diet?”, “How safe are packaged foods?”. Of those who sought out information to answer these questions (N=6), all spoke to medical professionals, while two of the six reviewed newspapers, television or radio, and one searched on the internet.

Table 4. Consumers’ sources of information and media use

MEDIA	RESPONSES	RESPONSES, BY GENDER		
	N	% ¹	MEN, N (%) ²	WOMEN, N (%) ²
SOURCES OF INFORMATION USED TO DETERMINE THE SAFETY OF FOOD				
Medical professional (doctor/nurse)	100	67%	34 (34%)	66 (66%)
Friends or family	94	63%	35 (37%)	59 (63%)
Food packaging / labels	71	47%	27 (38%)	44 (62%)
Experts on radio or TV	50	33%	22 (44%)	28 (56%)
Internet / social media	44	29%	16 (36%)	28 (64%)
Journalists (newspaper) / show hosts (TV/radio)	24	16%	12 (50%)	12 (50%)
Local religious leader	15	10%	6 (40%)	9 (60%)
A famous person you like	9	6%	6 (67%)	3 (33%)
Government agencies	4	3%	1 (25%)	3 (75%)

¹ Total percentages reflect the full sample size (N=150).

² Percentages by gender reflect the sample (N) per commodity, which varied, as respondents could skip questions or provide multiple answers per question.

Consumers use different media channels for entertainment purpose (**Figure 5**). Satellite TV was the most frequently mentioned media type (70%), followed by network TV (30%) and radio (20%) – all of which were used daily.

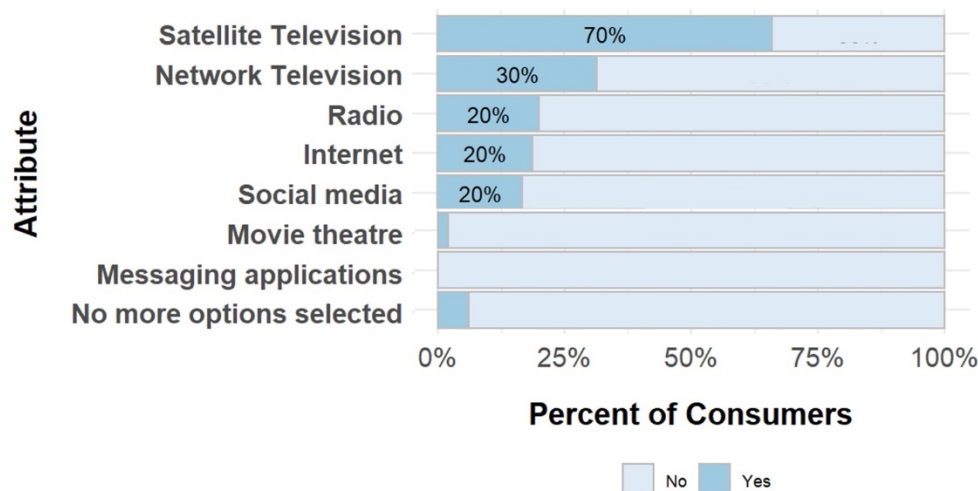


Figure 5. Source of media used for entertainment for consumers

6. RESULTS: VENDOR SURVEY

This section reviews vendor behaviors and attitudes that can inform the design of food safety interventions. This includes what products vendors sell; how vendors choose suppliers; how often vendors purchase new batches of food; actions that vendors take to promote purchasing of their products; communication among vendors and consumers; reasons vendors think customers complain; cleaning practices of vendors; where unsold food is kept; what sources of media vendors use.

Results in this section are summarized across all vendors (N=150) unless otherwise stated. They include both genders unless results were different between men and women.

6.1. GENERAL FOOD VENDING PRACTICES

Most of the vendors surveyed did not own land (93%), cultivate any food crops (94%) or own livestock (84%). Likewise, the majority (95%) did not produce the commodities they sold in the market. Three-quarters of vendors sold tomatoes, while 18% sold kale and 10% sold lettuce.⁷ Half of vendors (58%) varied their commodities by season, primarily because the quality of the food varied during rainy (June, July, and August) and dry seasons (December, January, and February) (reported by 35% of vendors).

On average, vendors source food from about nine suppliers though this varied substantially with a range of 0 to 100 (SD \pm 23). Vendors predominantly purchased food from wholesalers (89%), and these vendors often (78% of the time) repeatedly purchase from the same wholesaler(s) (SD \pm 28). Some vendors compare different suppliers, while others buy food from the same suppliers. Vendors chose suppliers by their price, food quality, food cleanliness/safety, and how suppliers treat them (**Figure 6**). If they wanted to change suppliers, most respondents (81%) indicated that they could do so.

Vendors reported getting new batches of kale daily (26%, N=7 of 27), lettuce two days per week (47%, N=7 of 15), and tomatoes three times per week (33%, N=37 of 114). Vendors generally bring food to the market themselves (75%). Women had suppliers bring food to their shop more often than men (27%, N=34 of 128 and 9%, N=2 of 22 respectively) – potentially reflecting differences in access to equipment or a vehicle to transport products. There was a significant difference between how women and men bring food to the market (p-value = 0.01, chi-square test).

⁷ Note that these estimates mirror the relative number of vendors selling these commodities in the market, as identified by EatSafe during market visits.

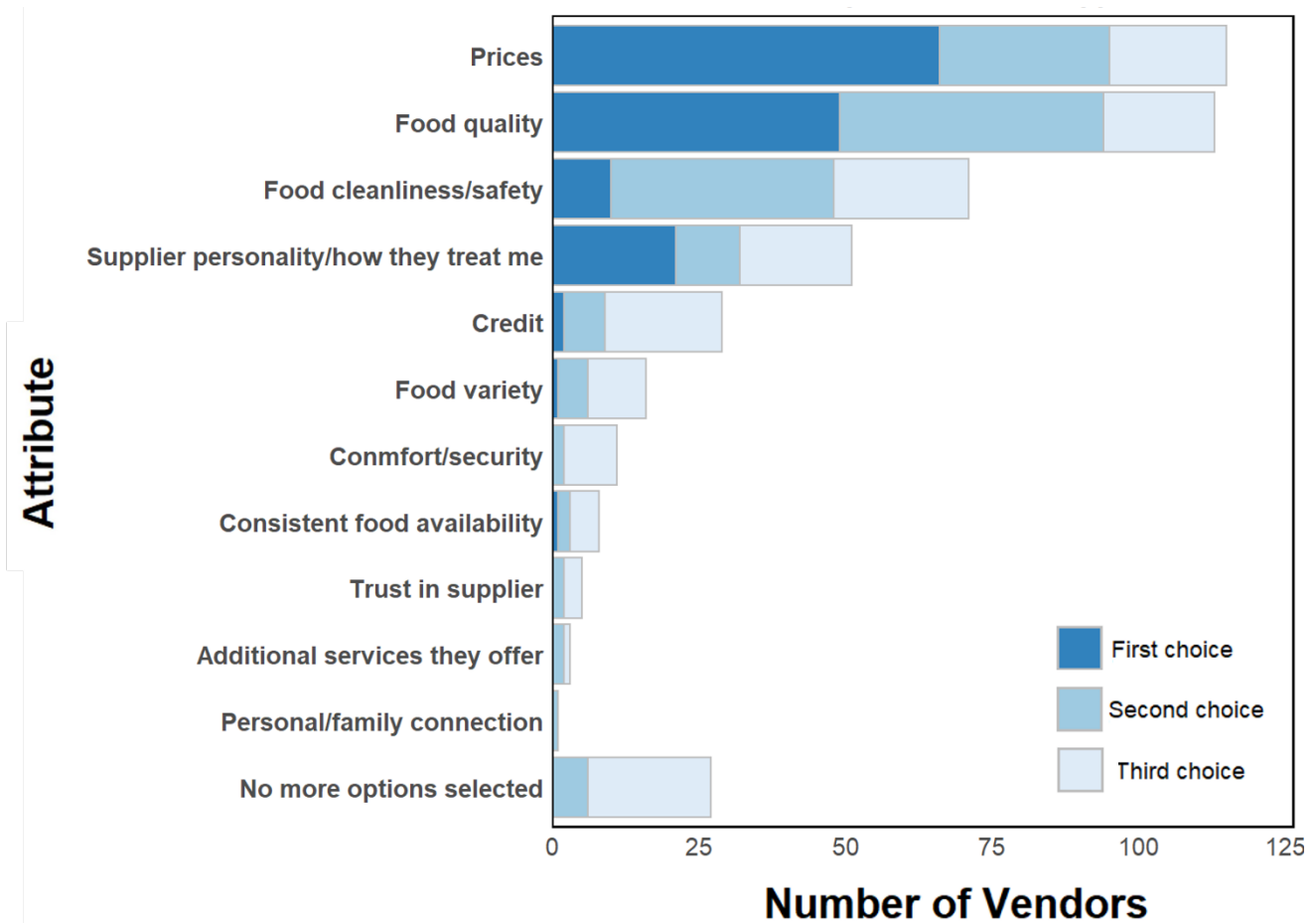


Figure 6. Reasons that vendors purchase food from a particular supplier

Most vendors are satisfied with their experience selling at the market (79%) and feel secure (i.e., physical safety) when selling food at the market (81%). Most shops consisted of a tarp on the floor (40%) or a wood structure (25%). On average, vendors have been selling at this market for 8.1 years (SD ± 7.0) with women (Mean=8.5, SD ± 7.0) having been vendors at this market for more time on average than men (Mean=6.0, SD ± 6.7). This difference is significant (p-value < 0.05, t-test). All vendors surveyed only sell food produce at the target market. Additionally, working at the shop is the primary income-generating activity for most vendors (97%) and there generally are no additional staff working at the shop (76%). Most shops are open year-round (98%). Per day, vendors on average sell to 9.4 customers (SD ± 9.6) with an average of 3.7 customers being regular customers (SD ± 3.4). Men were found to sell to more customers (14.4) on average than women (8.6, p-value = 0.01, t-test). Vendors perceive that the reasons that customers choose to purchase food from their shop include the quality of the food, their personality, and giving discounts on their products. Many vendors report using only one or two actions to promote consumer purchasing of their products including the discount in prices of their products, treating customers politely, and having quality food (**Figure 7**).

Overall, vendors felt supported by other vendors. If vendors need help doing something in their shop, they trust other vendors will help them (58%). Reasons that a vendor did not trust that other vendors would help them included vendors acting independently and the negative perception of asking for help.



Figure 7. Actions that vendors take to promote purchasing

6.2. FOOD SAFETY KNOWLEDGE, AWARENESS, AND ATTITUDES

Overall, vendors thought that the market was slightly clean (mean of 3.3 on a 5-point scale, $SD \pm 0.9$). Of the 21 vendors that rated the market as dirty or very dirty, respondents mentioned waste disposal and rain as primary reasons for this statement.

Vendors are generally not worried about foodborne disease (73%), as only 7% indicated they were worried about bacteria. While vendors generally do not perceive foods as risky, they seemed to demand information on the topic: several vendors expressed interest in learning more about bacteria and how negative health effects such as diarrhea can be related to consumption of contaminated food. Only 3% of vendors reported that they or someone in their household experienced a foodborne illness in the last year.

Vendors noted several visual cues to identify signs that a batch of food may be unsafe, including rotten or spoiled foods, or vendors' unhygienic practices.

6.3. FOOD SAFETY CHOICES AND BEHAVIORS

Generally, vendors felt confident in their ability to find suppliers that sell high quality food and choose safe foods from these suppliers – as “agree” and “strongly agree” comprised >90% for all responses. Most vendors (62%) also said that they would spend more time and money selecting safer foods. The variation in answers was slightly greater amongst women than men, with women having a wider range of answers (**Table 5**).

Table 5. Vendor choices of supplier related to food safety (N=150)

PERCEPTION	RANK				
	STRONGLY DISAGREE	DISAGREE	NEITHER	AGREE	STRONGLY AGREE
Can find suppliers that sell high quality foods	2%	4%	3%	66%	25%
Knowing how to choose safe foods	1%	1%	1%	65%	33%
Will spend a bit more time selecting safer foods	1%	3%	4%	62%	31%
Will spend a bit more money selecting safer foods	0%	2%	3%	62%	33%

Vendors are satisfied with their current suppliers (Median: 5.0, SD ± 0.8) due to the quality, price, and cleanliness of the food that they sell. Suppliers and vendors care about the quality, price, and safety of food. Vendors agree that customers tell them when they are satisfied with the food they provide (Median 4.0, SD ± 0.6). Men thought that customers tell them they are satisfied with the food they provide more strongly than women (Median for men: 4.5, SD ± 0.5; Median for women: 4.0, SD ± 0.6).

Verbal communication on food attributes is uncommon. Vendors reported that customers infrequently or never ask where their food comes from (92%). Vendors generally do not have conversations about the safety of the food that they sell with consumers (61%). The quality or variety of tomatoes is most discussed (45%). Out of the vendors that had customers complain, the most common complaints were about quality, shelf life, price, and taste of their products (**Figure 8**). A small number of vendors stated that they have heard customers complain about their food making a customer or household member sick (**Figure 8**). Similarly, vendors reported that they do not often or never have conversations with suppliers about food safety and quality (82%).

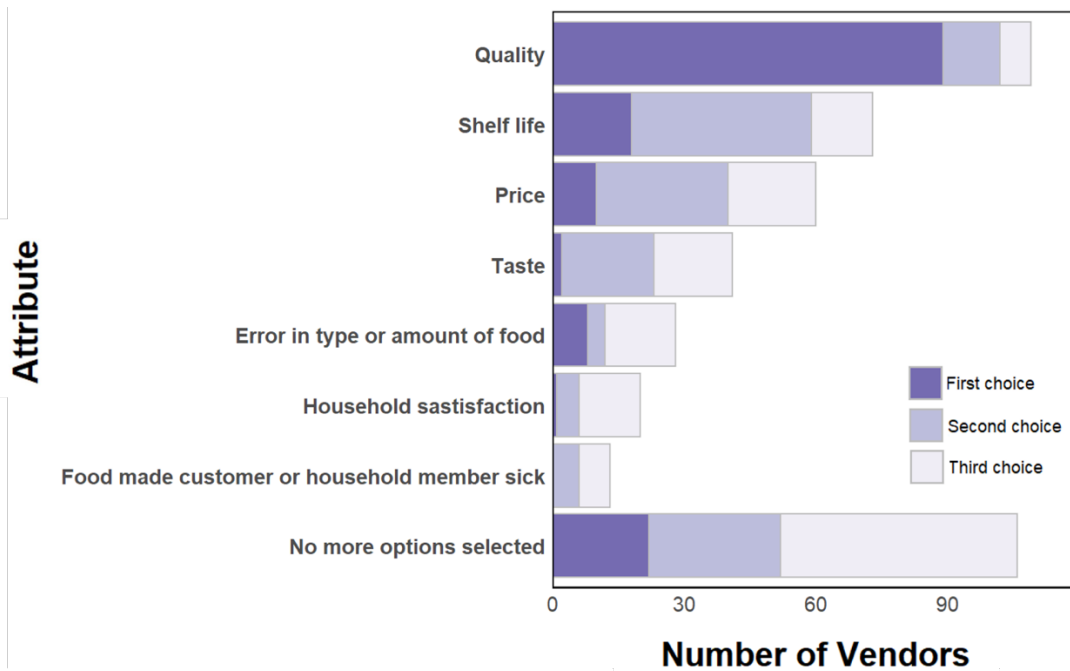


Figure 8. Vendors perception of customer complaints

Nearly all (97%) of vendors agreed or strongly agreed that they were proud the quality of the food they sold, and most 79% were satisfied with overall shop operations (**Table 6**). Answers varied more on questions related to specific rules for preserving food safety and shop cleanliness: while over half of those surveyed agreed with these statements, about one-third disagreed. Further variation was observed among women vendors, who displayed greater differences in opinion as compared to men.

Table 6. Vendor satisfaction with different aspects of operations in their shop (N=150)

PERCEPTION	RANK				
	STRONGLY DISAGREE	DISAGREE	NEITHER	AGREE	STRONGLY AGREE
Proud of the quality of the food sold	2%	1%	1%	58%	39%
Satisfied with shop operations	3%	10%	8%	52%	27%
Specific rules for preserving food quality/safety exist	15%	21%	10%	45%	9%
Specific rules for keeping the shop clean exist	14%	23%	7%	45%	11%
It is sometimes difficult to keep the shop clean	13%	35%	3%	39%	11%

Nearly all vendors (97%) reported not having made changes to their physical shop structure or the way they sell food in the past year, but they have taken actions to keep food safe. In the past year, vendors obtained towels, knives, umbrellas, and fly whisks to keep food safe. Vendors reported to daily sweep/clean their shop (58%) as well as washing the food that they sell (19%). On average, vendors said that they wash their hands 3.3 times per day (SD \pm 1.9). Additional actions vendors perform to keep food safe include using a fly whisk to get flies off of food (15%), cleaning food with a cloth (12%), and covering food from the sun with a shade or a polypropylene fabric (12%).

Unsold food is generally kept at the shop for the next day (90%; **Figure 9**). The majority of the vendors surveyed did not have a refrigerator in their household (83%, N=125 of 150). Vendors cover food or store it in a crate to keep it fresh.

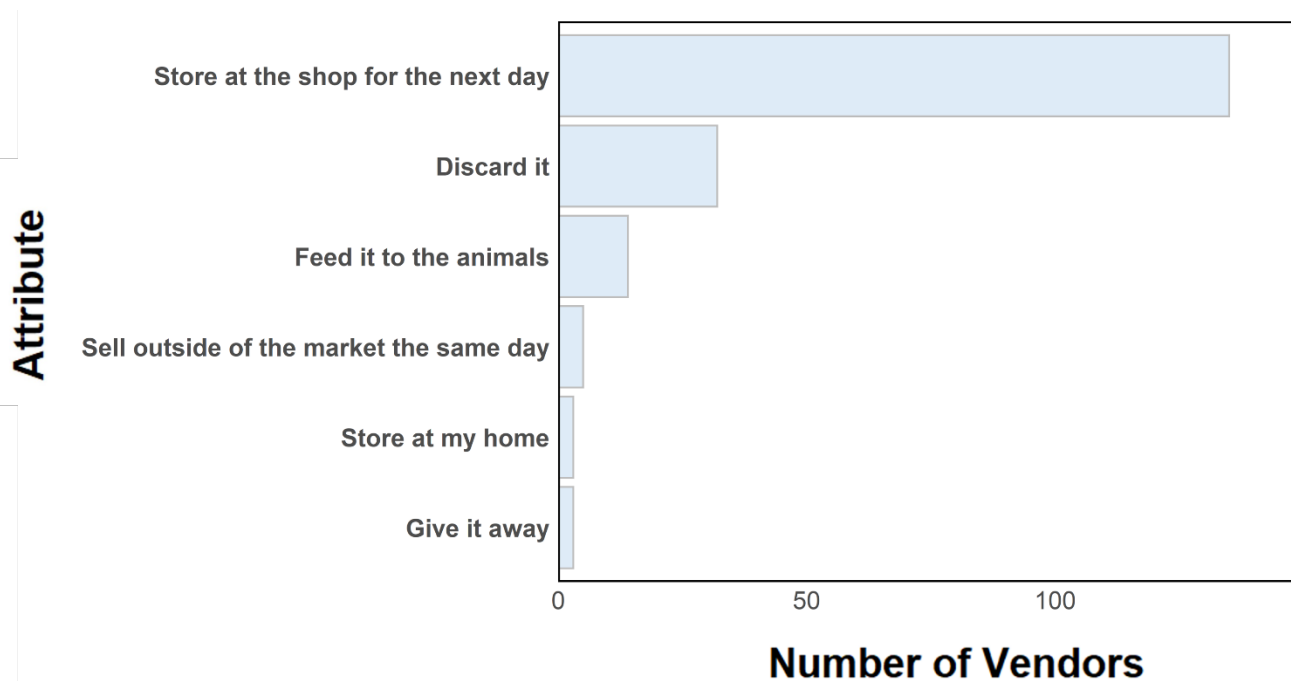


Figure 9. Actions vendors take with unsold food

6.4. INFORMATION SOURCES AND MEDIA USE

The households of most vendors own at least one cell phone – smart and non-smart (97%), a television (70%), a satellite dish (69%), and a radio (58%). Of the vendors surveyed, 73% of vendors owned at least one mobile (non-smart) phone and 18% owned a smartphone.

The majority (91%) of the vendors that were surveyed in the study do not have access to the internet. The most frequently mentioned device respondents utilize to access internet was a smartphone (86%, N=12 of 14 who have access to internet) followed by mobile tablet and desktop computer (7%, N=1 of 14 each). Among the social media platforms, most of the vendors regularly use Facebook and Telegram (64%, N=9 of 14 and 64%, N=9 of 14

respectively). The most common media channel vendors use for entertainment include network and satellite television (74% and 33% respectively; **Figure 10**).

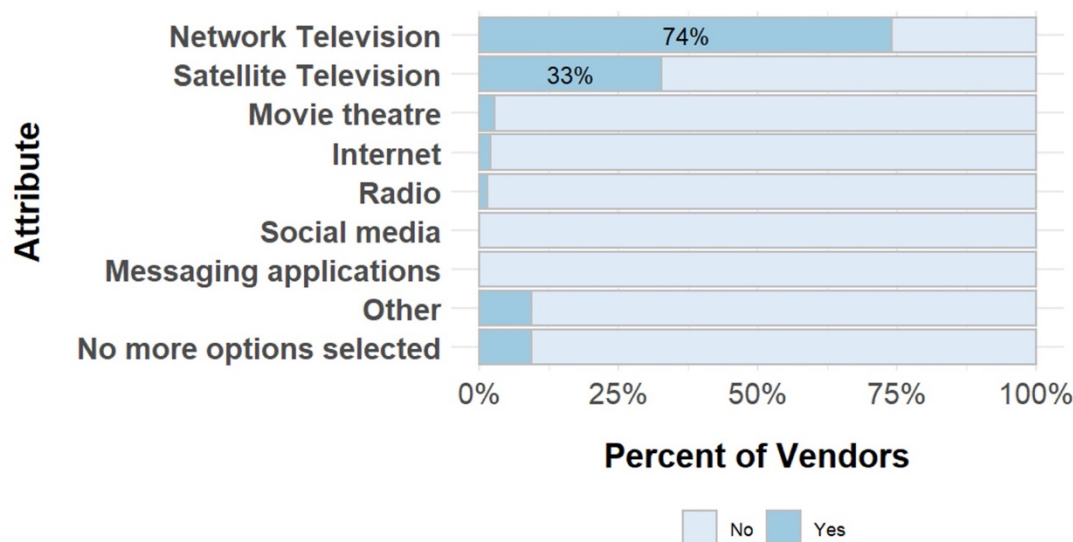


Figure 10. Media channels vendors utilize for entertainment content

Of the vendors who watch network or normal television, most vendors watch it daily (87%, N=97 of 111). In contrast, of the vendors who watch satellite television, some watch it daily (41%), but a larger percentage watch it two or three time a week (47%). When asked about the types of entertainment content viewed, vendors most frequently mentioned TV series or soap operas (76%). Women (63%) sought out this content more than men (13%).

Vendors trust medical professionals to provide reliable information about health issues (95%). To determine the safety of food, vendors would predominantly consult friends or family (70%) and medical professionals (71%).

7. IMPLICATIONS FOR FOOD SAFETY INTERVENTIONS

This study revealed important factors to consider for the design of food safety interventions applicable to consumers and vendors in traditional markets in Ethiopia.

Consumers are loyal customers, as many of them have been shopping at the market for more than three years. Consumers choice of which vendor to purchase from are influenced by the food quality, safety, price, and personality of the vendor. Because consumers commonly buy food from a particular vendor, but at least sometimes compare vendors, EatSafe could leverage these relationships as a possible intervention point. Vendors could see an incentive to improve their food safety practices, either by being favored by consumers that compare shops, and/or by increasing trusted relationships with regular customers.

Vendors and consumers have different opinions on the safety of the food that is being sold at the target market. Vendors felt confident in their ability to find suppliers that sell high quality food as well as to choose safe foods from suppliers, while consumers stated that differences exist in the safety of foods among vendors. Consumers primarily rely on visual cues of food safety related to the vendor's food and shop. An opportunity exists to increase the use of cues for vendors utilizing safe food practices that may or may not be visible to consumers, to promote consumer purchasing of safer food at the market.

Both groups rarely, if ever, talk about food quality and safety with each other during market transactions, suggesting verbal communication is not a common way to express demand. Vendor also do not commonly discuss food quality or safety with their suppliers. At the same time, vendors perceive their fellow vendors as collaborative and available to helping each other if there is need, suggesting openness to interaction.

Media use is similar across consumers and vendors, as both groups primarily watch satellite and network television for entertainment. Over half of consumers (61%) have a smartphone, compared to 73% of vendors. When asked about where they obtain information about food safety, both groups stated they would consult family and friends as well as medical professionals. EatSafe could leverage these communication channels to increase demand for improved food safety practices.

There seems to be a role for information sharing on food safety and foodborne illness, to increase motivation and inform purchasing and vending decisions. Consumers generally did not believe that individuals can get sick from consuming kale, lettuce, or tomatoes. Similarly, vendors were not generally concerned about foodborne diseases. In practice, proper sourcing and handling of lettuce, kale, and tomatoes are crucial to keep them safe and preventing foodborne disease (5,6). At the same time, both vendors and consumers expressed an interest in learning more about how negative health effects such as diarrhea can be related to contaminated food. These findings highlight a gap in risk awareness as well as demand for information.

Some consumers are particularly vulnerable to foodborne illness, including children under five years of age. In this study, as in many others, children under five years old were found to consume different foods from other household members (7,8). As most households in this study include young children, protecting children's health could be an important motivator for parents.

Increasing vendors' capacity and self-efficacy regarding safe food handling and storage could improve the safety of food sold in the market. For example, some vendors store food overnight in the market and try to sell it the next day. Unsold food could be a potential food safety concern depending on how food is stored at the shop. Additionally, many vendors find it sometimes difficult to keep their shop clean. Since unsold product and storage are common concerns for vendors, i.e., vendors are likely already motivated to address these

issues, solutions that embed food safety practices within existing needs could be more effective.

Price is a key factor that influences consumers' food purchasing decisions, both at market, vendor, and food level. Interventions to increase food safety need to be sensitive to price thresholds and consumers' willingness to pay for food of different quality. Food safety interventions should maximize food safety while minimizing increases in food prices, so that more people could have access to safer food. Safeguards against the unintended consequence of food price increase should be discussed. Education programs might increase awareness on the cost of foodborne illness, as a way to increase consumers' willingness to pay for safer food, but it is very likely that price will remain a top purchase choice factor.

The cost of interventions for vendors also needs to be considered. For many vendors, selling food at the market is their main livelihood. Additionally, interventions should be aware of whether vendors have licenses to sell products in the market, as their official vs. unofficial status could influence vendors' willingness to participate in interventions, costs incurred, and dynamics among vendors. Ideally, interventions would have a minimal cost to the vendor and simultaneously attract more customers, thus increasing sales. This would incentivize vendors to continue implementing safe food practices as well as potentially motivate other vendors to adopt them. Competition among vendors seems to be accepted, suggesting there could be a role for interventions focusing on individual stalls/vendors. However, market-based programs involving many or all vendors could leverage values of collaboration and equity, while being financially more achievable.

Gender considerations should be accounted for in interventions. While most survey answers were not significantly different between women and men, for both consumers and vendors, important differences in roles and social norms emerge. Most fresh vegetable vendors at the market are women. Women vendors on average have been vending at the market for a longer time. Women and men had different ways of transporting food to the market, with women having suppliers bring food to their shop more commonly than men. Women were primarily responsible for food preparation in the household.

This study has limitations that should be considered when interpreting the results. First, it is a cross-sectional survey conducted in one market in a mid-size city in the Sidama region in Ethiopia, which may limit the generalizability of findings. However, similar results were found in a study conducted by the research team in Nigeria (9). In addition, structured surveys have limits in the range and nuance of questions that can be effectively answered in a short time. EatSafe conducted additional in-depth interviews (Activity ET 1.4) and targeted behavioral research (Activity ET 1.9) to complement findings of the study presented here, and more comprehensively inform intervention decisions.

8. CONCLUSIONS

Results of this survey demonstrate that vendors and consumers in traditional markets want to sell and buy safe food products. Opportunities exist to increase food safety in traditional markets through vendors' and consumers' behaviors and attitudes around safe food handling and purchasing. As highlighted in this study, interventions need to be sensitive to cultural contexts, such as consumer shopping practices and their communication patterns. They also need to be aware of the price of implementation for both vendors and consumers as there are limits to the ability to absorb costs. Additionally, effective interventions need to be sensitive to gender roles and associated social norms, as this increases the specificity of the intervention for the person who is actually implementing a practice. Taking into account vendors and consumers current practices, culture, and prior knowledge can increase the acceptance and sustainability of interventions to improve food safety in traditional markets.

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10. APPENDICES

10.1. APPENDIX I: DETAILED METHODOLOGY

Selection of study area and target market. EatSafe used several criteria to choose the target study market: city being within a Feed the Future Zone of Influence; undernutrition prevalence in the city containing the market; the target foods being widely consumed; the city being of sufficient size to have multiple markets, the state and city having sufficient security to allow for the work to take place safely. Within the Sidama region, the urban area of Hawassa city was prioritized based on size (with the preference for a city, large enough to have multiple markets but small enough to facilitate research), and security. Within Hawassa city, multiple open air fresh food markets met the required, and some desired, criteria, EatSafe selected one target within the urban perimeter of Hawassa.

Focus commodities. EatSafe's key commodities in Ethiopia represent a basket of fresh vegetables including **lettuce, tomatoes, and kale**. These three commodities were identified in consultation with USAID and key local stakeholders, based on local priorities and alignment with existing USAID Feed the Future programs in Ethiopia, and include foods that are commonly at high risk for contamination by microbial or chemical hazards. Most also have high inherent nutritional value, are accessed via informal markets for domestic human consumption, and are sold directly to consumers. While some studies found fresh vegetables in Ethiopia to be highly contaminated with parasites and bacteria, comparatively little data was available for this commodity category, thus supporting EatSafe's choice of fresh vegetables as a focus (10).

Sample size. EatSafe based sample size calculations on a cross-sectional study, taking as reference metric the ability to accurately estimate the prevalence of a certain belief or practice in the study group. Using a scenario involving a simple (non-stratified) random selection from a large population and a prevalence of 0.50 (expressed as proportion), a confidence coefficient alpha of 0.05 (probability of false positive error of 5%, corresponding to a 95% confidence level), and a desired level of absolute precision in the prevalence metric of 0.1 (i.e. 10%), the required sample size based on Cochran's formula (11) is 96. When increasing the precision to be able to accurately measure a prevalence of 8%, the required sample size is 150. In other words, with this samples size one would be able to estimate a prevalence of 50% with a precision of +/- 8%.

Survey piloting and finalization. The survey data collection tools consist of multi-module questionnaires, developed by GAIN in consultation with EatSafe consortium partners. Before deployment, the questionnaires were field tested in June 2022 to obtain feedback on question clarity and cultural appropriateness, as well as to define most common answers to be pre-coded. Ten enumerators and two supervisors participated in the pilot. Each interviewer conducted two interviews, one each with vendors and consumers from markets other than the study markets. Questionnaires were then revised based on the pilot feedback. Final versions of the questionnaires are available upon request.⁸

Local enumerators. EatSafe recruited 26 experienced and local data collectors, fluent in one or more main local languages and English (including Amharic, Sidama and Wolayita). EatSafe comprehensively trained the staff, which included 20 enumerators, four supervisors, and two quality

⁸ Email EatSafe@gainhealth.org.

control officers, standard instructions for all standard survey questions/modules (i.e., WHO/UNICEF/USAID FANTA for dietary assessments). The enumerator staff were held to performance prior to collecting field data.

Translation. Surveys were translated into Amharic, allowing respondents to select their language of preference. Answers were translated back into English before data analysis. The survey was administered using an in-field computer-assisted personal interviewing (CAPI) data entry program, in Amharic. If a respondent selected as their preferred language, the enumerator translated from Amharic verbally (i.e., from the CAPI in Amharic, without the guidance of written text in the preferred language).

Respondent enrolment. Consumers eligible for enrolment in the study were defined as those who shop in at least one target market, at least once a month on average, and have primary or shared responsibility for purchasing food for their household. Within each household, one respondent (the ‘primary shopper’) was interviewed. Vendors eligible for enrolment in the study were defined as key staff of a market shop or stall, that regularly perform key vending operations which may include those relevant for food safety (e.g., handling or cutting food, conducting transactions with customers, upkeeping the stall, cleaning the stall and any tools, storing the food at closing time). Only one vendor per business was enrolled. Both consumers and vendors were stratified by gender, and vendors were also stratified by commodity sold. **Table A1** contains inclusion and exclusion criteria for both groups.

Data collection. All data was collected field using computer-assisted personal interviewing (CAPI) technology, an integrated data collection application used for fieldwork management and real-time quality control. CAPI was loaded onto the tablets or mobile phones of the enumerators, which then allowed data to be uploaded to a secure web-based platform. Where needed due to logistical or security constraints, paper copies were used as an alternative data collection tool.

Table A1. Inclusion and Exclusion Criteria for Vendors and Consumers

CONSUMERS	VENDORS
INCLUSION CRITERIA	
<ul style="list-style-type: none"> • 18 years of age or above (completed years) • Have primary or shared responsibility for food purchasing in their household • Shops at a target market at least once in the average month • Purchases at least one key commodity at the target market (preferably multiple) • Able and willing to give informed consent 	<ul style="list-style-type: none"> • 18 years of age or above (completed years) • Sells food within the boundaries of the study market • Sells food at the market \geq 1 day/week • Sells at least one key commodities⁹ regularly (at least once per average week) in the market • Has sold food at the study market for at least three months • A primary vendor in the shop or food vending business, i.e. (a) physically present for at least half of average business hours in a week, (b) interact directly with consumers during transactions, and (c) primary decider of how the shop/stall operates (e.g., which suppliers

⁹ Key commodities(-ies) must be main/sizeable portion of what the shop sells, not a niche product.

- to buy from, which tools or equipment to use, arrangement of food)
- Able and willing to give informed consent

EXCLUSION CRITERIA

- | | |
|--|---|
| <ul style="list-style-type: none"> • Being a vendor at the target market; vendor or hawker of street or ready to eat foods; or a vendor or hawker selling outside the market • Reselling part or all of the food purchased at the target market (not including buying some food for a neighbor or a relative) • Planning to move far from the market or stop shopping at the market in the next two years • Be a respondent in the EatSafe Focused Ethnographic Study (FES) • Another member of the household that shares primary food shopping responsibilities is already enrolled; the person with primary responsibilities should be preferentially enrolled • Not being able to communicate verbally in English, Amharic, Sidamic, or Welayta languages • Not willing to share contact information for follow-up | <ul style="list-style-type: none"> • Planning to move far from the market or stop selling food at the market in the next two years • Be a respondent in the EatSafe Focused Ethnographic Study (FES): respondents in the FES Phase 2 should be excluded (and vice versa: participation in the cohort is an exclusion criterion for FES Phase 2); respondents in the FES Phase 1 can be considered eligible, if needed to reach the target sample size. This participation should be recorded in the survey and direct observation data. • Another vendor in the same food vending business is already enrolled; the person with primary responsibilities in the operation of the business should be preferentially enrolled • The business sells only snacks or food that is not bought home and consumed at home • Not being able to communicate verbally in English, Amharic, Sidamic, or Welaitta languages • Not willing to share contact information for follow-up |
|--|---|

Data Quality Control and Assurance. Data collectors were supervised closely in the field by an experienced supervisor. Supervisors and a research manager reviewed the data in real-time via the online platform and debriefed with data collectors to identify and correct any errors. To aid with follow-up and supervision, GPS coordinates and phone numbers, where available, were logged for each survey.

To identify potential outliers, EatSafe used the z-score technique that indicates how much a given value differs from the standard deviation. The z-score, or standard score, is the number of standard deviations a given data point lies above or below mean and is calculated by taking each observation for a specific variable minus the mean of the variable and dividing the result by the standard deviation of the variable. EatSafe considered the observations with the absolute value of the z-score greater than 3 as the outlier, following an approach previously validated (12). Potential outliers were assessed by the research team considering the study context. As a result, answers of “100” for the number of suppliers a vendor has were omitted from the analysis.

Data Analysis and Visualization. Statistical analyses were carried out using Stata software (13). All means are reported with a standard deviation (SD). All plots were produced using the R software (14).

For single- and multiple-selection questions, the proportion of respondents citing each answer option across the total population was calculated, as well as the proportion by sub-group (gender). For

multiple-selection questions that allowed up to either three or four selections per respondent, depending on the question, the order of mention (1-3 or 1-4) was summarized as a mean rank. Answers were also summarized without considering the order of mention. The ranking method followed these steps:

- For each order scheme (1-3 or 1-4) the rank of each choice (answer option) was calculated based on the frequency of being selected: the choice that had the lowest frequency was assigned a rank of 1; the other choices were ranked 1 plus the number of choices that were selected at lower frequency. Choices with equal frequency were assigned the average rank.
- The mean rank was computed for each choice.
- The weighted rank mean was computed for each choice using the frequency of each choice (N) as weight.

The following statistical tests were used to assess the significance of differences:

- T-test: to compare means between genders (men and women) for numeric data.
- Fisher's exact test: to determine significant differences in proportional responses by gender to all categorical variables with binary answer options (e.g., "Yes" or "No"). This test was also applied to each individual answer option in multiple-selection questions, such that each answer was treated as a separate binary question.
- Chi-square test: to evaluate gender-based differences for categorical variables with more than two answer options and assess differences in proportions across sub-groups. A significance level of $p \leq 0.05$ was used as a significance threshold for all comparisons.

PPI. A previously developed Ethiopia-specific PPI was used as an indicator of SES (14). The PPI is based on ten indicators of wealth/poverty, including the geographical region of the country; the number of household residents; the highest grade of education completed by the head of household; the frequency of beef consumption; the frequency of horse bean consumption; the roofing material of the dwelling; the type of toilet facility accessed; the main source of light for the household; the main source of cooking fuel for the household; and the number of mattresses owned.¹⁰ The PPI is scored on a 100-point scale, where higher values indicate higher SES (**Table A2**). PPI values were converted to probabilities of poverty using look-up tables provided by the PPI developers.¹¹ Two poverty lines were used: the Ethiopia National Poverty Line (NPL) and the international poverty line of \$3.20/day developed by the World Bank. Poverty likelihoods were averaged to compute population-level poverty rates for consumers and vendors, respectively.

¹⁰ In the original version of the Ethiopia PPI Scorecard, the final question was about the number of machetes (*gejera*) owned. As this question was flagged as potentially sensitive by GAIN staff and implementation partners, a new Scorecard was developed and calibrated in coordination with Innovations for Poverty Action (IPA), the developers of PPI.

¹¹ Available upon request.

Table A2. Ethiopia-specific PPI indicators and corresponding scores

INDICATORS	RESPONSES	POINTS	
		ETHIOPIAN NPL (7,184 ETB/day)	INTERNATIONAL PL (\$3.20/day)
In which region does the household live?	A. Amhara	0	0
	B. Oromiya	9	9
	C. SNNP	0	0
	D. Tigray	5	3
	E. Other regions	1	0
How many members are there in the household?	A. 1 to 4	22	20
	B. 5 to 7	11	9
	C. 8 or more	0	0
What is the highest grade that the household head completed?	A. Kindergarten	0	0
	B. Nursery	0	0
	C. 0 grade	0	0
	D. From 1st to 4th grade	0	0
	E. Fifth grade or above	10	10
	F. Informal education (literate, but has never been in regular school)	10	10
	G. Adult literacy program	10	10
	H. Satellite	10	10
	I. Non-regular (literate, but never attended regular school; attended religious institutions like Kes or Kuran)	10	10
	J. Illiterate (not educated)	0	0
	K. Never attended school	0	0
Over the past 7 days, did you or others in your household consume any beef?	A. Yes	17	19
	B. No	0	0
Over the past 7 days, did you or others in your household consume any horse beans?	A. Yes	8	7
	B. No	0	0
The roof of the main dwelling is predominantly made of what material?	A. Thatch	0	0
	B. Mud and Wood	0	0
	C. Bamboo/Reed	0	0
	D. Plastic Canvas	0	0
	E. Corrugated Iron Sheets	3	3
	F. Concrete/Cement	3	3
	G. Asbestos	3	3
	H. Bricks	3	3
	I. Other	0	0

What type of toilet facility does the household use?	A. PIT Latrine without slab	0	0
	B. Composting toilet	0	0
	C. Field/Forest	0	0
	D. Flush toilet	4	3
	E. PIT Latrine (ventilated pit)	4	3
	F. PIT Latrine with slab	4	3
	G. Bucket	4	3
	H. Other	0	0
What is the main source of light for the household?	A. Bio gas	0	0
	B. Electrical battery	0	0
	C. Light from dry cell with switch	0	0
	D. Kerosene light lamp (imported)	0	0
	E. Local kerosene lamp (Kuraz)	0	0
	F. Candle/Wax	0	0
	G. Firewood	0	0
	H. Electricity meter-private	8	8
	I. Electricity meter-shared	8	8
	J. Electricity from generator	8	8
	K. Solar energy	8	8
	L. Lantern	8	8
	M. Other	8	8
What is the main source of cooking fuel?	A. Collecting firewood	0	0
	B. Crop residue/leaves	0	0
	C. Dung/Manure	0	0
	D. Saw dust	0	0
	E. Solar energy	0	0
	F. Biogas	0	0
	G. Purchased firewood	9	11
	H. Charcoal	9	11
	I. Kerosene	9	11
	J. Butane-Gas	9	11
	K. Electricity	9	11
	L. Solar energy	9	11
	M. None	0	0
	N. Other	0	0
How many mattresses does your household own?	A. Zero	0	0
	B. One	6	7
	C. Two or more	10	10

10.2. APPENDIX 2: MAP OF CONSUMER INTERVIEWS

The locations of consumer interviews, by socioeconomic status, is in **Figure A2**. The shading and size of the circles correspond to the probability of being in poverty (according to the \$3.20/day income level as stated in the PPI). Note that darker shading is associated with a higher probability of poverty.

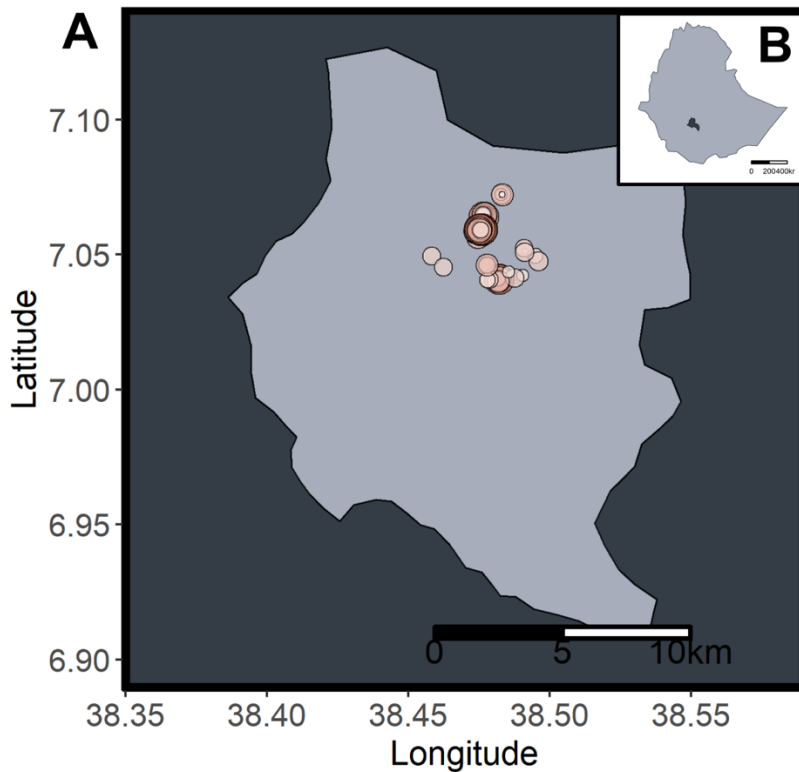


Figure A2. Locations of interviews conducted by socioeconomic status