

How does food safety influence food choice in LMICs? Evidence from the Drivers of Food Choice Program

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Street markets in Hanoi, Vietnam.



Makola market, Accra (taken by Mark Green, a member of the project team, who claims no rights on the photograph).

Introduction

Global commitment to ensuring access to and consumption of sustainable healthy diets for all is growing. Ensuring food safety is central to the success of achieving these goals. Shifting food systems and food environments in low- and middle-income countries (LMICs) caused by globalization, urbanization, new technologies, and climate change have lengthened supply chains and altered the production, distribution, and consumption of foods and beverages in ways that increase the risk of foodborne disease transmission.¹ This risk is especially a concern with fruits, vegetables, and animal-source foods due to increased and sometimes inappropriate use of agrochemicals and unhygienic food handling practices.²⁻⁵ Causes of foodborne disease include bacteria, viruses, protozoa, helminths (worms), parasites, fungus, and chemicals that include pesticides and substances used to adulterate certain foods, such as melamine in milk.² Foodborne illnesses are a major cause of diarrheal diseases that can be acute and lead to chronic conditions like micronutrient deficiencies, stunting, and wasting. Additionally, consumption of food contaminated with some harmful fungi or chemicals is associated with development of some cancers.^{6,7} The burdens of foodborne disease are highest in Africa and Southeast Asia, comparable to those of malaria, HIV/AIDS, and tuberculosis.⁴

In LMICs, the complex market structure is comprised of modern retail outlets and traditional food markets, which include informal markets and formal wet markets. Modern food retail outlets in LMICs are developed with the promise of increased safety due to regulations regarding safe food growing, handling, and storage practices, yet food sources that people access in LMICs remain largely traditional, informal, and diverse, and support dietary diversity among the poor.^{8,9} Due to living and environmental conditions, however, these settings are also the primary contexts in which foodborne diseases occur.^{4,10} Contamination may occur at one or more points along the supply chain between production and preparation at the household level.¹¹ Government capacities for regulatory oversight are limited in both formal and informal supply chains, a challenge that is exacerbated as supply chains become lengthier and more complex.¹¹



Semi/Informal vendors also sell locally and nationally packaged and prepared snacks such as chips, savory crackers, jams, popcorn, bread, and sauces. These types of food are sold mostly sold by men in Dar es Salaam.

Whereas there has been substantial research on supply-side drivers of food safety risk and mitigation efforts, there is limited research on consumers' experiences and perspectives regarding food safety and their influence on food choice behaviors and healthiness of diets in LMICs.^{10,12-15} To continue progress in addressing the myriad food safety concerns in LMICs, researchers have begun to widen their focus from predominantly supply-side, top-down regulatory strategies to explore opportunities and challenges of activating and harnessing consumer demand to increase food safety.¹⁶⁻¹⁸ Consumer demand may be a powerful incentive for supply chain actors to adopt safer production, processing, and handling practices where supply-side interventions have fallen short.^{10,19-21} Understanding why individuals make choices in the context of perceived food safety risks is critical to developing and sharing insights with policymakers. Communication efforts must effectively engage consumers' knowledge, experiences, needs, preferences, and attitudes to influence key food choice behaviors (i.e., acquisition, preparation, and allocation) and to inform efforts to incentivize supply-side actors to provide safer foods.

The Drivers of Food Choice portfolio includes six projects that offer insights on why individuals make choices about food based on experiences and perspectives on food safety across varied LMIC settings.²²⁻²⁶ We summarize these findings below (Table 1):

Table 1. Conditions and characteristics that influence perspectives on food safety

		N	Influence on perspectives on food safety
Conditions and characteristics that contribute to perspectives on safety	Good food hygiene practices	4	Food hygiene where food is made or purchased influences decisions about where to eat: vendor's personal appearance of cleanliness, clean water and food preparation and storage practices and materials
	Positive relationships or experiences with vendors	5	Trust that food vendors with whom consumers have established relationships and who are visibly clean will source safe and fresh foods <ul style="list-style-type: none"> Concerns about agrochemicals and sewage Consumers feel they know where their food is coming from <ul style="list-style-type: none"> Visual inspection and daily shopping with trusted vendors used to ensure freshness of purchased foods Perceived safety from need for vendor to maintain reputation
	Meals prepared at home	4	Meals prepared at home can be made to the consumer's preference, with quality ingredients and hygiene practices, and decreased risk of adulteration or contamination
	Policies and regulations	4	<ul style="list-style-type: none"> Concerns about agrochemicals support the use of modernized retail outlets that offer heightened perceptions of food safety Consumers believe that government can ensure safety through safety regulations and monitoring Food safety perceptions did not always translate into increased usage of formal markets. This may be due to the convenience of informal markets and lack of trust that supermarkets will offer better food safety
Conditions and characteristics that contribute to perceptions of a lack of safety	Adulteration and contamination	6	<p>Vendor mistrust is based on:</p> <ul style="list-style-type: none"> Concerns about potential adulteration of products (milk, produce, prepared foods). Leaving food uncovered (flies, etc.) Selling food in plastic bags Selling food that is expired or stale Unsafe agricultural practices/growing conditions for food sold in informal markets/food vendors: concerns about agrochemicals and sewage <p>Supermarket mistrust is based on:</p> <ul style="list-style-type: none"> Relabeling of packaged foods and sell-by dates for produce Selling vegetables sourced from traditional markets
	Environmental sanitation	2	Unhygienic appearance of external environment surrounding outlet (e.g., litter) increased concerns about food hygiene and vendor mistrust

Note: N = number of DFC projects that reported a condition or characteristic as important in influencing perspectives on food safety

Perspectives on what makes food safe

Good food hygiene practices

Projects across rural, urban, and peri-urban settings in Ghana, Guinea, Kenya, and Tanzania described the positive influence of good food hygiene on consumers' perceptions of food safety. In the urban cities of Accra and Ho in Ghana, adolescent girls and women described the importance of food hygiene practices on their decision-making about where to eat. These indicators of good food hygiene included the visible cleanliness of food vendors (including hand washing practices and wearing of gloves and/or hair nets), food preparation methods (cleaning the food before cooking or using clean water to prepare meals), and covering the food to avoid contamination once it has been cooked and is ready to be sold. Study participants from artisanal mining communities in rural Guinea considered street foods or food prepared outside the home as unhealthy, most likely from a perception of lack of cleanliness. While mothers identified the visible cleanliness of vendors as a key factor in choosing where to purchase foods, fewer than half of vendors named their personal appearance and handwashing to be important in their strategies to attract customers through signaling good food hygiene. Consumers in peri-urban Tanzania and Kenya also considered the observable cleanliness of vendors as indicators of good food hygiene, citing the example of butchers wearing clothes without visible blood stains or sweat and selling of animal-source foods on clean surfaces free from flies.

Positive relationships with vendors

Consumers in urban Ghana and Vietnam and peri-urban Tanzania and Kenya described trusting vendors with whom they had long and established relationships to source and prepare food safely. In Tanzania, consumers felt that they reduced their risk of consuming unsafe foods by purchasing only from trusted vendors. Consumers in urban Vietnam and Ghana and peri-urban Kenya felt that relationships with vendors in the traditional markets conferred a sense of safety based on "knowing where the food comes from." In Vietnam, lacking trust in formal food safety claims, women demonstrated a suite of traditional practices to create their own alternative, food safety mitigation strategies based on visual inspections and personal relations (e.g., trust formed through intimate interactions with their local market vendors), although without evidence of effectiveness. Informal neighborhood vending was also affected by a social community rebound effect. Many people in the neighborhood purchase food from the same source and illness in a customer would adversely affect the vendor's business through damaged trust with other consumers.

Meals prepared at home

Preparing meals at home was noted by consumers from Guinea, Ghana, Vietnam, and Tanzania to be the best way to ensure that food is safe. In rural Guinea, artisanal miners tended to describe "healthy" foods as clean foods, including with reference to those cooked at home, rather than considering health in terms of nutrition. Urban poor consumers in Ghana considered meals cooked outside the home much more likely to be prepared unhygienically, potentially with poor handwashing practices, washing food

in unclean water or not at all, and not covering prepared food to protect from flies. As a result, these consumers preferred homecooked meals where quality of ingredients could be ensured and safe and hygienic preparation practiced. Like the Guinean miners, the Ghanaian consumers considered homecooked meals to be healthier based on cleanliness. In peri-urban Tanzania, people living with HIV and their caregivers attributed diarrhea and other digestive issues to experiences with eating locally produced juices, snack foods, and takeout meals. In cases where health issues were of concern, some of the consumers emphasized preparing their own food, including washing vegetables to reduce potential contamination from chemicals and sewage as a strategy to avoid illness.

Policies and regulations

Modern retail outlets, such as supermarkets and convenience stores, have been promoted in urban Vietnam and supported through policies that aim to substitute these for traditional markets. These policies are grounded in concerns about pesticides and other agrochemicals in fresh fruits and vegetables and the ability of the modernized retail outlets to make guarantees about food safety that traditional markets cannot make. Nevertheless, supermarkets, promoted as safe alternatives, were not frequently utilized because (1) supermarkets were not fully trusted to offer better food safety than traditional markets, (2) fresh foods needed to be purchased daily (supermarket shopping was less frequent), and (3) traditional shopping practices were considered more convenient. With food safety viewed as not guaranteed via supermarkets, the practice of shopping for fresh foods daily was considered the best way to mitigate food safety and meet nutritional needs. The perceived freshness of the foods was an additional aspect of food quality that drove consumers towards continued shopping at traditional markets.

The majority of women studied among the urban poor in Accra, Ghana felt that the local government has a duty to enforce regulations around sanitation and hygiene practices of food vendors, including licensing those food outlets that are clean and shutting down those that do not meet licensing standards. In rural Guinea, local government mining stakeholders mentioned that there was essentially no local enforcement of quality control and inspection of foods, leading to the selling of expired or poor-quality packaged foods; these specific concerns were not echoed by the main study participants (miners), but miners did note that the overall quality of food available to them was worse than could be found in main cities. Consumers in peri-urban Kenya considered meats purchased from butcher shops to be safer than from abattoirs, partially due to the presence of inspection officers. On the other hand, they recognized that many of the animal-source foods to which they had access did not go through formal safety and quality checks, and as such, were fearful of their potential contamination. These consumers, like those in Accra, wished for government to take more action to protect them and ensure safety of their food.

Perspectives on what makes food unsafe

Adulteration and contamination

Consumers in peri-urban Tanzania cited concerns about chemicals and pesticides on vegetables as well as contamination from sewage in areas where produce is grown. They described additional specific foods as potentially contaminated by chemicals, such as commercial chickens and locally prepared juices and the need to avoid these unsafe foods. Consumers from rural South India also noted changes in their patterns of consumption of fruits and vegetables due to perceived poor taste and lack of nutrients, attributed to pesticides used in growing the produce sold by mobile vendors, and associated with a fear of developing cancer due to ingestion of these pesticides. Consumers in Ghana, Guinea, and Kenya all noted the potential contamination from foods that vendors do not cover to protect from flies. Ghanaian and Kenyan consumers also described the fear of products adulterated by vendors, either by adding substances to change the taste or appearance of the food, or specifically by chemicals added to milk to prolong shelf-life, produce or prepared vegetables. Ghanaian consumers and Guinean local government stakeholders also noted concerns about vendors selling foods that were expired, rotten, or stale. In Kenya, consumers noted concerns specifically about the safety of food processing specifically in relation to animal-source foods. In Vietnam, consumers described mistrust in supermarket claims of food safety due to recent public exposure of expired food relabeling practices and reselling of produce from informal markets.

Environmental sanitation

The physical environment around the shop was highlighted as a major factor by consumers in Guinea and Ghana. Consumers highlighted the cleanliness of the shop, the area where food is prepared, and the dishes used to prepare and serve food, as well as the presence of litter around the shop as evidence of the safety of food prepared by that vendor. Poor environmental sanitation was also evident in site observations undertaken in the Guinea study.



Vegetables are primarily sold via both semi/informal food vendors in peri-urban Dar es Salaam.

Sources of information that influence perspectives on food safety

Sources of information also influence perspectives on food safety and ultimately food choice. Evidence from peri-urban Kenya showed that the media can be important disseminators of information when food outbreaks occur, contributing to public knowledge and safety through televised and radio news reports. Rumors or false information were more often shared by word-of-mouth communication and at times through television and radio coverage of unverified information. Some peri-urban consumers from Tanzania also mentioned the influence of the radio in sharing information about food safety and of social networks sharing information via mobile phones. In these two settings, media disseminated both important public health messages and false information or rumors, demonstrating the power of media in influencing public perspectives on food safety.

Conclusions

Food was more likely to be considered safe if it was cooked at home or acquired from vendors who observed good hygiene practices and with whom consumers had positive relationships that acted to validate source and quality. Foods were considered to be unsafe when they were offered in physical environments with poor sanitation and when food vendors (traditional or modern) were suspected of adulterating or contaminating the foods or if consumers could not verify the source, especially of animal-source foods. Policies intended to enhance food safety may or may not be successful, depending on the policy instrument (e.g., promotion of modern markets, use of inspectors) and whether consumers have trust in the results of using those instruments. Consumers' perspectives about food safety derive from their own experiences and information reaching them through media and social networks.



Selling fresh meat at the market in Hanoi.



Street markets in Hanoi, Vietnam accommodating access to daily fresh foods in local neighbourhoods.

References

1. Jaffee, S., Henson, S., Unnevehr, L., Grace, D., Cassou, E. (2018). The Safe Food Imperative: Accelerating Progress in Low- and Middle-Income Countries [Internet]. The World Bank; 208 (Agriculture and Rural Development). doi.org/10.1596/978-1-4648-1345-0
2. Grace, D. (2015). Food Safety in Low- and Middle-Income Countries. *International Journal of Environmental Research and Public Health*, 12(9), 10490-10507. doi:10.3390/ijerph120910490
3. Grace, D. (2016) Influencing food environments for healthy diets through food safety. In: *Influencing food environments for healthy diets*. Rome: Food and Agriculture Organization.
4. Havelaar, A. H., Kirk, M. D., Torgerson, P. R., Gibb, H. J., Hald, T., Lake, R. J., . . . Devleesschauwer, (2015). World Health Organization Global Estimates and Regional Comparisons of the Burden of Foodborne Disease in 2010. *PLOS Medicine*, 12(12). doi:10.1371/journal.pmed.1001923
5. FAO and WHO. (2019). Sustainable Healthy Diets – Guiding Principles. Rome. <http://www.fao.org/3/ca6640en/ca6640en.pdf>
6. Liu, Y. and Wu, F. (2010). Global burden of aflatoxin-induced hepatocellular carcinoma: a risk assessment. *Environmental Health Perspectives*, 118(6), 818-824.
7. Oberoi, S., Barchowsky, A., Wu, F. (2014). The global burden of disease for skin, lung, and bladder cancer caused by arsenic in food. *Cancer Epidemiology Biomark Prev Publ Am Assoc Cancer Res Cosponsored Am Soc Prev Oncol*. 23(7), 1187–94.
8. Alonso, S., Muunda, E., Ahlberg, S., Blackmore, E., and Grace, D. (2018). Beyond food safety: Socio-economic effects of training informal dairy vendors in Kenya. *Global Food Security*, 18, 92. doi:10.1016/j.gfs.2018.08.006
9. Wertheim-Heck, S., Raneri, J. E., and Oosterveer, P. (2019). Food safety and nutrition for low-income urbanites: Exploring a social justice dilemma in consumption policy. *Environment and Urbanization*, 31(2), 397-420. doi:10.1177/0956247819858019
10. Ortega, D. L. and Tschirley, D. L. (2017). Demand for food safety in emerging and developing countries. *Journal of Agribusiness in Developing and Emerging Economies*, 7(1), 21-34. doi:10.1108/jadee-12-2014-0045
11. Hoffmann, V., Moser, C., and Saak, A. (2019). Food safety in low and middle-income countries: The evidence through an economic lens. *World Development*, 123, 104611. doi:10.1016/worlddev.2019.104611
12. Bardosh, S., Inthavong, P., Xayaheuang, S., and Okello, AL. (2014). Controlling parasites, understanding practices: The biosocial complexity of a One Health intervention for neglected zoonotic helminths in northern Lao PDR. *Social Science & Medicine*, 120, 215-223. doi.org/10.1016/j.socscimed.2014.09.030
13. Wertheim-Heck et al. (2014) Constrained consumer practices and food safety concerns in Hanoi. *International Journal of Consumer Studies*, 38(4), 326-336.
14. Wertheim-Heck et al., (2014) Food safety in everyday life: shopping for vegetables in a rural city in Vietnam. *Journal of Rural Studies*, 35, 37-48.
15. Wertheim-Heck, S., and Spaargaren (2016) Shifting configurations of shopping practices and food safety dynamics in Hanoi, Vietnam; a historical analysis. *Agriculture and Human Values*, 33, 655–671.

References

16. EATSafe: Evidence and Action Towards Safe, Nutritious Food Project Overview. (2020). Feed the Future: The U.S. Government's Global Hunger & Food Security Initiative.
17. EATSafe: Evidence and Action Towards Safe Nutritious Food [webinar].
<https://www.gainhealth.org/events/eatsafe-evidence-and-action-towards-safe-nutritious-food-webinar-1-food-safety-and-nutrition>
18. Bill & Melinda Gates Foundation Portfolio. (2020). <https://sif.gatesfoundation.org/portfolio/>.
19. Roesel, K. and Grace, D. (2014). Food safety and informal markets: Animal products in sub-Saharan Africa. London, UK: Routledge.
20. Havelaar, A. (2019, June 7). Why food safety in Africa's informal markets must be driven by consumers. <https://safefoodfairfood.ilri.org/2019/06/07/why-food-safety-in-africas-informal-markets-must-be-driven-by-consumers/>
21. Grace, D., Dipeolu, M., and Alonso, S. (2019). Improving food safety in the informal sector: Nine years later. *Infection Ecology & Epidemiology*, 9(1), 1579613. doi:10.1080/20008686.2019.1579613
22. Zhang, L.X., Koroma, F., Fofana, M.L., Barry, A.O., Diallo, S., Songbono, J.L., Stokes-Walters, R., Klemm, R.D., Nordhagen, S., Winch, P.J. (2020) "Food Security in Artisanal Mining Communities: An Exploration of Rural Markets in Northern Guinea." *Foods*. 9(4):479. doi: 10.3390/foods9040479.
23. Wertheim-Heck, S.C.O. and Raneri, J.E. (2020). Food policy and unruliness of consumption: An intergenerational social practice approach to uncover transforming food consumption in modernizing Hanoi, Vietnam. *Global Food Security*, 26, 100418. doi.org/10.1016/j.gfs.2020.100418, *in press*.
24. Surendran, S., Selvaraj, K., Turner, C., Addanki, S., Kannuri, N.K., Debbarma, A., Kadiyala, S., Kinra, S., Walls, H. (2020). "Characterising the fruit and vegetable environment of peri-urban Hyderabad, India." *Global Food Security*. 24:100343. doi:10.1016/j.gfs.2019.100343.
25. Patil, C., Ambikapathi, R., Gunaratna, N., Killewo, J., Leyna, G., Sando, M., Shemdoe, A., Mosha, D., Boncyk, M., Froese, S., Edwards, C., Mangara, A., Nyamsangia, S., Kazonda, P., Lackings, B., & Fawzi, W. (2020, July 30). "I have doubts": Adult perspectives on food safety in peri-urban Tanzania [Oral presentation]. 5th Agriculture, Nutrition & Health (ANH) Academy Week, virtual.
26. Dominguez-Salas, P., Bukachi, S., Ngutu, M., Muthiru, S., Kadiyala, S., & Lepine, A. (2019, June 24). Drivers of demand for animal-source foods in low-income informal settlements in Nairobi, Kenya [Poster presentation]. 4th Agriculture, Nutrition & Health (ANH) Academy Week, Hyderabad, India.

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