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Ensuring Freshness and Safety: Unveiling the Secrets of Food Handlers' Knowledge and Practices in Zambia's Traditional Markets

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Short Report

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Abstract

Background

Foodborne diseases remain a major public health challenge in low- and middle-income countries, particularly in informal food markets where regulatory oversight and infrastructure are often limited. Food handlers play a central role in ensuring food safety through their knowledge, attitudes, and practices.

Methods

A qualitative case study was conducted at Masala Market in Ndola, Zambia. Data were collected through in-depth interviews and key informant interviews with food handlers (n = 14), health inspectors (n = 3), and customers (n = 3). The interviews were audio-recorded, transcribed, and translated where necessary. The data were then analysed thematically using NVivo version 12. This study aimed to explore the perspectives of various stakeholders regarding food safety and hygiene practices at the marketplace, providing valuable insights into the challenges and opportunities faced in improving food safety standards.

Results

Five major themes emerged: awareness of basic food safety principles; a gap between knowledge and actual practices; attitudes toward food safety training; environmental and structural barriers to safe food handling; and weak regulatory enforcement and institutional support. Although most food handlers demonstrated a general awareness of food hygiene and safety, limited access to clean water, inadequate storage facilities, time constraints, economic pressures, and insufficient training hindered the consistent implementation of safe food handling practices.

Conclusion

Food safety knowledge alone is insufficient to ensure safe food handling practices in informal market settings. Behavioural adoption is strongly influenced by environmental, social, and institutional factors. Strengthening food safety training, improving market infrastructure, and enhancing regulatory support are critical to improving food safety in traditional markets.

Background

Food safety is a global public health concern due to the substantial burden of foodborne diseases caused by microbial, chemical, and physical contaminants [1]. Food provides a conducive environment for microbial growth and may become contaminated at multiple stages of production, handling, storage,

and preparation through exposure to water, air, equipment, pests, and human contact [2]. Globally, foodborne diseases are responsible for an estimated 600 million illnesses and 420,000 deaths annually, with low- and middle-income countries bearing a disproportionate share of this burden [1].

Food handlers play a pivotal role in preventing food contamination by adhering to hygienic practices, safe food-handling procedures, and appropriate storage and preparation techniques. Evidence consistently demonstrates that inadequate food safety knowledge, negative attitudes, and unsafe practices among food handlers are strongly associated with foodborne disease outbreaks [3, 4]. Common food handling errors documented in the literature include improper cooking and reheating, cross-contamination between raw and cooked foods, poor personal hygiene, unsafe food storage, and prolonged holding of cooked foods at inappropriate temperatures [5, 6].

In Sub-Saharan Africa, informal food markets and street food vending are widespread and provide affordable food and livelihood opportunities for large segments of the population [7]. However, food safety management systems in these settings are frequently weak, fragmented, or inadequately enforced, increasing the risk of food contamination and foodborne disease transmission [7]. In Zambia, the demand for ready-to-eat food sold in markets continues to rise despite limited regulatory capacity, inadequate infrastructure, and the absence of a comprehensive, standalone national food safety policy, particularly for informal food systems (Sambo, 2015; Phiri et al., 2021).

Most existing studies on food safety in Zambia and comparable low- and middle-income country settings have relied predominantly on quantitative survey designs, which are useful for measuring levels of knowledge and practices but offer limited insight into the contextual, behavioural, and structural factors shaping food safety practices in informal markets [3, 4]. As informal market environments are shaped by complex social, economic, and infrastructural conditions, there is a need for qualitative approaches that capture the lived experiences and realities of food handlers and other stakeholders [8]. Guided by the Knowledge-Attitude-Practice (KAP) framework and behaviour change theories, this qualitative study aimed to explore the factors influencing food safety knowledge, attitudes, and practices among food handlers at Masala Market in Ndola, Zambia. By generating in-depth, context-specific evidence from food handlers, health inspectors, and consumers, the study seeks to address existing knowledge gaps and provide a stronger empirical basis for designing practical, market-appropriate public health interventions to improve food safety in informal food systems.

Methods

Study design

This study utilised a qualitative case study approach to investigate food safety knowledge, attitudes, and practices within the vibrant context of a traditional market [9]. A qualitative methodology was chosen for its ability to facilitate an in-depth exploration of participants' perceptions and experiences, particularly in

complex and resource-constrained environments. This approach allows us to unpack the nuanced realities surrounding food safety practices, as emphasised by researchers such as [10].

By employing a case study design, we were able to gather insights from a diverse range of perspectives, including food handlers, health inspectors, and consumers, all within a single, bounded setting. This comprehensive approach enriches our understanding of food safety challenges in informal market environments, aligning with the principles outlined by [11]. Through this study, we aim to contribute valuable knowledge to inform improved food safety practices in traditional markets.

Study setting

This study was conducted at Masala Market, the largest traditional market located in the Ndola District, Copperbelt Province of Zambia [12]. As the provincial capital, Ndola plays a crucial role as a hub for industrial, commercial, and transportation activities in the region. Masala Market is positioned about two kilometres south of the central business district and serves as a vital centre for the trading, preparation, and consumption of food.

The market is home to a multitude of small-scale food enterprises, including vendors selling cooked meals, meat processing stalls, and traders offering fresh produce. This diverse array of food establishments caters to a large and varied population of consumers daily.

Given its informal structure, the high volume of food-handling activities, and limited infrastructure, including inadequate sanitation facilities and poor waste management systems, Masala Market is an important context for exploring food safety practices. Informal markets like this one are widely recognised as high-risk environments for foodborne diseases, particularly in low- and middle-income countries [13]. This study aims to shed light on prevailing food safety practices in this setting, offering valuable insights into the public health challenges faced by such markets.

Study population and sampling

The study focused on study participants who were directly involved in food handling, regulation, or consumption within Masala Market. A total of 20 participants were intentionally selected for their ability to provide valuable insights into food safety practices in this setting. The sample consisted of food handlers from registered small-scale food establishments (n = 14), health inspectors from Ndola City Council who oversee food safety inspections and enforcement (n = 3), and customers who regularly purchased and consumed ready-to-eat food from the market (n = 3).

Purposive sampling was employed to ensure that participants possessed firsthand knowledge and experience related to food safety practices in the market context [14]. This strategy is often recommended in qualitative research to enhance the depth of information gathered, rather than focusing solely on statistical representation [15]. Participants were accessed through local community centres,

market associations, and outreach efforts within the community, ensuring a diverse range of perspectives. To qualify for participation, individuals were required to be aged 18 years or older and to have lived in the community or interacted with the market for at least six months before the study. This criterion was established to ensure that they were adequately familiar with the market's operations and the routine food handling practices, thereby enriching the data collected.

Data collection procedure, methods, and tools

The data collection for this study involved a comprehensive approach that utilised semi-structured in-depth interviews as well as key informant interviews. This method was carefully chosen due to its effectiveness in uncovering the complexities of behaviours and perceptions surrounding food safety [16].

To guide these semi-structured interviews, tailored interview guides were developed, focusing on participants' knowledge, attitudes, and practices regarding food safety. We aimed to probe deeper into the perceived challenges that individuals face, as well as the enabling factors that could improve food safety standards in their environments. The interview guides were structured yet flexible, allowing for the exploration of emerging themes that participants may raise during the conversation.

Key informant interviews [17] were specifically conducted with health inspectors, whose insights were invaluable in illuminating regulatory practices, enforcement mechanisms, and the broader challenges related to food safety within the market. Engaging directly with those responsible for maintaining public health standards provided a holistic view of the systemic issues at play.

Interviews with health inspectors were conducted in English, ensuring clarity and precision in discussions regarding technical aspects of food safety regulations. Conversely, for interviews with food handlers and customers, Bemba, the predominant local language in the region, was utilised. This choice was instrumental in fostering a comfortable and trusting environment, which encouraged participants to communicate openly and share their experiences without the barrier of language-related biases [18].

Each interview was designed to last approximately 40 to 50 minutes, providing sufficient time to delve into topics thoroughly. With the consent of all participants, the interviews were audio-recorded to ensure accuracy in data capture and to allow for detailed subsequent analysis. Additionally, field notes were taken during and immediately after each interview to document contextual observations, non-verbal cues, and my initial analytical reflections. This practice aligns with recommendations in qualitative fieldwork, emphasising the importance of capturing the nuances of participant interactions [15]. This comprehensive approach to data collection not only enriched the qualitative data but also ensured that the voices of various stakeholders in the food safety domain were heard and valued.

Data analysis and management

In this study, all audio recordings from interviews were meticulously transcribed verbatim to ensure accuracy and fidelity to the participants' voices. For the interviews conducted in Bemba, translations into English were done with careful attention to context and nuance, recognising the importance of cultural subtleties that might affect interpretation.

The analysis of the data was performed thematically, utilising an inductive approach that was both systematic and iterative. This process involved several stages: becoming familiar with the data, generating initial codes, categorising those codes, and ultimately interpreting the findings. Following the guidelines established by [19]We read the transcripts multiple times. This immersion allowed us to develop a deep understanding of the material, laying the groundwork for effective coding.

To facilitate this complex process, we employed NVivo version 12, a qualitative data analysis software that aided in the management and organisation of the data. This tool supported our coding efforts, helping to visually map out connections and patterns that emerged during the analytical process. Importantly, data collection and analysis were conducted concurrently, a practice that enabled early insights to influence the direction of subsequent interviews. This iterative approach is consistent with best practices in qualitative inquiry, as highlighted by (Creswell et al., 2007).

Recruitment of participants was an ongoing process that continued until we reached thematic saturation. This critical point was defined as the moment when no new themes or substantial insights emerged from the interviews, indicating that we had gathered a comprehensive understanding of the topic of interest, as noted by [20]. By ensuring a rich, diverse sample and remaining responsive to the data, we were able to uncover layered insights that contribute meaningfully to our understanding of the subject matter.

Overall, this rigorous method of data analysis not only upholds the integrity of the research process but also enriches the findings, providing a comprehensive narrative that reflects the experiences and perspectives of participants. The commitment to thoroughness in both data collection and analysis underscores the importance of qualitative research in capturing the complexity of human experiences.

Trustworthiness

Several strategies were employed to enhance the trustworthiness of the study. Credibility was strengthened through triangulation of data sources by incorporating perspectives from food handlers, health inspectors, and consumers [21]. This multifaceted approach allowed for a comprehensive understanding of the various viewpoints and motivations influencing food safety practices across the supply chain, ultimately providing a richer and more nuanced interpretation of the findings. Furthermore, member checking was utilised, allowing participants to review and confirm their responses for accuracy, thus reinforcing the credibility of the data collected.

Dependability was ensured using standardised interview guides and consistent data collection procedures, which facilitated systematic and reproducible data gathering. Regular team meetings were

held to discuss the data collection process and address any inconsistencies immediately, ensuring that the research design and implementation remained aligned with the study's objectives. Additionally, the use of peer debriefing sessions allowed for external perspectives to identify potential biases and enhance the researcher's reflexivity throughout the investigation.

Confirmability was achieved by grounding findings in verbatim participant quotations and maintaining an audit trail of analytic decisions. This transparency allows readers to follow the analytical process and verify how interpretations were derived from the data. The incorporation of diverse participant voices through rich narrative descriptions also helped to illustrate the complexities of their experiences while maintaining a clear connection to the research questions.

Transferability was supported through thick descriptions of the study context, participant characteristics, and market setting. By providing detailed information about the socio-cultural environment, including local food safety regulations, community practices, and demographic information of the participants, readers are better equipped to assess the applicability of the findings to similar contexts [22]. Comparative analysis with existing literature on food safety practices in various cultural settings also enhances the transferability of this study, allowing for broader implications to be drawn and potentially informing policy and practice in diverse environments.

Overall, these combined strategies contribute to a robust framework for establishing the trustworthiness of the study [23], facilitating a more impactful connection between research findings and real-world applications in food safety management.

Ethical considerations

Ethical approval was obtained from the Lusaka Apex Medical University Biomedical Research Ethics Committee (LAMUBREC) and the Zambian National Health Research Authority (NHRA). Permission to conduct the study was also obtained from relevant local authorities acting as gatekeepers to the market. All participants were informed about the purpose of the study, the voluntary nature of participation, and their right to withdraw at any time without consequence. Written and verbal informed consent were obtained before participation. Confidentiality was ensured using pseudonyms, and all data were securely stored and accessible only to the research team, in accordance with established ethical principles for research involving human participants [24].

Results

Participant characteristics

Twenty participants were included: food handlers (n = 14), health inspectors from Ndola City Council (n = 3), and regular customers at Masala Market (n = 3). Participants were aged 25–65 years, with most food handlers being female and having completed secondary education. All participants had at least two

years of sustained interaction with Masala Market, either as vendors, inspectors, or consumers, supporting the credibility of accounts related to routine food handling practices. Inspector and customer perspectives were used for contextual verification of vendors' self-reported practices. Thematic analysis yielded five interrelated themes describing food safety knowledge, attitudes, and practices among food handlers at Masala Market. These themes are explicitly mapped to the research questions in Table 1, further illustrating the findings of the study.

Table 1
Explicit summary of themes to research questions

Research question	Corresponding theme(s)	How the theme addresses the RQ
RQ1: What food safety knowledge do food handlers possess?	Awareness of basic food safety principles	Demonstrates general conceptual knowledge focused on cleanliness and health protection, but has limited procedural understanding
RQ2: What attitudes influence food safety behaviour?	Attitudes toward food safety learning	Shows preference for informal, experience-based learning and ambivalence toward structured learning
RQ3: What food safety practices are applied in daily operations?	Knowledge-practice disconnect	Documents the inconsistent implementation of safe practices despite awareness
RQ4: What factors influence food safety practices in informal markets?	Environmental and structural barriers; Weak regulatory enforcement	Identifies individual (financial), structural (infrastructure), and institutional (enforcement) factors shaping behaviour

Awareness of basic food safety principles

Food handlers, customers, and health inspectors consistently described food safety in terms of cleanliness, adequate cooking, and protection of consumer health.

"Food safety is important because if it is contaminated, it becomes a danger to a person's health."(Customer, C2)

Health inspectors noted that hygiene awareness among vendors had improved following routine sensitisation activities.

"We raise awareness on food safety, especially hygiene and how food should be cooked and handled." (Health Inspector, KII 1)

However, awareness was largely conceptual rather than procedural. Participants rarely articulated specific practices such as temperature control, food separation, or contamination pathways, suggesting a limited operational understanding of food safety.

Knowledge-practice disconnect in food handling

Despite general awareness, participants described a persistent gap between food safety knowledge and everyday practice. Food handlers emphasised that adherence to recommended practices was often constrained by their working conditions.

“Sometimes there is no soap, but we still wash our hands with water only.”(Food Handler, FH1)

Health inspectors similarly observed that unsafe practices persisted even when vendors appeared knowledgeable.

“They know what they should do, but the conditions do not always allow them to do it properly.”(Health Inspector, KII 2)

Customers reported uncertainty about food preparation conditions, reinforcing concerns about inconsistent practice.

“You just hope the food was handled properly, but sometimes you are not sure.”(Customer, C1)

These accounts indicate that non-compliance was driven more by contextual limitations than by lack of awareness.

Attitudes toward food safety learning

Attitudes toward acquiring food safety information varied across participants. Health inspectors perceived low engagement with organised learning activities, often attributing this to vendors’ concerns about lost trading time.

“People don’t want to attend because they think it will waste time and reduce business.”(Health Inspector, KII 1)

Food handlers described learning as informal and experiential, shaped by customer feedback and peer observation.

“We learn through customers complaining or telling us what they want.”(Food Handler, FH4)

This reliance on informal learning pathways contributed to uneven application of food safety practices across vendors.

Environmental and structural barriers to safe practice

Constraints to safe food handling occurred at multiple levels. At the individual level, food handlers cited limited capital as a barrier to purchasing equipment such as refrigerators, covered containers, or protective clothing.

“They lack storage facilities because they do not have enough capital.”(Health Inspector, KII 1)

At the structural level, market conditions, including inadequate access to clean water, poor waste management, pest infestation, and the absence of communal storage infrastructure, were described as persistent challenges.

“Even if you want to do things properly, the place itself is not suitable.” (Food Handler, FH7)

Customers associated these visible environmental conditions with heightened food safety risk, aligning with concerns raised by vendors and inspectors.

Weak regulatory enforcement and institutional support

Participants across groups perceived regulatory oversight as inconsistent. Health inspections were described as irregular, with limited follow-up and variable consequences for non-compliance.

“Our offices are open, and we provide sensitisation, but people rarely come.”(Health Inspector, KII 3)

Food handlers reported that infrequent monitoring reduced sustained adherence to safe practices, while customers expressed diminished confidence in food safety assurance mechanisms.

“Sometimes you are not sure how the food was prepared.” (Customer, C1)

These perspectives suggest that limited institutional presence within the market environment contributed to the persistence of unsafe practices.

Discussion

This study aimed to explore (1) food safety knowledge, (2) attitudes toward food safety, (3) food handling practices, and (4) contextual factors influencing these practices among food handlers operating at Masala Market, an informal urban market in Zambia. The findings demonstrate that food safety behaviour in this context is shaped by a complex interaction between individual awareness, livelihood pressures, environmental conditions, and institutional governance.

Food safety knowledge among food handlers

The findings indicate that most food handlers possessed a general awareness of food safety principles, particularly hygiene, cleanliness, and prevention of illness. This aligns with studies from informal markets in Namibia, Ghana, and South Africa, where vendors frequently demonstrate conceptual knowledge of food safety despite limited formal training [25]. However, as observed in this study, such awareness rarely translates into procedural or technical understanding. Similar research across sub-Saharan Africa reports that vendors often lack operational knowledge related to temperature control, cross-contamination, and safe storage, despite acknowledging the importance of hygiene [26].

These findings suggest that food safety knowledge in informal markets is often normative rather than technical, reflecting shared social expectations rather than standardised food handling competencies.

Attitudes toward food safety and learning

Attitudes toward food safety learning were strongly shaped by livelihood realities. Food handlers viewed time spent away from trading as a threat to income, resulting in limited engagement with structured learning opportunities. Instead, knowledge acquisition occurred informally through experience, peer observation, and customer feedback. This pattern mirrors findings from informal markets across Africa, where economic precarity encourages experiential learning over formal instruction [7, 13].

Importantly, these attitudes did not reflect resistance to food safety itself, but rather to learning formats perceived as poorly aligned with informal work conditions. Similar conclusions have been drawn in studies from Nigeria and South Africa, where vendors prioritised practices that sustained daily income over long-term risk reduction [27, 28]. These findings underscore the need to interpret attitudes within the broader context of informal employment and economic survival.

Food safety practices and the knowledge-practice gap

A central finding of this study is the persistent disconnect between food safety knowledge and daily practice. Food handlers did not describe unsafe practices as intentional; rather, they attributed non-compliance to material constraints such as lack of soap, clean water, refrigeration, and appropriate storage. This knowledge-practice gap has been extensively documented in African informal food systems, where awareness alone rarely predicts safe practices [29, 30].

Health inspectors' observations and customers' concerns in this study reinforced vendors' accounts, strengthening the credibility of these findings. Comparable multi-stakeholder studies across six African and Asian countries show that consumers frequently rely on trust and familiarity to navigate food safety uncertainty, compensating for weak institutional assurance [31]. Taken together, the findings suggest that food safety practices in informal markets are constrained less by attitudinal deficits and more by the feasibility of implementation.

Individual, structural, and institutional influences on food safety

This study identifies barriers to food safety at three interrelated levels. At the individual level, limited financial capacity reduced vendors' ability to invest in refrigeration, protective clothing, and covered storage. At the structural level, inadequate market infrastructure, including water access, waste management, and pest control, restricted safe practice regardless of individual intent. These conditions are consistent with evidence from informal markets across East, West, and Southern Africa [7, 32].

At the institutional level, weak and inconsistent regulatory enforcement further undermined food safety compliance. Participants described irregular inspections and limited follow-up, a pattern widely reported in African food systems where regulatory frameworks are often ill-suited to informal contexts [7]. Studies across sub-Saharan Africa have shown that conventional enforcement models frequently fail in informal markets due to capacity constraints and misalignment with vendors' realities [27].

Together, these findings support calls for context-responsive approaches to food safety that recognise informal markets as integral, not peripheral, components of urban food systems.

Limitations and reflexivity

This study has several limitations. First, the number of customers and health inspectors was small, which may limit the breadth of perspectives captured from these groups. However, their inclusion strengthened triangulation and enhanced the interpretation of food handlers' accounts. Second, the study focused on a single informal market; thus, findings may not be statistically generalisable to all informal markets in Zambia or the region. Nevertheless, the depth of qualitative insight provides analytic generalisability to similar informal urban settings.

From a reflexive perspective, the researcher acknowledges that engagement with food handlers and health inspectors may have been influenced by existing power dynamics, particularly given inspectors' regulatory roles. Efforts were made to minimise this through assurances of confidentiality and by treating inspectors' accounts as contextual rather than authoritative. The researcher's background in public health also shaped the interpretive lens of the analysis; reflexive memoing and peer debriefing were used to enhance analytical transparency and reduce bias.

Conclusion

This study demonstrates that food safety in Masala Market is shaped by the interaction of knowledge, attitudes, structural constraints, and institutional conditions. While food handlers possess basic awareness of food safety, consistent safe practice is constrained by infrastructural inadequacies, economic precarity, and weak regulatory engagement. These findings reinforce regional evidence that improving food safety in informal markets requires systemic, context-sensitive strategies that extend beyond individual behaviour change.

Declarations

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Author contributions

JM conceptualised and designed the study. Data collection and analysis were carried out by JM along with co-authors. KC, LH, and AMH provided supervision and critical review of the manuscript. All authors

have read and approved the final version of the manuscript.

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Competing interests

The authors declare that they have no competing interests regarding the publication of this study.

Ethics approval and consent to participate

Ethical approval for the study was granted by the Lusaka Apex Medical University Biomedical Research Ethics Committee (LAMUBREC) and the National Health Research Authority (NHRA). Written and verbal informed consent was obtained from all participants before their inclusion in the study.

Consent for publication

Written consent for publication was obtained from all participants involved in the study, where applicable.

Availability of data and materials

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

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References

1. Havelaar AH, et al. World Health Organisation global estimates and regional comparisons of the burden of foodborne disease in 2010. PLoS Med. 2015;12(12):e1001923.
2. Murray CJ, et al. Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. Lancet. 2022;399(10325):629–55.
3. Lema K et al. Food hygiene practice and its determinants among food handlers at University of Gondar, Northwest Ethiopia, 2019. International journal of general medicine, 2020: pp. 1129–1137.
4. Teffo LA, Tabit FT. An assessment of the food safety knowledge and attitudes of food handlers in hospitals. BMC Public Health. 2020;20(1):311.
5. Akabanda F, Hlortsi EH, Owusu-Kwarteng J. Food safety knowledge, attitudes and practices of institutional food-handlers in Ghana. BMC Public Health. 2017;17(1):40.

6. Li S, et al. Recent advances in the application of metabolomics for food safety control and food quality analyses. Crit Rev Food Sci Nutr. 2021;61(9):1448–69.
7. Cook B, Trevenen-Jones A, Sivasubramanian B. Nutritional, economic, social, and governance implications of traditional food markets for vulnerable populations in sub-Saharan Africa: a systematic narrative review. Front Sustainable Food Syst. 2024;8:1382383.
8. Tenywa PI. Making Sense of Food Safety and Food Waste: Lived Experiences in Food Catering Using Systems Thinking. 2023.
9. Creswell JW, Fetters MD, Ivankova NV. Designing a mixed methods study in primary care. Annals Family Med. 2004;2(1):7–12.
10. Sudershan R, et al. Food safety-related perceptions and practices of mothers. A case study in Hyderabad, India. Food Control. 2008;19(5):506–13.
11. Yu JC, Wu YJZ, Shin WS. From waste to value: Integrating legume byproducts into sustainable industrialisation. Compr Rev Food Sci Food Saf. 2025;24(3):e70174.
12. Cafer A, et al. Commercialising traditional market shares: A qualitative study of impacted peasant livelihoods in Copperbelt province. Zambia Dev South Afr. 2023;40(3):525–40.
13. Grace D. Burden of foodborne disease in low-income and middle-income countries and opportunities for scaling food safety interventions. Food Secur. 2023;15(6):1475–88.
14. Campbell S, et al. Purposive sampling: complex or simple? Research case examples. J Res Nurs. 2020;25(8):652–61.
15. Creswell JW, Creswell JD. Research design: Qualitative, quantitative, and mixed methods approaches. Sage; 2017.
16. Rhodes R. The Perceived Role of School Counsellors in RAMP and Non-RAMP Schools. 2023.
17. Kumar K. Conducting key informant interviews in developing countries. Washington DC: Agency for International Development; 1989.
18. Cypress B. Qualitative research methods: A phenomenological focus. Dimens Crit Care Nurs. 2018;37(6):302–9.
19. Braun V, Clarke V. Using thematic analysis in psychology. Qualitative Res Psychol. 2006;3(2):77–101.
20. Guest G, Bunce A, Johnson L. How many interviews are enough? An experiment with data saturation and variability. Field methods. 2006;18(1):59–82.
21. Manning L. Triangulation: effective verification of food safety and quality management systems and associated organisational culture. Worldw Hospitality Tourism Themes. 2018;10(3):297–312.
22. Lincoln YS, Guba EG. Criteria for Assessing Naturalistic Inquiries as Reports. 1988.
23. Kallio H, et al. Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. J Adv Nurs. 2016;72(12):2954–65.
24. Childress JF, Meslin EM, Shapiro HT. Belmont revisited: Ethical principles for research with human subjects. Georgetown University Press; 2005.

25. Sheehama WL, Singh T. Food Safety in informal markets: How knowledge and attitudes influence vendor practices in Namibia. Int J Environ Res Public Health. 2025;22(4):631.
26. Chukwu OA, Adibe M. Quality assessment of cold chain storage facilities for regulatory and quality management compliance in a developing country context. Int J Health Plann Manag. 2022;37(2):930–43.
27. Sepadi MM, Nkosi V. Strengthening urban informal trading and improving the health of vendors: An integrated management model. Int J Environ Res Public Health. 2023;20(6):4836.
28. Wenndt A, et al. Food safety through the eyes of rural market vendors in northwest Nigeria. J Rural Stud. 2025;114:103527.
29. Ahmed MS, Lupindu AM, Nonga HE. Assessment of knowledge, attitude, and practice about food safety among fried chicken meat street vendors in Ilala, Dar es Salaam region, Tanzania. 2026.
30. Sheehama WL. An Assessment of Food Handlers' Knowledge, Attitudes and Practices on Food Safety at the Oshakati Mini Market in Northern Namibia. University of Johannesburg (South Africa); 2024.
31. Kuboka MM. Food safety in informal markets: Hazard assessment for food in East African Community countries. Swedish University of Agricultural Sciences; 2026.
32. Khuluse DS, Deen A. Hygiene and safety practices of food vendors. Afr J Hospitality Tourism Leisure. 2020;9(4):597–611.