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Consumer preference and food values: can consumers in Tanzania play part in driving a sustainable food system?

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This study examines the role of consumers in Tanzania as drivers of sustainable food systems through their food values. Recognizing consumers as key actors in the food value chain, the research aims to identify how their preferences influence the transition toward sustainable consumption. A mixed-method approach was employed, including interviews with six key food system actors, two focus group discussions with 16 consumers, and a survey of 750 consumers from urban and rural towns across three regions in Tanzania. Participants rated the importance of 16 food values such as hygiene, nutrition, taste, and price—using the Best-Worst Scaling method. To determine relative preference, data were then analyzed through count analysis and mixed logit models. Findings indicate that consumers predominantly prioritize food safety and price. Notably, their understanding of safety centers on hygiene and spoilage, issues affecting short-term health, over long-term risks like aflatoxin, pesticide residues, and antimicrobial resistance. These patterns are consistent across consumer groups, though some variation emerges across different shopping contexts. For general food purchases, hygiene, freshness, and safety are emphasized, whereas for specific items like tomatoes and bread, hygiene, price, and naturalness are more prominent. These insights highlight the need for targeted interventions by policymakers, producers, and civil society organization to align consumer values with sustainable practices. Addressing gaps in consumer awareness and preferences can facilitate shifts toward healthier, safer, and more sustainable food systems in Tanzania.

KEYWORDS

food values, consumer preferences, sustainability, Tanzania, food safety, food choice behavior, rural, urban

1 Introduction

This paper assesses the underlying food values that drive consumer food choices in Tanzania, using a contextually adapted Best-Worst Scaling (BWS) experiment. Understanding these values in low-income settings is critical for designing effective food system interventions that address diet-related health challenges, including foodborne illnesses caused by harmful bacteria, viruses, or parasites such as *E. coli* and *Salmonella*, and Diet-Related Non-Communicable Diseases (DRNCDs), such as cancers, cardiovascular diseases, micronutrient deficiencies, diabetes, and obesity.

This study is particularly relevant given that, despite the implementation of several national and global strategies, including the National Multi-Sectoral Nutrition Action Plan (NMNAP-II), the National Roadmap for Sustainable Food System Transformation by 2030, the One Health Strategic Plan, and the Sustainable Development Goals (SDGs) 2 and 12, cases of foodborne illness continue to rise (Kitole et al., 2024). At the same time, Diet-Related Non-Communicable Diseases (DRNCDs) have increased by 35.7% over the past 4 years, posing significant public health and economic burdens (NBS and OCGS, 2022).

These conditions are partly driven by exposure to microbial and chemical contaminants in the food supply chain. For instance, a 2019 study by the Tanzania Pest Research Institute (TPRI) found that nearly half of vegetable samples collected from markets in Arusha contained pesticide residues, with two-thirds exceeding permissible limits (The Citizen Reporter, 2022). As 85.7% of urban and 63.4% of rural consumers in Tanzania rely on informal local markets for food (Food and Agriculture Organization, 2022; Tschirley et al., 2015), risks of contamination remain high.

In parallel, the increasing prevalence of unhealthy dietary patterns, characterized by excessive consumption of fats, sugars, salt, and refined carbohydrates, along with low intake of micronutrient-dense foods, has contributed significantly to the burden of DRNCDs (NBS and OCGS, 2016; World Food Programme, 2022).

Both structural and behavioral drivers influence these outcomes, including the functioning of food systems, and individual-level factors such as economic constraints and intrinsic consumer values (Constantinides et al., 2021; Karanja et al., 2022; Grunert, 2005). Prior studies in Sub-Saharan Africa have identified socioeconomic conditions, such as income, education, and purchasing power, as key determinants of food choice (Femi-Oladunni et al., 2023a, 2023b; McCullough et al., 2022; Wang et al., 2019). Other research has emphasized the importance of health perceptions, nutrition knowledge, cultural norms, habits, psychosocial factors (ethical, utilitarian, hedonic), and social influences (Blake et al., 2021; Femi-Oladunni et al., 2023a, 2023b).

While consumer preferences may shift in response to external conditions (Becker, 1976; Eales and Unnevehr, 1993; Shogren et al., 2000), the underlying food values that inform these preferences are relatively stable. These values are rooted in cognitive and normative beliefs about what food should offer, such as health, safety, taste, novelty, prestige, affordability, and cultural identity (Lusk and Briggeman, 2009; Rokeach, 1973).

Despite their relevance, few studies have explored food values in Sub-Saharan Africa. Notable exceptions include Antwi and Matsui (2018) in Ghana, and Femi-Oladunni et al. (2023a, 2023b) in Nigeria and Kenya, respectively. However, these studies are limited to urban settings, they assess only general food values, and do not build directly on the Lusk and Briggeman framework, which has been extended in Europe (Bazzani et al., 2018; Izquierdo-Yusta et al., 2019, 2020), the United States (Bazzani et al., 2018; Lister et al., 2017), and Asia (Bell et al., 2021; Yang et al., 2021).

This study contributes to the literature in two key ways: (1) by examining how food values vary across different shopping scenarios, and (2) by including rural consumers, many of whom are net food producers, alongside urban respondents. To this end, a hypothetical BWS experiment was conducted in selected rural and urban towns in Tanzania, capturing consumer priorities across a "basket of goods" that includes general food, bread, and tomatoes.

2 Theoretical framework

The decision to assess consumer food values in evaluating consumer preference for sustainable food attributes was based on the fact that food values are more stable. Gutman (1982) argue that it is a set of core underlying values that motivate consumer choices. Gutman further elaborates that buying a product embedded with different product attributes is usually a means to obtain a desirable state like private safety or protecting the environment. Therefore understanding consumer food values can allow coming up with interventions that can go to change stable preference.

We modified the food values created by Ardebili and Rickertsen (2023), Bazzani et al. (2018), and Lusk and Briggeman (2009) by splitting nutrition into presence of micronutrients; nutrition labeling and reduced fat; and food safety into food hygiene and free from contaminants that can cause long term side effects like Antimicrobial Resistance (AMR); aflatoxin and

TABLE 1 Food values and description.

Value	Description
Naturalness	Extent to which food is produced without modern technology
Taste	Extent to which consumption of food is appealing to the senses
Price	The price that is paid for the food
Safety	Extent to which consumption of food will not cause illness from contaminants like aflatoxins and pesticides residues, with long term size effects
Hygiene	Extent to which consumption of food will not cause illness from bacterial resulting from poor food hygiene conditions
Convenience	Ease with which food is cooked/or consumed
Reduced Fat	Amount and type of fat, protein, vitamins; weight management
Micronutrients	Rich in micronutrients such as Vitamin A, C, D and minerals like Iron and Zinc
Nutrition label	Indicating amount of sugar, fats, salts, energy or micronutrients present
Portion size	Amount or weight
Origin	Where the agricultural commodities were grown
Perishability	Shelf life, the length of time it can stay without going bad
Traceability	Know the producer and how the product was produced
Trust	Assurance that food from producers meets the quality of credence attributes (like safety and nutrition) it is expected to meet.
Taste	Extent to which food looks appealing
Environmental Impact	Effect of food production on the environment

Source: Modified food values created by Lusk and Briggeman (2009), Bazzani et al. (2018), and Ardebili and Rickertsen (2023).

pesticides residues. To reflect consumer mentality in an African context, we added values with a food security aspect such as portion size and perishability; that were inspired by the shelf life and bulkiness values of Antwi and Matsui (2018), and weights and measures value of (Femi-Oladunni et al., 2023a, 2023b). Novel values like animal welfare and fairness were dropped. Furthermore during the qualitative interviews, preserved tradition, novelty and naturalness were very close and highly correlated; hence we decided to assess preference for naturalness and dropped novelty and preserved traditions. Since food labeling and certification is not common in the market place, traceability and trust were included to assess aspects of trust on the production process. See Table 1, for the list of food values.

3 Study objectives

To ensure a food system that supplies healthy, sustainable food for people, animals, and the planet, coordinated actions are needed across governments, farmers, distributors, supply chain actors, and consumers.

This study offers a consumer-centric perspective in a low-income African country like Tanzania, where rapid changes in the food system have exacerbated food quality and food safety concerns. These include foodborne diseases caused by poor food hygiene and chemical contamination, such as pesticide residues and antimicrobial resistance (AMR). Changes in the food system have also contributed to the triple burden of malnutrition: undernutrition, micronutrient deficiencies, and overweight or obesity. Understanding the food values—that is, the underlying food preferences—of consumers in such a dynamic setting can help in designing targeted interventions that empower consumers to drive change toward more sustainable food systems.

The study aims to assess whether consumers can act as agents of change in achieving optimal health outcomes through sustainable food consumption. By mapping food values across demographic groups, including gender and vulnerable populations, it seeks to provide tailored policy and program recommendations. These recommendations are intended to help shift underlying core values toward safety, sustainability, and nutrition. By promoting sustainable food attributes, this research contributes to advancing responsible production and consumption.

4 Study design

To answer the research question of whether Tanzania consumers can be used as a driver of change in the food system, this study employed a mixed-methods approach, where qualitative and quantitative data on food preferences, food choices, and factors influencing those choices were collected.

Qualitative data were collected through in-depth interviews and FGD (Focused Group Discussion) with key stakeholders in order to benchmark food values used in Lusk and Briggeman (2009); and understand the drivers around the food values. Insights from these interviews informed the development of the quantitative survey and were also used to complement and contextualize the quantitative findings.

Quantitative data were gathered through a structured consumer survey in which participants elicitated their food-related values using the Best-Worst Scaling (BWS) technique. This method enabled a robust assessment of the relative importance of various food values.

The integration of qualitative and quantitative data provided a comprehensive understanding of the drivers behind consumer food choices.

Ethical approval for the study was obtained from the Senate Research and Publication Committee (SRPC) of the Sokoine University of Agriculture. Hence, during the study ethical procedures were followed. All participants gave informed consent before data collection and were assured of the confidentiality and anonymity of their responses. Respondents were also informed of their right to withdraw from the study at any time without consequence.

4.1 Sampling

Data was collected in person between April and June 2023. For the exploratory study using the qualitative method, 16 consumers from rural and urban Dar es salaam were purposively selected to be included in two FGDs; and six value chain actors purposively selected for indepth interviews. For the quantitative study 750 consumers from three regions (rural and urban) in Tanzania. 150 consumers from Dar es salaam; 300 from Morogoro; where 150 were from a rural and 150 an urban town; and 300 from Kilimanjaro; where 150 were from a rural town and 150 an urban town.

Dar es Salam which is one of the fastest-growing cities in East Africa (World Bank Group, 2023); was selected due to its cosmopolitan nature, and with reported high levels of food safety incidences and DRNCD (Diet Related Non Communicable Disease). Consumers in Dar es salaam have also little or no control of the supply chain (Tschirley et al., 2015). Morogoro was selected to represent a region with moderate levels of overweight and obesity; and Kilimanjaro to represent a region with high levels of overweight and obesity (above 20%) (MoHCDGEC et al., 2018).

To understand the food values of men, women, low income consumers; middle income consumers; food shoppers and food producers; respondents were randomly selected from these segments.

To represent food shoppers, that is net food consumers, data were collected in three urban towns of Dar es salaam, Morogoro and Kilimanjaro. For net food producers; data were collected in two rural towns [one in Morogoro (Mkuyuni) and one in Kilimanjaro (Kibosho)].

To represent middle and low income consumers; data were collected from consumers residing in low and high income streets. And to ensure equal representation of men and women, we purposely included at least 40% of men in the study. The selected sample was relatively representative of the national population (See Table 2).

4.2 Data collection

4.2.1 Qualitative data collection

Qualitative data were collected through FGDs and in-depth interviews with key stakeholders to explore underlying consumer food preferences and the contextual factors influencing them. To better understand consumer preference, choices and values across different

TABLE 2 Socio-demographic distribution.

	Study sample			Statistics in Tanzania		
	%	Mean (STD)	Median	%	Mean	Median
Gender						
Female	56%			51%		
Male	44%			49%		
Age (in years)						
Mean/median		45.7 (70.9)	42			18
Education						
No education or drop primary	13%					
Primary	55%			95%		
Secondary (include high school and certificate)	24%					
University and Above (Diploma to PhD)	8%					
Monthly family income-mean/median (TZS)		1,039,499 (3,831,869)	400,000		270,000	
Food expenditure (TZS)		244,892 (193,245)	213,500		560,964	364,335
<10,000/day	69%	167,409 (73,760)	152,500			233,000 (Bottom 40%)
> = 10,000/day	31%	421,094 (255,646)	310,000			490,000 (top 60%)
Number of people in a household (mean/median)		4.7 (1.99)	4		4.7	
Families with children	83%					
Families with children under 5 years	47%					
Marital status						
Single (never married, widow, divorced)	32%			50.9%		
Married	68%			49.2%		

All currencies are in TZS (Tanzanian Shillings). The exchange rate in April 2024 TZS 2,588 = USD 1 (Bank of Tanzania Indicative exchange rate). Income is estimated income of the household; while food expenditure was estimated in terms of household daily, weekly or monthly food expenditure.

socio-economic characteristics, two FGDs composed of eight consumers sampled from both low- and high-income quantiles were conducted. One FGDs was conducted in a rural town and one in an urban town.

Interviews were conducted with six value chain actors, including two farmers, two traders, one market standards regulator, and one policy influencer. These interviews provided a broader understanding of the systemic drivers and constraints affecting food safety and quality along the value chain.

The qualitative data offered rich insights into both stable and malleable consumer food values. Findings suggest that while certain preferences—such as food safety—appear stable across contexts, the way these values manifest differs by food type. For example, in the case of bread, concerns about added sugar content became prominent, whereas with leafy vegetables, consumers emphasized concerns about pesticide residues hence vetting for a naturally produced product. This indicates that although safety is a consistently valued attribute, its salience varies depending on perceived risk and symbolic meaning associated with different foods. The qualitative information was used to guide in selecting and modifying food values already in the literature (Ardebili and Rickertsen, 2023; Antwi and Matsui, 2018; Bazzani et al., 2018; Lusk and Briggeman, 2009).

4.2.2 Quantitative data collection

Quantitative data were collected using the Best-Worst Scaling (BWS) technique, in which consumers rated their preferences for 16 food values, including hygiene, food safety, and nutrition labeling (see Table 1 for details on the food values). The BWS technique is an extension of Thurstone's (1927) paired comparison method, where

Choice No 1		
Best	**Attributes**	**Worst**
	Nutrition-reduced fats, carbohydrates, and cholesterol free	
	Safety- Extent to which consumption of food will not cause illness from contaminants like aflatoxins and pesticides residues, with long term size effects	
	Labelled with nutrition information	
	Perishability	
	Portion size-A large portion size that is stomach filling	
	Hygiene-Extent to which consumption of food will not cause illness from bacterial resulting from poor food hygiene conditions	

FIGURE 1
An example of a choice card used to rate the most important and least important attribute a consumer considers when buying food in general, bread and tomatoes. From such a choice card, consumers were asked to rate the most important food attribute and the least important food attribute that they consider when they go grocery shopping for food in general, processed food like bread, and fresh vegetables like tomatoes. For each card they rated their most and least preferred attribute for the three products separately.

consumers are shown a set of items and are asked to indicate which is best and which is worst.

Based on insights from the qualitative data, the 16 food values were adapted from the sets originally proposed by Lusk and Briggeman (2009) and Antwi and Matsui (2018).

To design the BWS experiment, a balanced incomplete block design (BIBD) was used to assign the 16 food values across eight choice sets (or shopping scenarios). Each choice set contained six food values. An example of one of the eight BWS choice cards is presented in Figure 1.

In each choice set, respondents were asked to indicate which of the six food values they considered the most important and which they considered the least important when shopping for food in general, and when shopping for specific items such as bread and tomatoes.

The survey also captured respondents' socio-economic characteristics, revealed preference data on actual food purchases, and information on the drivers of their food choices.

4.2.2.1 Products

This study adds value to the existing literature on consumer food values (Antwi and Matsui, 2018; Ardebili and Rickertsen, 2023; Bazzani et al., 2018; Femi-Oladunni et al., 2021, 2023a, 2023b; Izquierdo-Yusta et al., 2019, 2020; Lister et al., 2017; Lusk and Briggeman, 2009) by examining how these values may vary depending on the type of food product. Informed by qualitative findings, the study investigates consumer preferences from three perspectives: food in general, a processed food item (bread), and a raw vegetable (tomatoes).

While previous studies have predominantly assessed food values in a general context, this study applies the Best-Worst Scaling (BWS) technique to a "basket of goods" that includes:- food in general, bread, and tomatoes. This approach makes it possible to assess whether consumer food values are product-specific as the qualitative data informs or relatively stable across different food categories.

Tomatoes were selected to represent raw vegetables due to their wide consumption in Tanzanian households, where they are used in a variety of dishes across both rural and urban settings (Reardon et al., 2024). They are also strongly associated with food safety concerns. Wenaty and Mkojera (2024) highlight increasing public awareness regarding pesticide use in tomato farming, while Fundikira et al. (2023) document concerns about the health effects of pesticide residues. Additionally, tomatoes are consumed both raw and cooked, making them particularly relevant for exploring food safety concerns linked to both microbial contamination (e.g., foodborne illnesses) and chemical contamination (e.g., pesticide residues).

Bread was chosen as a representative processed food, given its rising consumption in Tanzania and its role as a convenient, affordable, and widely accessible product (Sauer et al., 2021). Bread also serves as an illustrative example of ultra-processed foods, which often prompt value-based trade-offs among attributes such as taste, nutrition, safety, sustainability, and ethics. As one of the most commonly consumed processed items in both rural and urban contexts, bread provides a useful lens through which to assess consumer decision-making in relation to processed foods.

By analyzing consumer food values across different product types, this study offers new insights into the extent to which food preferences are shaped by the nature of the product itself, thereby deepening understanding of consumer behavior within dynamic, low-income food systems.

4.3 Data analysis

To answer the research question, a count model was used to analyze consumer food values rated through the Best-Worst scaling technique. In addition, a Random Parameter Logit (RPL) model was estimated using an ordered logistic regression, where 1 represented the best choice, 0 a neutral (non-choice), and −1 the worst choice. The RPL model was run for the entire sample and across different income groups, gender, age and location.

Qualitative data from interviews and FGDs were translated, transcribed and analyzed using ATLAS.ti software. Results from the qualitative analysis informed the design of the quantitative research and were used to complement findings from the quantitative analysis, including the word count results.

4.3.1 Word count

The ATLAS software was used to generate the word cloud for the different segments in the population. Both maps for the best attributes and worst attributes were mapped by different categories.

4.3.2 Count model

Following the count method used in Ola and Menapace, (2020); this study calculated the total number of times each attribute was selected as the "most important" and as the "least important"; then the difference between the most important total and least important total for each attribute was calculated. This was used to rank the relative importance of each of the attributes. Additionally, to show how important a food value is in relation to all 16 values, the share of food values was calculated by determining the percentage of consumers selecting a given value as their best option. All data were analyzed using Stata 15.

4.3.3 Ordered logit model

Since the outcome variable representing consumer preference for food values is ordinal with three ordered categories (−1 = worst, 0 = neutral, 1 = best), we employed an ordered logit model to analyze how consumers rank food value across different categories.

The dependent variable Y_{it} captures **importance** of food value "*t*" by respondent "*i*" coded as:

$Y_{it} = 1$ if the food value was chosen as the least important (worst),

$Y_{it} = 0$ if the food value was not selected (neutral),

$Y_{it} = 1$ if the food value was chosen as the most important (best).

Let X_{it} be a vector of dummy variables representing the food value presented in each choice set.

The ordered logit model estimates the latent preference score Y_{it}^* as:

$$Y_{it}^* = X_{it}\beta + \varepsilon_{it}$$

Where:

Y_{it}^* is the unobserved latent preference for a given food value,

β is the vector of coefficients to be estimated,

ε_{it} is a logistic distributed error term.

To ensure the model is fit, we compared the goodness of fit for ologit with the goodness of fit obtained by fitting mixed logit and latent class conditional logit (lclogit2) model. We decided to use the ordered logit model because the outcome variable could accommodate −1, 0 and 1.

5 Results

The purpose of this study was to assess if through sustainable food consumption. A consumer can be used as a driver of change in achieving optimal health outcomes. As a player in the food system, consumer preference for sustainable food attributes can contribute to driving change toward a sustainable food system. Hence, this study strives to understand consumer preference for different food attributes by understanding consumes' underlying core food values.

5.1 Consumer food values: word count analysis

To understand consumers' underlying food values, participants ranked their most and least preferred attributes across 16 food dimensions, including hygiene, safety, and nutrition labeling. The word count analysis revealed that food safety is highly valued by Tanzanian consumers. However, their attention tends to focus more on immediate concerns, such as hygiene and spoilage, rather than long-term risks such as antimicrobial resistance (AMR), aflatoxins, or pesticide residues (see Figure 2).

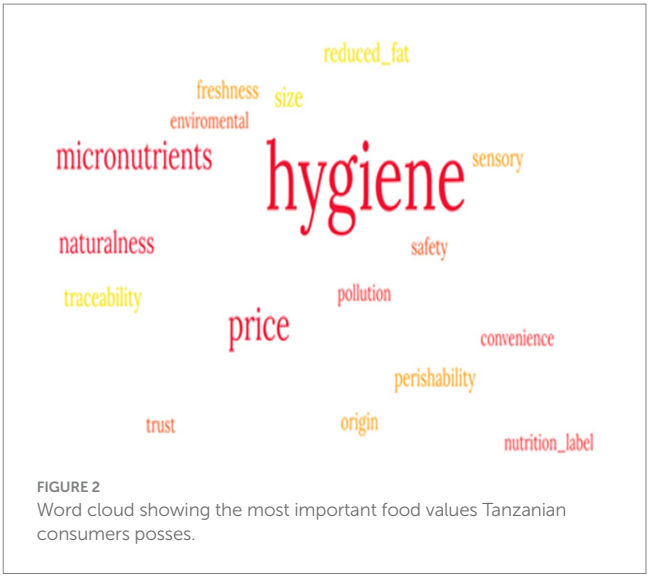

FIGURE 2
Word cloud showing the most important food values Tanzanian consumers posses.

This pattern is consistent across consumer subgroups (rural vs. urban, low vs. high income, women vs. men, and younger vs. older individuals), as well as across different shopping scenarios (see Figure 3).

5.2 Consumer food values: count model results

The count model results supported the word count analysis. In general food shopping, the top-ranked values were hygiene, freshness, and long-term safety (i.e., absence of contaminants). However, when consumers were shopping for specific products such as tomatoes and bread, price and hygiene emerged as the most important food values (see Figures 4, 5).

Consistently across all three shopping scenarios, consumers were likely to discard nutrition labeling, environmental impact, portion size, traceability, convenience, and sensory attributes when making food choices (see Figure 4).

5.3 Consumer food values: random parameter logit model results

The Random Parameter Logit (RPL) model was used to evaluate the relative importance of 16 food values across three shopping contexts: general food shopping, purchasing tomatoes, and purchasing bread.

Hygiene emerged as the most influential factor across all three scenarios, significantly increasing the likelihood of a product being chosen. Specifically, the presence of hygiene-related attributes increased the probability of choosing an option by 30% in general

food shopping, 29% when buying tomatoes, and 21% when buying bread (see Table 3).

In product-specific contexts, price also played a critical role, increasing choice probability by 26% for tomatoes and 21% for bread. However, in the general food shopping context, freshness (26%) and safety (25%) were more influential than price, which had only a marginal effect of 2%.

5.4 Food values across shopping scenarios

The findings show that while some values are product-specific, others are consistent across all shopping scenarios (see Table 3; Figures 4, 5). For example, hygiene, price, nutrition (both reduced fat and micronutrients), naturalness, sensory attributes, and freshness

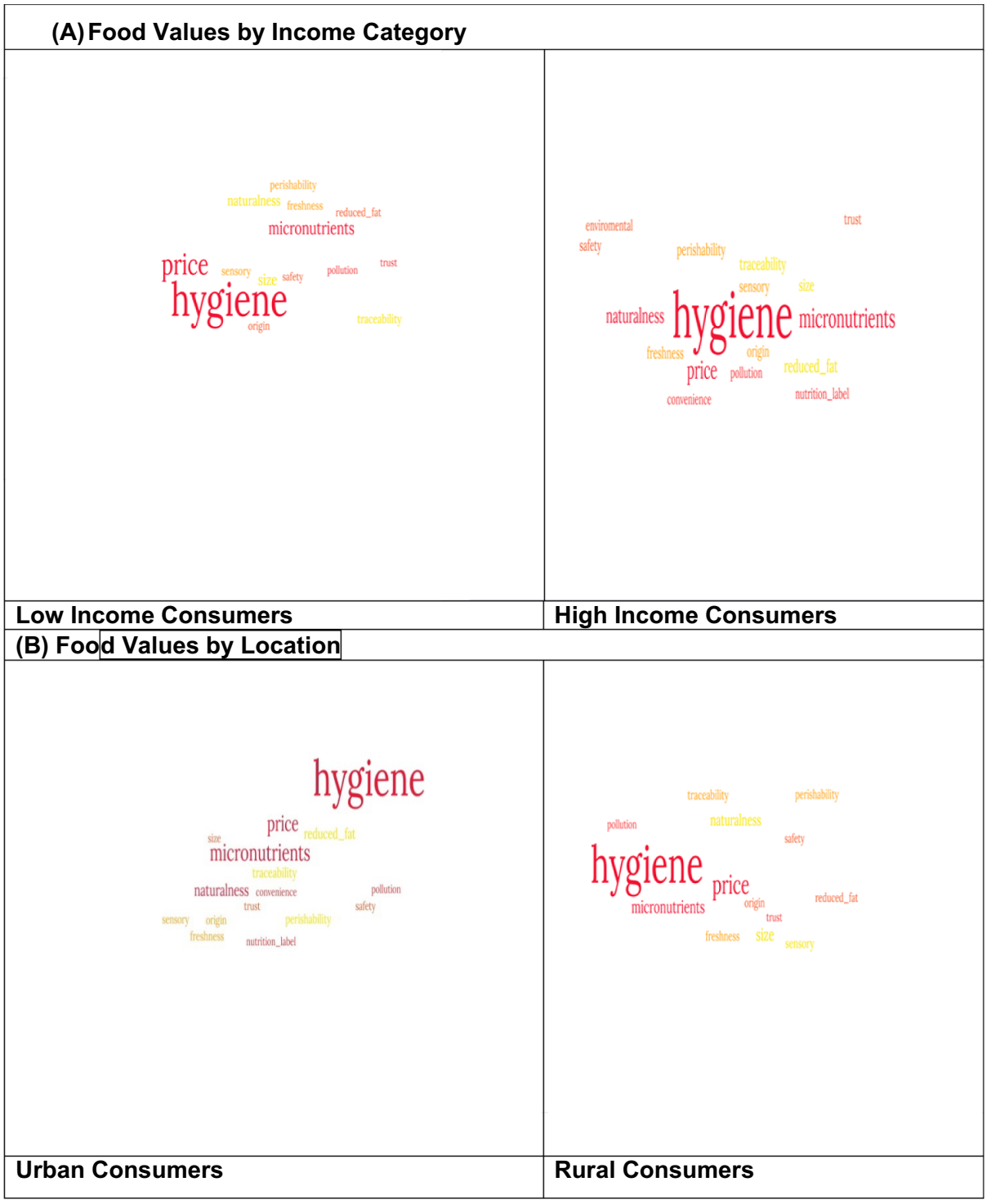

FIGURE 3 (Continued)

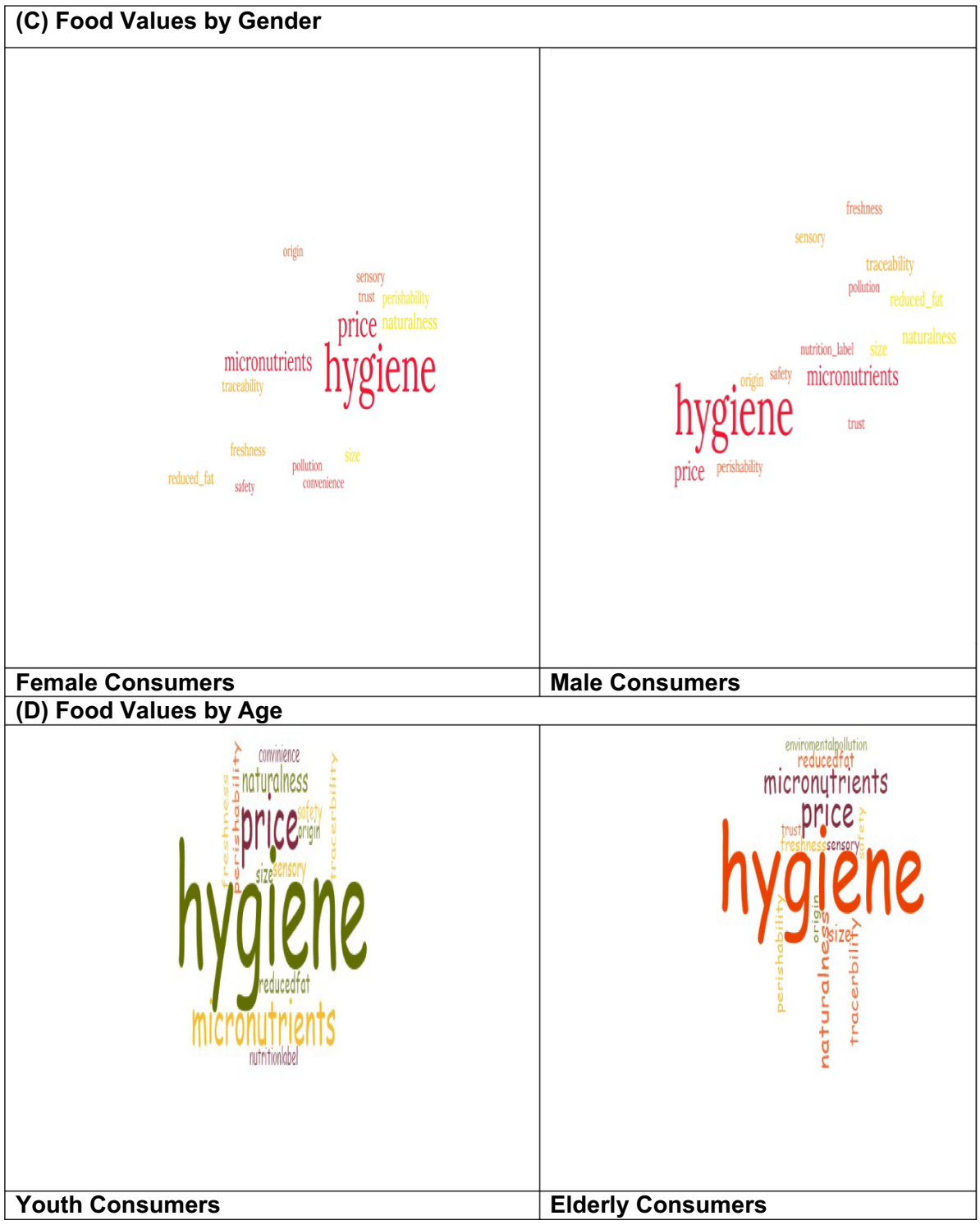

FIGURE 3
Word cloud showing the most important food value for different consumer groups. **(A)** Word cloud comparing food values for low and high income consumers. **(B)** Word cloud comparing food values across urban and rural consumers. **(C)** Word cloud comparing food values across female and male consumers. **(D)** Word cloud showing food values across youth and older consumers.

were universally valued. In contrast, safety, product shelf life, traceability, and origin varied by the shopping scenario. Specifically, safety and shelf life were important for bread and general food shopping but not for tomatoes. Meanwhile, product origin was relevant when shopping for a specific product, but less so in general shopping scenarios.

Portion size, although not statistically significant for bread, was generally discarded across shopping scenarios.

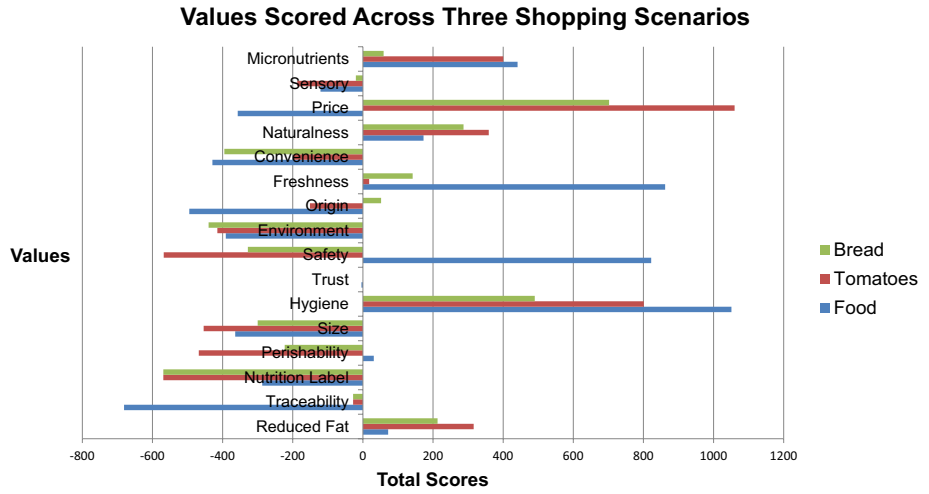

FIGURE 4
Consumer food values scored across three shopping scenarios. In the best-worst scaling technique the best option was given a + 1 score, worst or least important a – 1 score, and the unchosen a 0 score, hence the score for each value is the sum of the best, worse and unchosen.

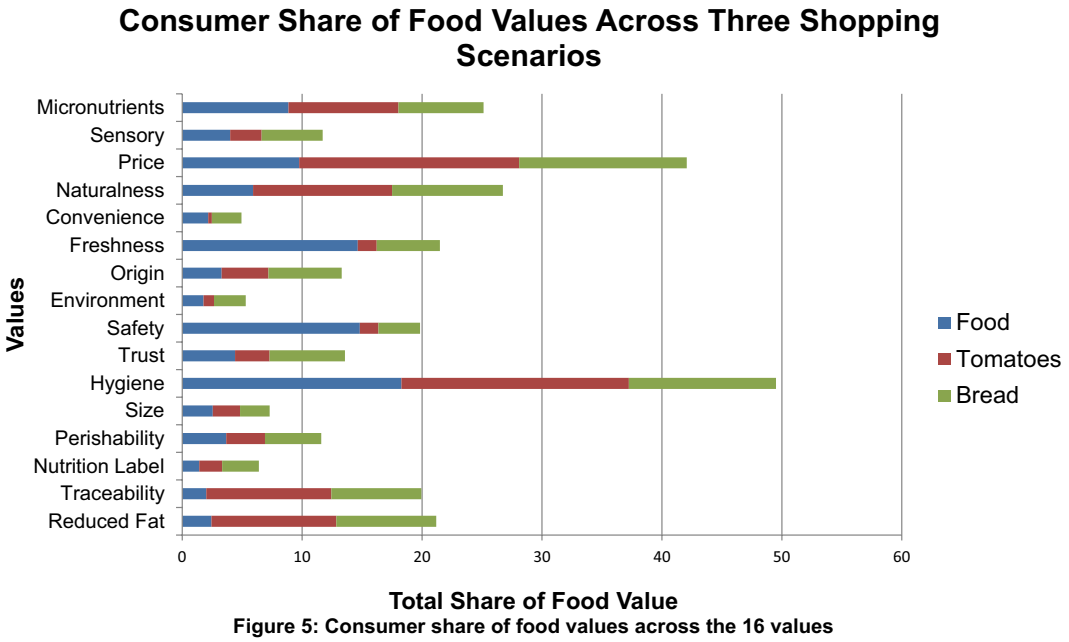

FIGURE 5
Consumer share of food values across the 16 values.

5.5 Food values across demographic segments

Across all income levels, hygiene, price, and naturalness consistently ranked as top food values. However, price and portion size were especially important for low-income consumers when buying bread (Table 4). Additionally, long shelf life was strongly preferred across all income groups when buying bread ($p < 0.001$), but it was not considered important when buying tomatoes.

Among different age groups (youth, adults, and older consumers), hygiene and price remained the highest-ranked values. Both the youth and elderly placed more emphasis on price when buying bread. Nutrition was positively valued across all age groups, with a preference for reduced fat in bread and micronutrients in tomatoes ($p < 0.001$). Sensory qualities, freshness, product origin, traceability, and trust were also widely appreciated across all age groups.

Interestingly, differences by age were most evident in preferences for portion size: youth valued portion size when buying bread,

TABLE 3 Consumer food values: results from the Random Parameter Logit (RPL) Model.

Values	Bread dy/dx	Food dy/dx	Tomatoes dy/dx
Reduced fat	14.5%***(0.00867)	9.7%*** (0.00571)	16.5%*** (0.00860)
Traceability	9.0%*** (0.00946)	−6.1%*** (0.00680)	8.1%***(0.0116)
Nutrition Label	−0.3%(0.0081)	2.3%*** (0.00648)	−3.7%*** (0.00698)
Perishability	5%*** (0.00851)	9.1%*** (0.00615)	−1.8%** (0.0074)
Size	−0.1% (0.00928)	−3.9%*** (0.00855)	−6.6%***(0.0086)
Hygiene	21.2%***(0.00892)	29.9%*** (0.00653)	28.5%*** (0.00869)
Trust	14.6%*** (0.00767)	0.05% (0.0080)	10.1%***(0.00577)
Safety	2.4%*** (0.00816)	25.4%***(0.00708)	−3.5%***(0.00683)
Origin	10.8%*** (0.00830)	−2.6%***(0.00723)	5.3%***(0.00725)
Freshness	12.9%***(0.00754)	26%***(0.00682)	9.2*** (0.00524)
Convenience	0.9% (0.00770)	−1% (0.00707)	4.8%*** (0.00545)
Naturalness	16.6%*** (0.00876)	12%*** (0.00712)	17.8%*** (0.0095)
Price	20.9%*** (0.00752)	1.6%*(0.00859)	25.9%***(0.00644)
Sensory	9.2%*** (0.00811)	5.4%***(0.0074)	4.7%***(0.00666)
Micronutrients	11.4%*** (0.00889)	17.7%*** (0.00704)	18.0%***(0.00734)
Environmental Friendly	.	.	.
cut1	−0.980*** (0.0417)	−1.115*** (0.0360)	−1.181*** (0.0412)
cut2	2.424*** (0.0439)	2.511*** (0.0380)	2.576*** (0.0439)
N	36,432	36,432	36,432
p	0	0	0

Standard errors in parentheses. *$p < 0.10$; **$p < 0.05$; ***$p < 0.001$. Food hygiene stands out across all shopping options.

TABLE 4 Food values across income.

Values	Bread			Tomatoes		
	Low income dy/dx	Middle income dy/dx	High income dy/dx	Low income dy/dx	Middle income dy/dx	High income dy/dx
Reduced fat	1.745*** (14.99)	0.767*** (7.97)	0.960*** (8.20)	1.353*** (11.21)	1.270*** (12.63)	1.306*** (10.31)
Traceability	0.853*** (6.13)	0.546*** (5.38)	0.698*** (5.53)	0.241 (1.51)	0.725*** (5.60)	0.901*** (5.66)
Perishability	0.738*** (6.21)	0.142 (1.52)	0.297* (2.55)	−0.187 (−1.67)	−0.0935 (−1.04)	−0.185 (−1.71)
Size	0.839*** (6.11)	−0.377*** (−3.73)	−0.239 (−1.82)	−0.222 (−1.54)	−0.573*** (−5.81)	−0.712*** (−5.55)
Hygiene	2.012*** (15.42)	1.347*** (13.91)	1.492*** (12.74)	2.027*** (14.58)	2.301*** (22.04)	2.387*** (18.85)
Trust	1.489*** (14.47)	0.862*** (9.88)	0.996*** (9.89)	0.813*** (9.74)	0.901*** (12.56)	0.643*** (7.90)
Safety	0.318** (2.83)	0.0430 (0.48)	0.251* (2.22)	−0.518*** (−5.28)	−0.237** (−2.90)	−0.105 (−1.01)
Origin	1.348*** (12.04)	0.568*** (6.05)	0.684*** (6.10)	0.534*** (4.94)	0.509*** (5.75)	0.206* (2.03)
Freshness	1.408*** (13.99)	0.693*** (8.08)	0.898*** (8.99)	0.751*** (10.07)	0.755*** (11.56)	0.672*** (8.73)
Naturalness	1.835*** (15.58)	0.946*** (9.68)	1.065*** (9.03)	1.440*** (11.26)	1.449*** (13.80)	1.309*** (9.89)
Price	2.136*** (20.95)	1.294*** (15.42)	1.465*** (14.82)	1.971*** (21.75)	2.049*** (26.76)	2.098*** (22.21)
Sensory	1.259*** (11.54)	0.410*** (4.51)	0.587*** (5.33)	0.476*** (4.83)	0.382*** (4.76)	0.259** (2.67)
Micronutrients	1.043*** (7.90)	0.762*** (7.92)	0.713*** (6.22)	1.460*** (15.28)	1.414*** (16.04)	1.392*** (12.42)
Nutrition Label	0.232* (2.03)	−0.156 (−1.73)	−0.0776 (−0.69)	0.67584	−0.299*** (−3.61)	−0.310** (−2.92)
Convenience	0.0821 (0.76)	0.109 (1.22)	0.0163 (0.16)	0.554*** (8.05)	0.340*** (5.01)	0.264** (3.04)
Environmental Friendly	.	.	.	.	.	.
Cut1	−0.648*** (−8.36)	−1.157*** (−18.07)	−1.046*** (−13.64)	−1.112*** (−17.24)	−1.097*** (−19.80)	−1.153*** (−16.46)
Cut2	2.870*** (34.24)	2.215*** (33.33)	2.345*** (29.20)	2.496*** (36.84)	2.537*** (43.40)	2.507*** (33.84)
N	10,032	15,696	10,704	10,032	15,696	10,704

Statistics in parentheses. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

TABLE 5 Food values across ages.

Values	Bread			Tomatoes		
	Youth dy/dx	Adult dy/dx	Elderly dy/dx	Youth dy/dx	Adult dy/dx	Elderly dy/dx
Reduced fat	1.210*** (0.103)	0.915*** (0.103)	1.185*** (0.125)	1.286*** (0.113)	1.233*** (0.108)	1.425*** (0.123)
Traceability	0.517*** (0.115)	0.748*** (0.111)	0.793*** (0.135)	0.503*** (0.150)	0.776*** (0.131)	0.620*** (0.173)
Perishability	0.431*** (0.105)	0.273** (0.101)	0.355** (0.121)	−0.229** (0.0969)	−0.136 (0.0940)	−0.0442 (0.119)
Size	0.198* (0.112)	−0.219* (0.114)	−0.00324 (0.140)	−0.646*** (0.111)	−0.690*** (0.113)	−0.0927 (0.136)
Hygiene	1.534*** (0.111)	1.539*** (0.103)	1.653*** (0.127)	2.280*** (0.120)	2.240*** (0.107)	2.226*** (0.140)
Trust	1.292*** (0.0943)	0.862*** (0.0894)	1.081*** (0.108)	0.831*** (0.0735)	0.785*** (0.0706)	0.777*** (0.0966)
Safety	0.0681 (0.0982)	0.198** (0.0980)	0.318** (0.117)	−0.420*** (0.0898)	−0.160* (0.0850)	−0.260** (0.109)
Origin	1.075*** (0.102)	0.615*** (0.0975)	0.751*** (0.119)	0.427*** (0.0928)	0.370*** (0.0914)	0.504*** (0.115)
Freshness	1.113*** (0.0926)	0.726*** (0.0885)	1.053*** (0.106)	0.726*** (0.0684)	0.711*** (0.0653)	0.758*** (0.0853)
Naturalness	1.401*** (0.104)	1.061*** (0.103)	1.216*** (0.127)	1.418*** (0.116)	1.344*** (0.113)	1.475*** (0.134)
Price	1.652*** (0.0904)	1.406*** (0.0890)	1.711*** (0.106)	2.074*** (0.0845)	2.001*** (0.0787)	2.050*** (0.0983)
Sensory	0.894*** (0.0985)	0.488*** (0.0957)	0.725*** (0.117)	0.339*** (0.0864)	0.318*** (0.0848)	0.494*** (0.104)
Micronutrients	0.917*** (0.107)	0.749*** (0.105)	0.820*** (0.129)	1.503*** (0.0925)	1.348*** (0.0913)	1.409*** (0.114)
Nutrition Label	0.0113 (0.0982)	−0.0685 (0.0993)	−0.00798 (0.117)	−0.363*** (0.0914)	−0.314*** (0.0884)	−0.161 (0.110)
Convenience	0.177* (0.0958)	0.0126 (0.0949)	0.0202 (0.111)	0.472*** (0.0695)	0.295*** (0.0696)	0.377*** (0.0878)
Environmental Friendly	.	.	.	.	.	.
cut1	−0.905***(0.0688)	−1.077***(0.0690)	−0.948***(0.0808)	−1.154***(0.0604)	−1.133*** (0.0570)	−1.039***(0.0730)
cut2	2.524*** (0.0729)	2.307*** (0.0722)	2.477***(0.0852)	2.514***(0.0638)	2.487*** (0.0599)	2.554***(0.0772)
N	13,056	14,112	9,264	13,056	14,112	9,264
p	9.79E-183	1.65E-150	2.28E-127	0	0	7.10E-207

Standard errors in parentheses. *$p < 0.10$; **$p < 0.05$; ***$p < 0.001$.

whereas adults and older consumers did not consider it important for either bread or tomatoes. These results were statistically significant for tomatoes only (see Table 5).

Both men and women prioritized price, hygiene, and naturalness. Nutrition and trust were also important across genders, with strong preferences for reduced fat in bread and micronutrients in tomatoes (see Table 6). There were no major gender differences regarding shelf life; both men and women valued it when buying bread but not when buying tomatoes. However, results were significant only among women for bread and men for tomatoes.

Differences emerged in relation to portion size: while it was generally deemed unimportant, female consumers considered it important when buying bread ($p < 0.05$).

Hygiene and price were consistently top-ranked across both urban and rural consumers. Price was especially important among urban consumers when buying bread. Naturalness, nutrition (reduced fat and micronutrients), trust, traceability, product origin, freshness, and sensory attributes were also valued across both settings. In contrast, portion size was generally discarded, except among rural consumers when purchasing bread. The preference was statistically significant across all segments (see Table 7).

6 Discussion

6.1 Consumer food values and their implications for a sustainable food system

This study highlights that while Tanzanian consumers strongly value food safety, their interpretation is predominantly shaped by short-term concerns, particularly hygiene and spoilage. These attributes, which reflect immediate risks, appear to take precedence over long-term food safety hazards such as antimicrobial resistance (AMR), pesticide residues, or aflatoxins. This prioritization likely stems from sustained public health messaging and regulatory focus on hygiene and sanitation. For example, national and local regulations, such as the Food Safety Regulations, the Urban Planning Act No. 8 of 2007, the Public Health Act No. 1 of 2009, and various municipal by-laws place considerable emphasis on hygiene and environmental protection.

The focus on hygiene is also historically grounded. Outbreaks of waterborne diseases like cholera and typhoid have shaped public perceptions of food safety. In 2016, for instance, Tanzania recorded approximately 15,000 cholera cases and 200 deaths, with children under five accounting for 10% of the cases (World Health Organization, 2018).

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TABLE 6 Food values across gender.

Values	Bread		Tomatoes	
	Female dy/dx	Male dy/dx	Female dy/dx	Male dy/dx
Reduced fat	1.207*** (0.0841)	0.940*** (0.0947)	1.313*** (0.0873)	1.285*** (0.100)
Traceability	0.770*** (0.0903)	0.563*** (0.106)	0.646*** (0.112)	0.635*** (0.133)
Perishability	0.527*** (0.0837)	0.133 (0.0931)	−0.0767 (0.0789)	−0.233** (0.0878)
Size	0.170* (0.0950)	−0.242** (0.102)	−0.434*** (0.0922)	−0.636*** (0.103)
Hygiene	1.654*** (0.0867)	1.459*** (0.0975)	2.215*** (0.0925)	2.292*** (0.105)
Trust	1.253*** (0.0750)	0.842*** (0.0828)	0.876*** (0.0617)	0.702*** (0.0663)
Safety	0.274*** (0.0775)	0.0642 (0.0934)	−0.244*** (0.0711)	−0.322*** (0.0822)
Origin	1.042*** (0.0825)	0.532*** (0.0890)	0.523*** (0.0772)	0.301*** (0.0833)
Freshness	1.077*** (0.0731)	0.785*** (0.0827)	0.778*** (0.0561)	0.664*** (0.0611)
Naturalness	1.401*** (0.0854)	0.998*** (0.0949)	1.445*** (0.0917)	1.349*** (0.105)
Price	1.658*** (0.0729)	1.463*** (0.0814)	2.030*** (0.0664)	2.047*** (0.0749)
Sensory	0.864*** (0.0796)	0.480*** (0.0882)	0.438*** (0.0705)	0.286*** (0.0777)
Micronutrients	0.831*** (0.0900)	0.815*** (0.0921)	1.401*** (0.0765)	1.437*** (0.0835)
Nutrition Label	0.0514 (0.0802)	−0.120 (0.0902)	−0.259*** (0.0731)	−0.334*** (0.0836)
Convenience	0.0308 (0.0789)	0.123 (0.0835)	0.365*** (0.0587)	0.394*** (0.0631)
Environmental Friendly	.	.	.	.
cut1	−0.880***(0.0558)	−1.109***(0.0626)	−1.077***(0.0481)	−1.165***(0.0545)
cut2	2.542***(0.0592)	2.283***(0.0653)	2.532***(0.0507)	2.486***(0.0575)
N	20,208	16,224	20,208	16,224
p	1.76E-280	1.73E-185	0	0

Standard errors in parentheses. *$p < 0.10$; **$p < 0.05$; ***$p < 0.001$.

This public health context reinforces why hygiene is seen as a critical food value by consumers.

Our findings also align with earlier studies done in Tanzania and other African contexts that identified consumer preferences for food safety attributes tied to both short and long-term risks (Alphonce and Alfnes, 2012, 2017; Constantinides et al., 2021; Chilenga et al., 2024; Femi-Oladunni et al., 2021; Femi-Oladunni et al., 2023b; Mashego, 2023; Yahaya et al., 2015). However, this study distinguishes itself by disaggregating food safety into short-term and long-term dimensions, revealing that consumers prioritize short-term safety more strongly.

In addition to hygiene, price and nutrition emerged as key food values—particularly when shopping for specific items. This is in line with previous findings that places price at the center of utilitarian consumers (Femi-Oladunni et al., 2023b), and nutritional content among both utilitarian and ethical consumer segments (Alphonce et al., 2020; Femi-Oladunni et al., 2023a, 2023b). Interestingly, in this study, price was less influential in the general food shopping context, suggesting that its importance is more salient when consumers evaluate specific, frequently purchased items.

Regarding values that were consistently discarded, our findings are consistent with previous literature on the low prioritization of portion size and environmental impact (Alphonce and Alfnes, 2012; Duvenage et al., 2010; Femi-Oladunni et al., 2021; Femi-Oladunni et al., 2023a, 2023b). For example, Femi-Oladunni et al. (2023a) reported that weight and measurement were among the least appreciated food values among Nigerian consumers. Similarly, Femi-Oladunni et al. (2023b) reported weight and measurement as the least important value among consumers in the ethical group, however, their study found that consumers in the utilitarian group placed importance on weight and measurement.

Furthermore, Alphonce and Alfnes (2012) reported that consumers in Tanzania were willing to pay more for smaller tomato portions(200 g) compared to larger tomato portions (e.g., 500 g and 1,000 g). Although this is against economic theory, some of the explanation include those stipulated by Duvenage et al. (2010), who reported that lower-income South African consumers preferred smaller packaging sizes, such as smaller bags of maize meal, not only due to affordability constraints but also possibly to preserve freshness. These insights align with our qualitative findings, which suggested that preference for smaller portions may also stem from a desire for freshness, particularly in small household size where larger quantities might lead to staleness and spoilage. For instance, a household might choose a smaller loaf of bread or a few tomatoes for daily consumption to ensure preserved freshness and avoid leftovers. Duvenage et al. (2010) further emphasized that packaging size was often prioritized over affordability, reinforcing the potential role of freshness as an underlying motive.

On another note, in line with our study, Femi-Oladunni et al. (2023b) found that environmental impact was among the least important values among Kenyan consumers; however, it gained prominence within the ethical consumer group.

TABLE 7 Food values across location.

Values	Bread		Tomatoes	
	Urban dy/dx	Rural dy/dx	Urban dy/dx	Rural dy/dx
Reduced fat	0.932*** (0.0808)	1.333*** (0.100)	1.244*** (0.0862)	1.387*** (0.102)
Traceability	0.485*** (0.0890)	0.977*** (0.109)	0.631*** (0.113)	0.657*** (0.133)
Perishability	0.179** (0.0802)	0.618*** (0.0987)	−0.210** (0.0749)	−0.0477 (0.0944)
Size	−0.244** (0.0872)	0.353** (0.115)	−0.697*** (0.0848)	−0.240** (0.117)
Hygiene	1.366*** (0.0834)	1.880*** (0.103)	2.264*** (0.0899)	2.226*** (0.109)
Trust	0.976*** (0.0719)	1.217*** (0.0879)	0.795*** (0.0579)	0.804*** (0.0724)
Safety	0.0637 (0.0794)	0.360*** (0.0901)	−0.304*** (0.0701)	−0.240** (0.0838)
Origin	0.650*** (0.0776)	1.068*** (0.0972)	0.367*** (0.0722)	0.511*** (0.0916)
Freshness	0.889*** (0.0718)	1.037*** (0.0844)	0.713*** (0.0536)	0.749*** (0.0650)
Naturalness	1.027*** (0.0811)	1.526*** (0.102)	1.359*** (0.0896)	1.469*** (0.109)
Price	1.445*** (0.0699)	1.769*** (0.0864)	2.040*** (0.0647)	2.034*** (0.0774)
Sensory	0.571*** (0.0767)	0.882*** (0.0929)	0.311*** (0.0669)	0.462*** (0.0835)
Micronutrients	0.801*** (0.0795)	0.857*** (0.110)	1.435*** (0.0727)	1.391*** (0.0894)
Nutrition Label	−0.125 (0.0773)	0.130 (0.0950)	−0.354*** (0.0707)	−0.198** (0.0878)
Convenience	0.155** (0.0734)	−0.0508 (0.0916)	0.397*** (0.0557)	0.351*** (0.0676)
Environmental friendly	.	.	.	.
cut1	−1.085*** (0.0541)	−0.824*** (0.0654)	−1.157*** (0.0469)	−1.054*** (0.0563)
cut2	2.303*** (0.0565)	2.621*** (0.0696)	2.491*** (0.0495)	2.543*** (0.0593)
N	22,128	14,304	22,128	14,304
p	2.48E-255	1.83E-216	0	0

Standard errors in parentheses. *$p < 0.10$; **$p < 0.05$; ***$p < 0.001$.

In contrast to our findings, Antwi and Matsui (2018) and Femi-Oladunni et al. (2023b) reported that some consumer segments, place high importance on weight and measurement, and environmental impact. These differences highlight the role of context-specific factors in shaping food value preferences. Contextual elements such as culture, consumer group (whether utilitarian or ethical), household size, income dynamics, and supply chain characteristics all influence how consumers value different food attributes. Hence, to steer consumer behavior toward more sustainable consumption and production patterns, targeted interventions are essential.

6.2 Comparing product-specific and general food values

Despite a consistent preference for food hygiene across various shopping contexts, a noticeable discrepancy emerges between general food shopping values and product-specific choices. For instance, differences in the importance placed on long-term food safety and price may be attributed to distinctions between consumers' stable and malleable preferences, stated versus revealed preferences, or market limitations such as product availability and information credibility.

It is likely that when consumers rate their preferences in the context of general grocery shopping, they express more stable, underlying values, normative or cognitive in nature, without fully accounting for practical market constraints. In contrast, when making decisions about specific food products such as tomatoes or bread, their preferences become more situational and adaptive, shaped by immediate market conditions. As a result, attributes like "freedom from contaminants with long-term health effects" may be discarded in contexts where such characteristics are not easily observable or available. Unavailability could be due to lack of labeling, certification, affordability, or supply.

In product-specific contexts, consumers' revealed preferences are clearly influenced by market realities. A typical Tanzanian food market has unregulated informal food vendors, hence certified or differentiated labeled products are rare (Grace, 2015; Holdsworth et al., 2020; Kissoly et al., 2025). This limits consumers' ability to choose based on explicit food safety attributes, instead, they rely on alternative indicators such as traditional, natural, or local varieties to infer product safety (Isanovic et al., 2023). Consistent with existing literature on consumer preference for naturally produced or organic-labeled foods (Alphonce and Alfnes, 2012; Alphonce and Alfnes, 2017; Yahaya et al., 2015), this study found that approximately two-thirds of sampled consumers preferred naturally produced eggs and chicken breeds, referred to as *"Kienyeji" and translated as local breeds normally produced with minimum inputs.* Furthermore, an analysis on the reasons behind product choices revealed that accessibility, nutrition, and perceived safety were key drivers for selecting local varieties that were often associated with naturalness. In contrast, accessibility, price, and sensory attributes were the primary considerations for choosing more generic options, such as conventional or pure breed of eggs and chicken. These findings reinforce the idea that while food safety is a stable consumer value, it may be compromised when market conditions limit the availability or recognition of safer alternatives.

Consumer preferences for food safety in general shopping contexts align with findings from both hypothetical (stated preference) and non-hypothetical (revealed preference) studies conducted in Tanzania and other African countries (Alphonce and Alfnes, 2012; Alphonce and Alfnes, 2017; Chilenga et al., 2024; Muhenga and Alphonce, 2023; Yahaya et al., 2015).

Interestingly, while perishability is prioritized during general food shopping, it is discarded when consumers evaluate specific products like tomatoes and bread. This may be due to a perceived trade-off between a prolonged shelf life (ie reduced post-harvest

losses) and naturalness. For example, a long shelf life in tomatoes is often associated with use of chemical preservatives, which contradicts a preference for natural products. Similarly, for bread, extended shelf life is equated with staleness, opposing consumer preferences for freshness. These examples suggest that core values such as naturalness and freshness become more salient in product-specific contexts, leading consumers to discount shelf life as a desirable attribute.

These findings highlight the importance of examining product-specific preferences when seeking to understand consumers' actual food values and behaviors. To better isolate true preferences and minimize hypothetical bias, future research should consider using non-hypothetical scenarios involving real products for specific food items.

6.3 Heterogeneity in food values

Across socio-economic groups (age, gender, income, and location), food hygiene consistently emerges as the most important value, followed by price. However, for low-income consumers, price is the primary concern when purchasing bread, highlighting affordability as a key driver. This aligns with earlier studies (Duvenage et al., 2010; Femi-Oladunni et al., 2023a; McCullough et al., 2022), which show stronger price sensitivity among lower-income groups. For example, Femi-Oladunni et al. (2023a) found that Nigerian consumers with lower incomes prioritized price, while McCullough et al. (2022) noted that maize prices in Tanzania significantly affects dietary energy and nutrient intake for poorer households than for wealthier ones.

Preferences for attributes such as portion size, shelf life, and food safety vary notably across demographic groups. In line with Caputo et al., 2025, Chambers et al., 2008, and Femi-Oladunni et al. (2023b), women and older consumers tend to value food safety more than men and younger individuals. This may reflect greater health awareness among women and older consumers, and women's traditional role in household food decisions (Milovanova et al., 2024). Low-income, women, and younger consumers prioritize portion size, possibly due to budget limitations (McCullough et al., 2022).

Interestingly, across all groups, portion size is not a significant factor when purchasing tomatoes. This aligns with Alphonce and Alfnes (2012), who found that Tanzanian consumers preferred smaller portions (200 g), likely due to concerns about freshness and perishability.

Shelf life, especially for bread, is more important for low-income and female consumers. This suggests a trade-off between freshness and food security, where longer shelf life is valued for its potential to reduce waste and extend food availability. Similar conclusions were drawn by Femi-Oladunni et al. (2023b) and McCullough et al. (2022), who reported that low-income consumers prioritize quantity-related attributes over micronutrient quality.

Despite some variation, consumers across all groups consistently value hygiene, price, nutrition (including reduced fat and micronutrients), sensory appeal, naturalness, freshness, product origin, and trust. These insights are valuable for food producers, marketers, and policymakers. While core values have broad appeal, designing targeted intervention to shift values for specific demographic groups such as promoting food safety awareness among men, can contribute to more sustainable consumption and production practices.

7 Conclusion, recommendations, and implications

7.1 Conclusion and recommendations

The purpose of this study was to assess if a consumer in Tanzania can be sustainable in their food consumption, hence become a driver of change in achieving optimal health outcomes (safer and healthier humans, animals, plants, and environments). As a key player in the food system, consumer preference for sustainable food attributes can significantly influence progress toward a sustainable food system. This study assessed consumers' more stable preferences, referred to as food values—to provide recommendations on interventions that can nurture or shift positive values toward healthier and safer food choices.

The study concludes that across all segments of the population, food safety emerges as the most important food value. However, consumers tend to prioritize immediate concerns, such as food hygiene and spoilage, over long-term risks from contaminants like aflatoxins, pesticide residues, and antimicrobial resistance (AMR). This prioritization can partly be attributed to the government's emphasis on food hygiene and sanitation in local food safety standards, as well as poor access to such foods in the local food markets or consumer food environment. Historical incidences of waterborne diseases, such as cholera and typhoid, have also reinforced the focus on hygiene in the local food markets and among consumers.

Price, nutrition, and naturalness also rank among the top four food values for consumers. Naturalness, defined as being free from artificial ingredients and produced without chemical fertilizers or pesticides, reflects a strong consumer preference for products free from contaminants such as AMR and pesticide residues. On the other hand, despite the importance of nutrition, consumers' preferences do not appear to include nutrition labeling, which is essential for informed decision-making.

These findings suggest that while Tanzanian consumers can contribute to building a sustainable food system, this potential is not yet fully realized. For consumers' stable food values to be reflected in actual food choices, targeted efforts are needed to improve the food environment and enhance the salience of these values at the point of purchase. Interventions should address key product attributes such as price, trust, freshness, sensory appeal, and accessibility. Additionally, behavior change strategies must be tailored to specific consumer segments to promote underemphasized values such as concern for environmental impact.

To achieve this, several strategic interventions are recommended. First, public education campaigns should build on the strong existing concern for food safety by broadening awareness beyond hygiene and spoilage to include the risks posed by long-term contaminants such as aflatoxins, pesticide residues, and AMR. Second, enhancing access to safer, more natural, and nutritious food options—particularly in local markets—should be a policy priority. Third, efforts should be made to promote the use and understanding of food labeling to support informed consumer decisions, especially with regard to nutritional content and sustainability attributes.

Through these multi-faceted and targeted efforts, consumers can be empowered to make more sustainable choices and play a

transformative role in creating a healthier, safer, and more resilient food system in Tanzania.

7.2 Implications

The study highlights that while Tanzanian consumers demonstrate a clear concern for food safety, their preferences are largely shaped by immediate and visible risks such as hygiene and spoilage. As a result, long-term health hazards and sustainability concerns receive less attention. This gap in consumer food values implies a need for systemic change in how sustainable food choices are framed and supported within the local food environment.

An important implication is that consumer education alone is insufficient unless it is paired with structural improvements in market access, food labeling practices, and trust-building mechanisms. If food environments continue to be dominated by poorly regulated informal markets with limited availability of nutritious and safe products, even well-informed consumers will remain unable to act on their values.

Moreover, the observed disconnect between the value placed on nutrition and the limited attention to nutrition labeling suggests that the visibility and usability of sustainability-related information must be improved at the point of purchase.

Finally, food policies and market innovations must go beyond raising consumer awareness. They should create enabling environments where choosing sustainable options is also the most available and affordable choice.

By addressing both informational and structural barriers to sustainable consumption, Tanzanian consumers can be empowered to become active drivers of transformation in the food system.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by The Senate Research and Publication Committee (SRPC), from the Sokoinke University of Agriculture. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

RA: Conceptualization, Writing - original draft, Writing – review & editing. YG: Conceptualization, Writing – review & editing. HS: Supervision, Writing – review & editing. LK: Conceptualization, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The authors declare that Gen AI was used in the creation of this manuscript. Editing and improving readability of already written text. Cross checking referencing style.

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References

Alphonce, R., and Alfnes, F. (2012). Consumer willingness to pay for food safety in Tanzania: an incentive-aligned conjoint analysis. *Int. J. Consum. Stud.* 36, 394–400. doi: 10.1111/j.1470-6431.2011.01067.x

Alphonce, R., and Alfnes, F. (2017). Eliciting consumer WTP for food characteristics in a developing context: application of four valuation methods in an African market. *J. Agric. Econ.* 68, 123–142. doi: 10.1111/1477-9552.12170

Alphonce, R., Waized, B. M., and Larsen, M. N. (2020). Consumer preference for novelty in processed foods: a developing country perspective. *J. Agribus. Dev. Emerg. Econ.* 10, 429–446. doi: 10.1108/JADEE-03-2019-0036

Antwi, A. O., and Matsui, K. (2018). Consumers' food value attributes on Ghana's local market; case study of Berekum municipality. *Int. J. Environ. Agric. Biotechnol.* 3, 834–838. doi: 10.22161/ijeab/3.3.18

Ardebili, A. T., and Rickertsen, K. (2023). Food values and personality traits in the United States and Norway. *J. Clean. Prod.* 413:137310. doi: 10.1016/j.jclepro.2023.137310

Bazzani, C., Gustavsen, G. W., Nayga, R. M. Jr., and Rickertsen, K. (2018). A comparative study of food values between the United States and Norway. *Eur. Rev. Agric. Econ.* 45, 239–272. doi: 10.1093/erae/jbx033

Becker, G. S. (1976). The economic approach to human behavior. Chicago: The University of Chicago Press.

Bell, W., Coates, J., Fanzo, J., Wilson, N. L., and Masters, W. A. (2021). Beyond price and income: preferences and food values in peri-urban Viet Nam. *Appetite* 166:105439. doi: 10.1016/j.appet.2021.105439

Blake, C. E., Frongillo, E. A., Warren, A. M., Constantinides, S. V., Rampalli, K. K., and Bhandari, S. (2021). Elaborating the science of food choice for rapidly changing food systems in low-and middle-income countries. *Glob. Food Sec.* 28:100503. doi: 10.1016/j.gfs.2021.100503

Caputo, V., Ortega, D. L., and Maredia, M. K. (2025). Agribusiness potential for nutritional and safety labels on peanut butter in Kenya: a study of consumer preferences. *J. Agribus. Dev. Emerg. Econ.* 2025:260. doi: 10.1108/JADEE-08-2024-0260

Chambers, S., Lobb, A., Butler, L. T., and Traill, W. B. (2008). The influence of age and gender on food choice: a focus group exploration. *Int. J. Consum. Stud.* 32, 356–365. doi: 10.1111/j.1470-6431.2007.00642

Chilenga, C., Mainje, M., Watts, A. G., Munkhuwa, V., Ndhlovue, B., and Machira, K. (2024). Factors influencing willingness to pay for aflatoxin-safe foods among farmers, traders, and consumers in sub-Saharan Africa: a systematic review. *Appl. Food Res.* 4:100511. doi: 10.1016/j.afres.2024.100511

Constantinides, S. V., Turner, C., Frongillo, E. A., Bhandari, S., Reyes, L. I., and Blake, C. E. (2021). Using a global food environment framework to understand relationships with food choice in diverse low-and middle-income countries. *Glob. Food Secur.* 29:100511. doi: 10.1016/j.gfs.2021.100511

Duvenage, S. S., Schönfeldt, H. C., and Kruger, R. (2010). Food product attributes guiding purchasing choice of maize meal by low-income South African consumers. *Dev. South. Afr.* 27, 309–331. doi: 10.1080/0376835X.2010.498940

Eales, J. S., and Unnevehr, L. J. (1993). Simultaneity and structural change in US meat demand. *Am. J. Agric. Econ.* 75, 259–268. doi: 10.2307/1242910

Femi-Oladunni, O. A., Martínez-Ruiz, M. P., Ruiz-Palomino, P., and Muro-Rodríguez, A. I. (2023a). Food values influencing consumers' decisions in a sub-Saharan African country. *Br. Food J.* 125, 1805–1823. doi: 10.1108/BFJ-02-2022-0144

Femi-Oladunni, O. A., Ruiz-Palomino, P., Martínez-Ruiz, M. P., and Muro-Rodríguez, A. I. (2021). A review of the literature on food values and their potential implications for consumers' food decision processes. *Sustainability* 14:271. doi: 10.3390/su14010271

Femi-Oladunni, O., Ruiz-Palomino, P., Martinez-Ruiz, M. P., and Perez-Jimenez, I. R. (2023b). Food values and purchase decisions in emerging markets: empirical evidence from Kenya. *Cogent Bus Manag* 10:2287771. doi: 10.1080/23311975.2023.2287771

Food and Agriculture Organization (2022). The food insecurity experience scale (FIES): Measuring food insecurity through people's experiences. Rome: FAO.

Fundikira, S., Selestine, E., and Msollo, S. (2023). Assessment of consumer's knowledge and practices on pesticide residues reduction in tomatoes in Mvomero, Morogoro region, Tanzania. *East Afr. J. Sci. Technol. Innov.* 4:700. doi: 10.37425/eajsti.v4i3.700

Grace, D. (2015). Food safety in low and middle-income countries. *Int. J. Environ. Res. Public Health* 12, 10490–10507. Available at:. doi: 10.3390/ijerph120910490

Grunert, K. G. (2005). Food quality and safety: consumer perception and demand. *Eur. Rev. Agric. Econ.* 32, 369–391. doi: 10.1093/eurrag/jbi011

Gutman, J. (1982). A means-end chain model based on consumer categorization processes. *J. Mark.* 46, 60–72. doi: 10.1177/002224298204600207

Holdsworth, M., Pradeilles, R., Tandoh, A., Green, M., Wanjohi, M., Zotor, F., et al. (2020). Unhealthy eating practices of city-dwelling Africans in deprived neighbourhoods: evidence for policy action from Ghana and Kenya. *Glob. Food Secur.* 26:100452. doi: 10.1016/j.gfs.2020.100452

Isanovic, S., Constantinides, S. V., Frongillo, E. A., Bhandari, S., Samin, S., Kenney, E., et al. (2023). How perspectives on food safety of vendors and consumers translate into food-choice behaviors in 6 African and Asian countries. *Curr. Dev. Nutr.* 7:100015. doi: 10.1016/j.cdnut.2022.100015

Izquierdo-Yusta, A., Gómez-Cantó, C. M., Martínez-Ruiz, M. P., and Pérez-Villarreal, H. H. (2020). The influence of food values on post–purchase variables at food establishments. *Br. Food J.* 122, 2061–2076. doi: 10.1108/BFJ-06-2019-0420

Izquierdo-Yusta, A., Gómez-Cantó, C. M., Pelegrin-Borondo, J., and Martínez-Ruiz, M. P. (2019). Consumers' behaviour in fast-food restaurants: a food value perspective from Spain. *Br. Food J.* 121, 386–399. doi: 10.1108/BFJ-01-2018-0059

Karanja, A., Ickowitz, A., Stadlmayr, B., and McMullin, S. (2022). Understanding drivers of food choice in low-and middle-income countries: a systematic mapping study. *Glob. Food Secur.* 32:100615. doi: 10.1016/j.gfs.2022.100615

Kissoly, L., Ngassa, C., Norman, F., Rutatora, S., and Aluko, A. (2025). Weekly food markets and access to nutritious foods in rapidly growing urban peripheries: insights from Dar Es Salaam, Tanzania. *VeriXiv* 2:84. doi: 10.12688/verixiv.974.1

Kitole, F. A., Mbukwa, J. N., Tibamanya, F. Y., and Sesabo, J. K. (2024). Climate change, food security, and diarrhoea prevalence nexus in Tanzania. *Hum. Soc. Sci. Commun.* 11, 1–13. doi: 10.1057/s41599-024-02875-z

Lister, G., Tonsor, G. T., Brix, M., Schroeder, T. C., and Yang, C. (2017). Food values applied to livestock products. *J. Food Prod. Mark.* 23, 326–341. doi: 10.1080/10454446.2014.1000436

Lusk, J. L., and Briggeman, B. C. (2009). Food values. *Am. J. Agric. Econ.* 91, 184–196. doi: 10.1111/j.1467-8276.2008.01175.x

Mashego, K. T. (2023). Consumers' willingness to pay for food safety attributes of nectarines: A discrete choice experiment in the Polokwane municipality of Limpopo, South Africa. Second Cycle, A2E. Uppsala: SLU, Department of Economics.

McCullough, E., Zhen, C., Shin, S., Lu, M., and Arsenault, J. (2022). The role of food preferences in determining diet quality for Tanzanian consumers. *J. Dev. Econ.* 155:102789. doi: 10.1016/j.jdeveco.2021.102789

Milovanova, N., Chukwugozie, D. C., David, K., Okonji, B. A., Njoagwuani, E. I., Onwukaeme, I. M., et al. (2024). Understanding food safety challenges through a gender and social lens in low-and middle-income countries. *JSFA Reports*, 4, 280–285.

Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC), Ministry of Health (MoH), Tanzania Food and Nutrition Centre (TFNC), National Bureau of Statistics (NBS), Office of the Chief Government Statistician (OCGS) and UNICEF. (2018). Tanzania National Nutrition Survey using SMART Methodology (TNNS) (2018). Dar es Salaam, Tanzania: MoHCDGEC, MoH, TFNC, NBS, OCGS, and UNICEF.

Muhenga, A. S., and Alphonce, R. (2023). Consumer's awareness and willingness to pay for aflatoxin-free sunflower oil from four selected regions in Tanzania. *Sustainability* 15:12309. doi: 10.3390/su151612309

NBS and OCGS. (2016). *Tanzania demographic and health survey 2015-16 (TDHS 2015-16). Ministry of Health, community development, gender, elderly and children*. National Bureau of Statistics and Office of the Chief Government Statistician. Available online at: https://dhsprogram.com/pubs/pdf/FR321/FR321.pdf.

NBS and OCGS. (2022). *Tanzania demographic and health survey and malaria Indicator survey (TDHS-MIS) 2022. Ministry of Health, Tanzania*. National Bureau of Statistics and Office of the Chief Government Statistician. Available online at: https://dhsprogram.com/pubs/pdf/FR382/FR382.pdf.

Reardon, T., Liverpool-Tasie, L. S. O., Belton, B., Dolislager, M., Minten, B., Popkin, B., et al. (2024). African domestic supply booms in value chains of fruits, vegetables, and animal products fueled by spontaneous clusters of SMEs. *Appl. Econ. Perspect. Policy* 46, 390–413. doi: 10.1002/aepp.13436

Rokeach, M. (1973). The nature of human values. New York: Free Press.

Sauer, C. M., Reardon, T., Tschirley, D., Liverpool-Tasie, S., Awokuse, T., Alphonce, R., et al. (2021). Consumption of processed food & food away from home in big cities, small towns, and rural areas of Tanzania. *Agric. Econ.* 52, 749–770. doi: 10.1111/agec.12652

Shogren, J. F., List, J. A., and Hayes, D. J. (2000). Preference learning in consecutive experimental auctions. *Am. J. Agric. Econ.* 82, 1016–1021. doi: 10.1111/0002-9092.00099

The Citizen Reporter. (2022). *Study finds contaminated fruits, vegetables in Arusha*. The Citizen, 10 December. Available online at: https://www.thecitizen.co.tz/tanzania/news/business/study-finds-contaminated-fruits-vegetables-in-arusha-4050600.

Thurstone, L. L. (1927). A law of comparative judgment. *Psychological Review* 34, 273–286.

Tschirley, D., Reardon, T., Dolislager, M., and Snyder, J. (2015). The rise of a middle class in east and southern Africa: implications for food system transformation. *J. Int. Dev.* 27, 628–646. doi: 10.1002/jid.3107

Wang, X., Pacho, F., Liu, J., and Kajungiro, R. (2019). Factors influencing organic food purchase intention in developing countries and the moderating role of knowledge. *Sustainability* 11:209. doi: 10.3390/su11010209

Wenaty, A., and Mkojera, B. (2024). Organophosphorus pesticide residues in tomatoes: a case of Mlali and Doma wards in Mvomero District, Morogoro. *Tanzan. J. Agric. Sci.* 23, 75–83.

World Bank Group. (2023). *Promoting green urban development in African cities: Dar Es Salaam, Tanzania - urban environmental profile*. Washington, DC: World Bank Group. Available online at: http://documents.worldbank.org/curated/en/947211495223709379.

World Food Programme. (2022). *Reporting status on malnutrition in Tanzania. World food Programme*. World Food Programme. Available online at: https://www.wfp.org/.

World Health Organization. (2018). Cholera outbreak response in the United Republic of Tanzania –WHO Regional Office for Africa. World Health Organization. Available at: https://www.who.int/emergencies/disease-outbreak-news/item/12-january-2018-cholera-tanzania-en

Yahaya, I., Yamoah, F. A., and Adams, F. (2015). Consumer motivation and willingness to pay for "safer" vegetables in Ghana. *Br. Food J.* 117, 1043–1065. doi: 10.1108/BFJ-10-2013-0296

Yang, S. H., Panjaitan, B. P., Ujiie, K., Wann, J. W., and Chen, D. (2021). Comparison of food values for consumers' preferences on imported fruits and vegetables within Japan, Taiwan, and Indonesia. *Food Quality and Preference*, 87, 104042.