EatSafe: Evidence & Action Towards Safe, Nutritious Foods

Report on Learnings from Phase I Research in Nigeria:

From Formative Research to Intervention Design

Revised January 2022

This EatSafe report presents a summary of evidence from global and Nigeria project years one and two that will help engage and empower consumers and market actors to better obtain safe, nutritious food. It will be used to design and test consumer-centered food safety interventions in traditional markets through the EatSafe program.

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ACRONYMS AND ABBREVIATIONS

ASF	Animal Source Food
EatSafe	Evidence and Action Towards Safe, Nutritious Food
FAO	Food and Agriculture Organization of the United Nations
FBD	Foodborne Disease
FSQB	Food Safety and Quality Bill
GAIN	Global Alliance for Improved Nutrition
HACCP	Hazards and Critical Control Points
LMICs	Low- and Middle-Income Country(ies)
KAP	Knowledge, attitudes, and practices
N/A	Non-Applicable
SBCC	Social Behavior Change Communications
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

EatSafe: Evidence and Action toward Safe, Nutritious Food (EatSafe) is a five-year, multi-country project to enable lasting improvements in the safety of nutritious foods purchased in traditional markets by focusing on consumer demand for safe foods. The project is implemented in two phases: **Phase I – Formative Research** and **Phase II – Intervention Implementation and Learning**. In Phase I, EatSafe combined global evidence with target county situational analyses.[1] For the purposes of this report, the targeted country situational analysis focused on Nigeria. This phased approach gave EatSafe an in-depth understanding of the cultural context and the consumer values and perceptions related to food safety that informed the design of interventions. In Phase II, based on the learnings from Phase I, EatSafe will implement a series of interventions using appropriate and feasible quasi-experimental designs to generate new knowledge on how to engage and empower consumers to demand safe, nutritious food in traditional markets.

EatSafe conducted its Phase I in Nigeria in FY2019 and FY2020. At the close of Phase I, GAIN and the EatSafe consortium partners had consolidated global, Nigeria, and Kebbi, Nigeria market-relevant knowledge covering a broad range of topics, including:

- Consumer values and perceptions on food safety;
- Gender roles and norms (for vendors and consumers) tied to the safety of foods;
- Food safety risks in markets;
- The enabling environment at the national and local levels;
- National and local legislation and regulation for food safety, and
- The leading stakeholders as EatSafe/safe food allies.

Ethnographic research was conducted that elucidated decisions made by consumers related to food in Kebbi markets, and the baseline cohort study was conducted, providing useful data to design (and eventually assess) EatSafe's market-based interventions.

Further, the Nigerian team engaged Kebbi and national stakeholders in different fora. Notable among these stakeholder engagements were collaborative meetings with Feed the Future activities in Kebbi. Through those engagements with Kebbi and national stakeholders, EatSafe has developed strong relationships and understanding of the program by all relevant actors and their continuous collaboration and support.

The preliminary design of novel interventions for traditional markets in Nigeria took place in the latter part of Phase I. Using the learnings from evidence generated in Phase I, EatSafe conducted a Human Centered Design Sprint to generate preliminary prototypes that would generate new evidence on how best to empower consumers to demand safe nutritious foods. The preliminary intervention ideas were designed to be consumer and market actor focused,

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[1] Phase I country specific research is replicated in all target geography where EatSafe operates.

behavioral in nature (i.e., centered in behaviors and their drivers, not infrastructure or technology), measurable over time, and informed by community norms, local priorities, values, and cultural practices. The five intervention prototypes developed during the Sprint will be further refined and tested in Phase II.

At the end of phase I, the EatSafe partnership produced 12 global reports and 13 Nigeria-specific products. Publicly available links to many of the reports are presented in Appendix 1. In addition, Phase I activities included several public engagements to raise the visibility of the findings and to stimulate discussion among expert and informed audiences on the importance of food safety in line with USAID's goals and objectives. Public engagements included webinars, blogs, podcasts, and publications as well as two high-profile project launches in Abuja and Birnin Kebbi.

This report provides a summary of the learnings from each of EatSafe's Phase I research activities and concludes with a synopsis of how these learnings were used to design five interventions that will generate new evidence on how to engage consumers to influence and shape traditional markets for better food safety and nutrition.

I. INTRODUCTION

Food safety is an important contributor to the health status for consumers living in low- and middle-income countries. The EatSafe program seeks to foster advancements in food safety by focusing on traditional food markets, a key source of nutritious foods and a known source of food contamination, for a large segment of the world population, and by leveraging consumer demand as a driving force that can shape food systems. Improving food safety in traditional markets in Nigeria requires understanding the motivations, attitudes, beliefs, and practices that shape the decisions of both consumers and food vendors, to enable consumers to demand safer food and vendors to deliver it.

EatSafe's research generated in Phase I falls into two categories. The global research activities build USAID's capacity to better understand food safety's role in support of USAID's goals and objectives and in particular the state of safe food in traditional markets. Specifically, to improve our knowledge of consumer and vendor perceptions of food safety in traditional markets. Learnings in these areas will inform the research and design of Phase II interventions in EatSafe countries. The 12 EatSafe global reviews and studies conducted during Phase I helped identify:

- Existing knowledge on food safety measures and indices;
- The relationship between food safety and nutrition;
- Consumer perceptions of food safety;
- Learnings from past food safety interventions; and
- Consumer and vendor behavior change models.

EatSafe also developed a series of documents specific to conditions in Nigeria. The 13 EatSafe Nigeria reviews and studies conducted during Phase I helped identify:
- Nigerian consumers' and vendors' perceptions of food safety;
- The impact of previous food safety investments in Nigeria;
- Occurrence of foodborne disease (FBD) hazards in food products consumed in Nigeria;
- Availability of public food safety information; and
- The enabling environment for food safety in Nigeria, including legislation, policy and stakeholder engagements.

This report provides a summary of EatSafe's 12 global reports and 13 Nigeria-specific products, highlighting how the results of the studies have influenced the design of interventions and inform future studies under the EatSafe program. Publicly available links to many of the reports are presented in Appendix 1.

The 25 reports also laid the foundation for Phase II (i.e., project years three to five) during which EatSafe will design and test interventions that will generate new evidence on the extent to which consumers can influence and shape markets to provide safer nutritious foods. This report concludes with the EatSafe's Intervention Design Sprint in August 2021, a collaborative

activity with the entire EatSafe team and partner organizations to design market interventions that, in Phase II, can be tested.

In response to the global pandemic, USAID provided additional funding to EatSafe to conduct rapid assessments in traditional markets in five countries, including Nigeria, to better understand the rapidly changing situation in traditional markets under COVID-19. The Nigerian results from this COVID-19 activity are not included in this report because they were implemented in response to extraordinary circumstances and do not fall under EatSafe's normal Phase I scope of work. Results from the Nigerian market surveys can be found here.

2. GLOBAL RESEARCH ACTIVITIES

The 12 research activities described below were implemented by the EatSafe Global team in project years one and two to consolidate the evidence around food safety standards and norms applied to traditional markets and the consumer and vendor perspectives that drive demand for food safety relevant to those markets. These studies provided important background as well as informed the design of EatSafe's interventions in Phase II.

2.1. Review of Measures and Indicators for Food Safety Performance (Activity 1.1, PY1)

This review provided a broad overview of the measures and indicators that assess key aspects of food safety systems. It examined a broad group of food safety indicators from numerous sources, including international agencies, like WHO and FAO, governments, private sector, and consumer organizations. Together with the literature review linking food safety and nutrition (see Section 2.10), this review provided a comprehensive view of indicators that can be useful for informing the development of a framework to address food safety within food systems as part of EatSafe and Feed the Future programming. Learnings include:

- Metrics of consumer and vendor knowledge, attitudes, and practices (KAP) are available, but they have not been broadly included in food safety indicators.
- Indicators developed by consumer organizations provide an example of how civil society can drive improvements in food safety by demanding data transparency and by interfacing with both governments and market actors.
- Interventions should use risk-based indicators to ensure effective practices are monitored and incentivized.
- Risk ranking approaches can identify indicators linked to the most important risk factors.
- Indicators specific and relevant to informal supply chains and markets were not identified; when developed they should consider both infrastructure and market actors.
- Indicators relevant to enabling environments for food systems exist but may need to be adapted for food safety objectives and better integrated into food systems.
- A common indicator-based vocabulary may facilitate data and practice harmonization across formal and informal food supply chains.
- The selection and application of gender factors in food safety indicators should be improved.

- Country-level indicators should be customized to both the national food safety system context and cultural or enabling environment factors (e.g., literacy, religion, and information access).
- Small and medium-size businesses may adapt industry-developed standards to support monitoring food safety improvement in informal markets.
- In high-income settings, consumer-driven rating schemes successfully incentivized businesses to improve service quality and to share information among consumers.

2.2. Global Review of Consumer and Vendor Perspectives on Food Safety (Activity 1.11.1, PY1)

This review assessed intervention methods that effectively influenced consumers' and vendors' perspectives on food safety. The review identified 131 consumer-focused studies, most of which assessed food safety knowledge and risk perceptions among primarily adult audiences in Asia. Additionally, the review identified 84 vendor-targeted studies, most of which were conducted since 2015 among women vendors in urban and peri-urban Africa. Results of the review indicated that food safety was conceptualized more as a set of practices and less as perceptions of risk. Where risk perception was identified, it appears more aligned with examining consumers' motives, their gains or losses, and consequences associated with unsafe foods. Further, consumers often made trade-offs between food safety, price, and convenience. Learnings include:
- EatSafe should consider to what extent food safety creates consumer segments, and, for which audience groups, whether the immediate considerations of convenience and price outweigh the potential future costs of unsafe foods.
- Consumer attitudes and emotional experiences are relevant to the intervention design. Consumers' understanding of the consequences of unsafe food may assist in identifying trade-offs between food safety criteria, price, and convenience.
- EatSafe should explore whether consumers with limited purchasing power will still voice demand for safer food if they feel limited in their choices.

2.3. Food Safety Education, Training and Technology Interventions in Africa and Asia: A Review of Studies Relevant to Traditional Markets in Low Resource Settings (Activity 1.12, PY2)

This review identified a broad landscape of effective interventions, tools, and approaches implemented in traditional markets. Studies published since 2000 were categorized by target audience (i.e., community members or vendors) and geographically, with 19 and 23 studies reviewed Asian and African countries, respectively. Group training interventions targeting community members used a variety of media, equipment (e.g., cooking utensils), infrastructure, and interpersonal interactions to enable participants to implement better food safety practices. The studies focused on cultural acceptance, integration with daily routines, and participatory approaches that leveraged emotions and values – particularly those related to childcare. Most studies identified positive outcomes related to changes in KAP over a

relatively short time frame (e.g., several months to one year), while only few measured hazards or longer-term impacts. Learnings include:

- Few interventions directly targeted markets, consumers, and/or market operators.
- Most studies reported positive outcomes, although the outcome magnitude was often not reported in sufficient detail.
- EatSafe could leverage the food safety content and delivery approaches used within the most common intervention type – education.
- Knowledge alone is insufficient. Most effective interventions provided both the physical tools needed for target practices and practical skill building to stimulate behavior change.
- The WHO's 5 Keys to Food Safety are a recognized content tool that can be utilized in food safety capacity building in various settings
- Applications of Hazards and Critical Control Points (HACCP) processes appear promising for use in market participatory approaches specific to LMICs.
- Software training and information-sharing interventions were the primary tools used. However, combinations of technology and behavior change also proved successful.
- Few interventions involved media (e.g., songs, films, documentaries, and video trainings). Most training interventions used traditional printed materials and in-person instruction.
- Community social networks and trusted community actors (e.g., religious figures, local health workers) were often underutilized in food safety interventions.
- Aflatoxin studies showed markets can reliably apply testing methods. Disseminating test results can empower consumers and vendors in choosing safer suppliers and vendors.
- Biosafety interventions to control animal disease may also reduce foodborne hazards and improve hygiene in markets.
- EatSafe could consider interventions that benefit the health and nutrition of caregivers, by understanding how caregivers make choices about food for children in the household.
- More research is necessary to identify motivators and effective incentives for market actors in traditional markets, including vendors and consumers, to prioritize food safety.

2.4. EatSafe Innovation Inspiration Tool (Activity 1.12.3, PY2)

Designed to inspire EatSafe team members' creativity and imagination prior to and during the EatSafe Intervention Sprint (see Appendix 2 for more information), this tool described the features, benefits, and enabling infrastructure of over 100 consumer-first food system innovations. The innovations originated from a variety of country contexts, each having reusable or replicable components to the design. Learnings include:

- Human Centered Design places the needs of the consumer as the highest priority.
- Innovations can be categorized into one of three consumer-first engagement types, including i) *Configurations*: consumer methods and practices; ii) *Offerings*: core

products and services provided to the consumer; or iii) *Experiences:* consumer-facing opportunities.
- Consumer-first interventions have mutually-reinforcing benefits for vendors.

2.5. Assessing Food Safety Interventions Relevant to Foodborne Zoonoses in LMICs (Activity 1.13.2, PY2)

This report highlights the complex factors involved in mitigating foodborne zoonoses in animal sourced foods (ASFs) and pathogens in non-ASFs sold at traditional markets in LMICs. It examines food safety interventions implemented at both the market- and consumer- level, as well as at the farm and processing stages. The report highlights factors previously identified by interventions as inhibitory or enabling to effective food safety strategies (e.g., cultural contexts, governance policies, or infrastructure). Learnings included:

- No one-size-fits-all intervention exists to mitigate foodborne zoonoses in traditional markets. Intervention designs must recognize site-specific cultural, social, and economic factors.
- Actors at traditional markets lack knowledge on foodborne zoonoses, transmission pathways, and health implications. Values and beliefs regarding safe food systems vary among actors and geographic regions and are resistant to change.
- Educational interventions can improve the knowledge of farmers, vendors, and consumers but knowledge alone does not bring about a reduction in foodborne zoonoses risk.
- Educational interventions should adopt a Participatory Action Learning approach to ensure key drivers of behavior are reflected in intervention design.
- Initiatives should contain a sustainability mechanism to refresh knowledge and skills.
- Though ideal, risk-based approaches are challenging to implement in LMICs where necessary risk analysis metrics are missing. Aspects of HACCP can systematically identify areas where contamination occurs, allowing for targeted intervention design.
- Because strict regulations for traditional markets can further destabilize fragile food systems, EatSafe should consider participatory and voluntary approaches.
- A One Health approach may create an enabling environment for interventions, as it has proved useful in integrated diseases surveillance, human and animal vaccination campaigns, and control of antimicrobial resistance.

2.6. Perspectives on Food Safety: A Review of Ethnographic Studies (Activity 1.14.1, PY1)

This review examined 35 food safety studies that leveraged ethnographic and qualitative methods to identify insights relevant for EatSafe's intervention design. The review found that many consumers already have existing, culturally-specific food safety risk-mitigation strategies. In certain cultures, some groups and individuals have constrained agency to mitigate food safety risk, which limits their ability to act to demand safer food. Learnings include:

- Because consumer trust in vendors may not reflect direct observation of hygienic practices, EatSafe will need to evaluate the extent to which local beliefs obscure or enable improved food safety practices.
- Highly motivated to avoid food safety issues, vendors are promising partners for intervention. However, project interventions should avoid impacting vendor livelihoods.
- EatSafe investigations must be constantly confirming: "Safe for whom"? "Safe under what circumstances"?
- To reconcile the tension between the breadth of food safety determinants and time/resource constraints, EatSafe should consider focusing the interventions on a defined set of foods.

2.7. Stories from the Forefront: Interviews with SBCC Media Professionals (Activity 1.15.2, PY1)

This report features top practitioners in the SBCC media field (e.g., executive directors, country directors, producers, and researchers) to identify the nuances of program development that enable effective and sustainable SBCC media productions. Learnings include:
- Because an in-depth understanding of the audience is critical, EatSafe country office staff should provide hands-on technical assistance to local crews throughout production.
- Intervention design is an iterative process, requiring script testing with audiences, and if necessary, rewriting following audience feedback.
- Because character identification is a key element of storytelling, allowing audiences to connect to the action in the story, characters (including positive, negative, and transitional characters) should also be tested with audiences.
- Together with information provided by behavioral experts, stories can provide an advantage in behavior change communication. Stories should emphasize self-efficacy to ensure audiences feel they can change their behavior.
- Use of story immersion will allow the audience to become emotionally engaged and consequently more open to the core messaging of the intervention.
- Understanding cultural contexts are critical when determining where and when the audience will experience the SBCC media.
- Distribution is an integral part of intervention design, requiring early and often engagement with local groups and associations.

2.8. Training with Media for Social and Behavior Change: A Review (Activity 1.16, PY1)

This review examined health, WASH, nutrition, and food safety training interventions that incorporated media-based SBCC components, published since 2010. Though international development has long used SBCC in a variety of sectoral programs, only recently has it been used in food safety interventions. Learnings include:

- The social ecological model and place-based approaches enable intervention designers to understand the environment in which food safety behaviors are practiced and where interventions may be most successful.
- A theory of change and participatory planning processes that emphasizes the value of community participation may effectively link intervention activities with outcomes.
- Training interventions should be designed to work through existing systems and structures.
- A SBCC strategy based on training often reflects the assumption that more information will motivate participants to action. Education-entertainment strategies can inform while entertaining the audience through storytelling. Narratives deliver content in an engaging format while characters activate social cues, which are critical determinants of behavior change.

2.9. Report on Normative Guidelines for Governments to Promote Safer Traditional Markets (Activity 1.18, PY2)

This report reviewed four existing normative guidelines governments use to manage food safety and quality issues for street foods vended in traditional food markets – including the Latin America and Caribbean (LAC) Code, the Near East Code, Africa Guidelines, and the Asia Regional Code., published as regional guides by the Codex Alimentarius (Codex). These four regional guides to manage the safety of street-vended foods also provide useful insights to guide food safety practices in traditional food markets. Learnings include:
- Normative guidelines provide appropriate baseline standards for intervention design.
- The Africa Guidelines related to street food provide regionally-appropriate guidance for EatSafe countries. The Hazard Analysis and Critical Control Points outlined for a variety of market activities in the LAC Code may also be useful.
- Among the five intervention categories for street foods in Codex documents, the categories related to consumer demand have direct impacts on street food safety and traditional markets (e.g., Food Handling, Vendor Health and Hygiene, and Training and Education).
- Supplementary documents from the World Health Organization (WHO) and Food and Agriculture Organization of the United Nations (FAO) advise on the application of HACCP to traditional markets and food safety training for vendors.
- Several supplementary documents provide useful advice and content for food safety training programs for vendors. See especially the WHO 2006 Guide and the INFOSAN 2010 Information Note.

2.10. Literature Review Linking Food Safety and Nutrition (Activity 1.2.2, PY1)

This review assessed 52 articles on the linkages between food safety and nutrition-related health outcomes, with a specific focus on FBD's physiological impacts, relevant research gaps, and opportunities for intervention. Together with the literature review of the measures and

indicators for food safety performance (see), this review will support the development of a framework linking food safety and nutrition as part of Feed the Future and EatSafe programming. Learnings include:

- Food safety and nutrition are strongly linked via many impact pathways by direct association (i.e., proven linkage between environmental enteropathy and stunting) or indirect processes that both impact a health outcome (i.e., diabetes or other metabolic processes).
- Despite strong associations between some gastroenteric diseases and nutrition outcomes in children under five years old, the specific causal mechanisms remain unclear in adults.
- Vulnerable groups, such as pregnant women, the elderly, children, and groups at higher risk of occupational exposure have a higher risk of adverse nutrition outcomes associated with foodborne hazards.
- Multiple pathogens, rather than specific pathogen/commodity pairs, appear to stimulate gastroenteric diseases linked to poor nutrition outcomes in low- and middle-income countries (LMICs); therefore, interventions aiming to reduce overall FBD burden and associated nutrition impacts should focus on multiple pathogens.
- The physiological mechanisms that link specific foodborne hazards to health and nutrition outcomes are not well characterized, particularly for chronic or time-delayed impacts.
- Consumers in traditional markets may be more at risk for the cumulative impacts of FBD exposures (e.g., WASH,[2] housing) and associated nutrition impacts.
- The incidence and magnitude of impacts linking food safety and nutrition outcomes at the total diet and population scales are poorly understood.
- Interventions should be prioritized using relative impact magnitude. Some well-characterized pathways may not be the most impactful in terms of population burden.
- Studies rarely included gender factors, though where included, gender disaggregation was generally possible for both health burden and behavior data. The gender differential in other exposure and physiological mechanisms is unclear.
- For some hazards, gendered differences in illness rates may reflect gendered occupational behaviors (e.g., slaughterhouse workers are usually male), not biological differences. Messaging interventions customized by gender and/or occupation may be warranted.
- Further discussion on the selection of nutrition outcomes to evaluate in food safety interventions is necessary, and may include increasing syndromic surveillance and hazard attribution, integrating metrics of gut health and chronic effects of FBD, and including measures of hazard-specific impacts on micronutrient status, as appropriate.

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[2] WASH refers to water, sanitation, and hygiene.

2.11. Integrating Food Safety and Nutrition for Improved Health and Wellbeing: A New Lens on Food System Frameworks (Activity 1.2.4, PY2)

This report reviewed existing food systems conceptual frameworks with a food safety and nutrition lens. In the first half, it included an in-depth review of published literature, focusing on the most influential frameworks of nutrition or food systems to identify where food safety was included and proposed a new lens for food systems frameworks that incorporates food safety. In the second half, the report covers findings from a virtual workshop with over 30 leading experts in food safety and nutrition to critique and comment on the various aspects of the new food safety lens on food systems frameworks. Learnings include:

- EatSafe has the opportunity to be a model program for designing interventions based on both food safety and nutrition goals. Keeping a strong focus on nutritious foods will help leverage this opportunity.
- In addition to measuring changes in actual risk, interventions should consider uncertainty, evidence gaps, and potential nutrition impacts (e.g., modified perceptions around a food may reduce its consumption, prices, or local availability).
- In the informal sector, consumer demand and preferences, supply chain infrastructure, market and supply chain power dynamics, and overall population health levels could play a key role in determining the success of an intervention.
- A better understanding of foodborne risk perceptions and other factors affecting consumer choices are needed to predict joint food safety-nutrition impacts.
- When discussing desired or anticipated EatSafe program impacts, potential nutrition impacts of food safety interventions should be explicitly anticipated and discussed, including the impact of uncertainty or evidence gaps.
- The food safety and nutrition lens developed here, and any further customization, can serve as a road map to pinpoint where a project sits within a food system, to map direct and indirect connections with other system components, and to estimate impact pathways of interventions including trade-offs.
- Indicators: while EatSafe will not directly track nutrition outcomes, it will propose and test a set of food safety indicators appropriate for Feed the Future efforts and other joint food safety-nutrition programs in LMICs.
- EatSafe's relatively short intervention timespan may be unable to detect changes in longer-term health outcomes. Options to address this include impact assessments that focus on intermediate outcomes with known or likely links to health or nutrition outcomes and/or use of an intervention with established impact pathways but which may require longer timeframes.
- Coordination between programs in nutrition and food safety is necessary, and will require greater information sharing across projects to better evaluate joint progress on relevant outcomes.

2.12. Consumer-Facing Interventions to Improve Food Safety Perceptions and Practices in LMICs: A Review (Activity 1.3.1, PY1)

This review assessed 92 consumer-facing food safety behavior change interventions implemented globally since 2000, categorizing them by target audience (i.e., direct to consumer or through training programs with practitioners working with consumers), behavior change theory, intervention strategy, evaluation design, and outcomes. It explored the significance that emotions play in consumers' intake of information and the associated ways that interventions can be designed to generate desire to act. Learnings include:

- Because consumer demand consists of two components – motivation (i.e., desirability) and choice (i.e., behavior) – interventions must focus on both components.
- As powerful motivators, the most promising emotions for communicating food safety are trust (i.e., feeling of safety), fear (i.e., feeling of loss or heightened risk), disgust, and nurturance. More research is necessary to understand how different consumers express these emotions (e.g., men vs. mothers vs. children).
- Information should aim to motivate the consumer and influence choice, not just to improve knowledge. The former will be more emotive, persuasive, and delivered at the right time.
- Though consumer purchasing behavior (i.e., desire) is a strong market signal, consumers' overt demands and collective desire for safe food may require different strategies than ones used for purchases.
- Relevant strategies separate from improving consumer purchase decisions may include consumer advocacy and citizen participation – in governance through community management councils, accountability through "community score cards," and outbreak reporting.
- Through community events, marketplaces, or influencers, the community remains an important place for intervention implementation. Interventions that rely on social signals (i.e., norms, cues, peer-to-peer modeling) and trust will usually have a significant community component.
- Since most interventions rely on communication approaches, EatSafe should select several theories to organize and design content, delivery channels, and intervention exposure. EatSafe should avoid designing based on "labels" (e.g., social and behavior change communication (SBCC), information, education, communication, social marketing) since these labels use many of the same tactics and delivery channels.

3. NIGERIA RESEARCH ACTIVITIES

The 13 research activities described below were implemented by the EatSafe Nigeria team in project years one and two to consolidate the evidence in Nigeria and Kebbi state to inform consumer driven demand for food safety, identify and engage key stakeholder as well as inform the design of EatSafe's interventions in Phase II specifically within the Nigerian context.

3.1. Analysis of Food Safety Investments in Nigeria: A Review (Activity 1.17.1, PY1)

This review summarizes the food safety investment landscape in Nigeria. It includes information on domestic and export food safety investments and the gap in funding across commodities and food safety hazards. Learnings include:

- Investments in food safety, potential positive public health outcomes, and business partnerships in the food sector are mutually beneficial.
- An enabling regulatory environment will facilitate investments in food safety infrastructure and procedures for traditional markets.
- Because contamination can occur at any point in the food value chain, food safety investments require multi-sectoral and consumer-centric approaches.
- New investments to support food safety in traditional markets should be gender-sensitive. Training and other technical assistance should be tailored for actors at state and local levels.

3.2. Report of the Municipal Roundtable Engagement with Stakeholders (Activity 1.19.4, PY2)

This report documents the municipal roundtable discussion on the design of safe markets for nutritious food, a town-hall style meeting held in Birnin Kebbi on May 18 and 19, 2021. Approximately 100 local stakeholders were organized into five groups, with representatives from i) state and local government Ministries, Departments, and Agencies (MDAs); ii) Feed the Future and other CSO or development partners; iii) market associations; iv) food processors; and v) professional associations. A facilitator moderated each group discussion, which included review of current market conditions and food safety risks; existing food safety market rules and other organizations' current activities; challenges identified for promoting food safety; absence of consumer associations to promote food safety; recommendations for safe markets; and potential future collaborations from representative organizations. Learnings include:

- Problems in the markets included lacking or nonexistent functioning drainage systems; high population density; insufficient number of hand-washing facilities; inadequate water supply; concerns of pesticides on grains (especially cowpea); open defecation; open influx of contaminated foods; and an inadequate number of environmental health officers;
- Improving or creating new water, sanitation, and hygiene facilities may be necessary.
- Increasing public awareness of alternative preservation methods for grains is required to reduce chemical contamination.

- A revival of the regulatory environment, improvements to vendor compliance, and continuing use of consumer associations are important next steps.
- The creation of functional consumer associations leveraging relevant MDAs and NGOs should be considered.
- Suggested interventions included food safety training, reviewing and advocating for food safety legislation, providing facilities/infrastructure in the markets, and increasing awareness of food safety through mass media or other engagement methods.

3.3. Report of Review of Indicators in Nigeria (Activity 1.2.6, PY2)

This report documents two stakeholder workshops in Abuja and Birnin Kebbi, Kebbi State, Nigeria in April and May 2021 – each of which had 25 and 27 participants, respectively, representing other USAID and Feed the Future-funded activities, as well as state and local MDAs), NGOs, and professional associations, among other representatives. The stakeholders first reviewed EatSafe's Custom Indicators from Phase I of the program, then discussed modifying existing Feed the Future Indicators to pilot new food safety-focused indicators. In total, 11 indicators were discussed, with six indicators total – three each covering consumer and vendor knowledge, feelings and attitudes – recommended by the stakeholders at both meetings. Learnings include:

- EatSafe Custom Indicators for Phase II will benefit from input from both national and local stakeholders.
- Several additional indicators were recommended by both Abuja and Kebbi stakeholders, which should be considered for use in other countries where EatSafe operates.
- EatSafe should consider additional work in PY3 to identify and pilot Feed the Future indicators for food safety.

3.4. Publicly Available Food Safety Information: Grey Literature Resources for Consumers and Practitioners, with a Focus on Nigeria (Activity 1.3.2, PY1)

This report examined consumer food safety resources, public communication resources, policy briefs, white papers, and other internal documents beyond the published academic literature specific to the Nigerian context. All resources were from a list of 26 organizations that work on consumer food safety and were in English. Learnings include:

- Sensitization programs help raise consumer awareness about food safety issues. These include handwashing at home as a critical practice before preparing or eating food and after handling currency; knowledge of risks related to specific foods (e.g., salads, meats).
- From a cost/benefit perspective, interventions should emphasize that it costs more to treat a foodborne illness than it does to purchase more hygienic foods.
- Customers may be a "monitoring tool" once they learn food safety best practices. They can demand hygienic practices and notify authorities of non-compliance.

- Consumer participation in policy design is crucial to addressing key issues for consumers.

3.5. Consumer and Vendor Perspectives and Practices Related to Food Safety in Nigeria: A Review (Activity 1.4.1, PY1)

This review identified 87 studies published since 2000 on the perspectives and practices of consumers and vendors vis-à-vis food safety in Nigeria. Most studies took place in a single city or state in Nigeria, and the majority focused on vendors and general food safety hazards rather than specific food items. Learnings include:

- Ethnicity and culture are determinants of KAP and differ across cultures.
- Gender should remain a cross-cutting theme of EatSafe work. Data should be disaggregated by gender, where relevant and possible.
- Research should determine how vendors and consumers perceive their ability to influence pre-retail aspects of the supply chain.
- Integrate a wide range of methods for evaluation of interventions, such as closed-ended surveys, experimental techniques, and qualitative approaches from fields such as anthropology.
- Examine raw foods (e.g., fresh vegetables) sold in traditional open-air markets.
- When using surveys, apply best practices in survey design (e.g., avoid leading questions and appropriately sequence questions)
- When assessing practices, use metrics that are based on contextually appropriate assessments of risk and hazard.
- Attitudinal issues should be examined in greater depth (e.g., core beliefs on safety and hygiene and the relative salience of food safety compared to other drivers of choice).
- Interventions should be appropriately tailored to lower-income, less-educated consumers.

3.6. Focused Ethnographic Study on Food Safety Values, Knowledge and Practices in Traditional Markets in Birnin Kebbi, Nigeria (Activity 1.4.8, PY2)

This report used focused ethnographic methods (i.e., in-depth and semi-structured interviewing, cognitive mapping techniques (e.g., free listing and ranking), and market observations) to examine perceptions, knowledge, and experience related to food safety among both consumers and traditional market vendors in three target markets in Birnin Kebbi, Nigeria – Central, Yaryara, and Tsohon Kasuwa markets. In phase 1, EatSafe interviewed 16 consumers and 12 vendors, while in phase 2, 31 consumers and 24 vendors were interviewed. Learnings include:

- Consumers can elevate food safety in their thinking if given the right cues (e.g., reminders to check for known aspects of cleanliness) and motivators (e.g., reminders of effects of consuming unsafe food).

- Consumers generally view food as safe, have flexible understandings of gastrointestinal illnesses' causes, and do not clearly separate foodborne illness from other causes.
- Consumers will likely be unwilling to prioritize safety over price; this is particularly true for women (who have less price flexibility) and consumers who use credit.
- A gender-targeted strategy to motivate changes in shopping behaviors could leverage strong, shared perceptions of gendered shopping behaviors and/or gendered rivalry (i.e., of women being "good, discerning shoppers," and men being "busy, with no time to waste" and the associated pride that women/men feel with each of these traits).
- Women consumers' strong feeling of agency in acquiring high quality foods at a good price could be leveraged in messages regarding the importance of food safety practices.
- Consumers' main food safety concern relates to chemical contamination. Intervention strategies might explore how these existing concerns could be referenced to motivate consumers to change behaviors that address more actually high-risk foods.
- Vendors' norms of cooperation and consensus will challenge strategies that encourage active competition among vendors, particularly related to price. Instead, interventions should use vendor associations and the value of consensus to foster shared practices, norms, and enforcement of improved safety practices.
- Vendors would likely welcome change in practices that make foods more attractive to consumers, thereby increasing demand without requiring active recruitment of consumers loyal to other vendors (i.e., contrasting social norms), or that allow them to sell perishable goods more quickly.
- While times of scarcity stress vendors, periods of abundance could be an effective entry point. At these times, vendors have more flexible margins and could be encouraged to experiment with new handling or display practices.
- Key foundational themes for an intervention could include the collective safety of the community, civic contribution of vendors, long-term consumer-vendor relationships, and the continued earning of consumer trust. In particular, the strong ties between some repeat vendors and consumers creates existing social capital (e.g., by appealing to the consumer's or the vendor's responsibility to his/her "customer, using the two-way meaning of "customer" as used in Birnin Kebbi).

3.7. Baseline Report on Food Safety Attitudes and Practices (Activity 1.5.9, PY2)

This research activity, in tandem with Activity 1.4 (Ethnographic Assessment), is central to the goals of EatSafe's Phase I understanding of food safety attitudes, values, and practices of consumers and vendors in informal markets. Leveraging information obtained from the ethnographic assessment (as well as literature reviews carried out in project year 1), structured surveys were developed that aim at refining the assessment of pre-intervention features by asking more pointed questions that are quantifiable and increasing sample size to allow for

statistical analyses. This cohort surveyed 470 consumers and 460 vendors. Additionally, EatSafe conducted an observational study on 50 vendors. Below are just a few significant findings and observations that were considered during the design of its interventions:

Consumer Survey Results:

- The Cohort is comprised of an equal proportion of women and men. Hausa is the dominant ethnic group (80%), with minorities of Igbo, Yoruba, Fulani, and others. The main religions in the group are Muslim and Catholic (79% and 21%).
- Market cleanliness is not an important driver of market choice. Market cleanliness was mentioned by only 13% (N=62) of consumers.
- When asked about what factors drive their food purchase choices, price was consistently the most frequently reported factor (cited by 56% of consumers). Other important factors reported included proximity of the market to home (42%), quality of the food (37%), and food variety (21%). However, when asked to rank the top 3 factors, food quality was most commonly the first, not price.
- On average, consumers report they have a "regular customer" relationship with around one-fourth (26%) of their vendors.
- Both appearance and cleanliness of vendors' stalls were cited by around a quarter of respondents as criteria they use to compare among shops. Quality of food, price, and variety of foods were the most reported criteria (62%, 59%, 45%).
- When assessing a shop's cleanliness specifically, the most important factor considered by consumers (46%) is the tidiness of the shop, followed by whether food is covered (44%), cleanliness of surfaces such as countertops (41%), waste management (~33%).
- For most consumers, a drastic decision of not buying from a vendor anymore is rarely enacted (only 15% report to stop buying from a vendor often or very often). When they do, the motivation is most commonly price or food quality. Only 3 consumers (out of 470) reported that they at some point decided to stop buying from a certain vendor due to a foodborne illness incident.
- Consumers use a range of cues to decide if food is safe: smell/odor (49%), visual signs such as blemishes, desiccation, or color (49%), and texture (16%)
- Slightly more than half of consumers (55%) reported that they "rarely" or "never" discuss issues pertaining to food quality with vendors at the market. However, this leaves a large group that does (41% sometimes or often, and 3% always).
- Only a minority of consumers (5%) reported having a food safety question or topic they wanted to know more about. Active promotion to attract consumers to an information-sharing stand may be needed, or a combination approach that does not rely solely on spontaneous information seeking.

Vendor Observations:

- Working surfaces were common: most often wooden counters or tables for vendors of vegetables and grains/pulses, more frequently concrete slabs or counters for beef vendors.
- The vast majority (88%) of vendors display their food without any covering.
- Cloths or towels for wiping surfaces were available in approximately half of the shops; vendors were observed to wipe surfaces once per hour on average; most wiped items were countertops (44%), cutting boards (26%), and knives (46%)
- Most shops (88%) did not have high-risk foods (e.g., meat, fish) in contact with lower-risk foods (vegetables, grains and legumes)
- Meat and fish vendors often used the same tools to handle both raw and cooked meat or fish without first washing or sanitizing the tool, at an average of 2 (±4) times during the observation period.
- Less than half of vendors were observed to wash their hands; limited handwashing facilities were available in proximity to the shops.
- Vendors handled food and money with the same bare hands (88%). No use of mobile money was observed. In a minority (6%) of beef or fish shops, a second person that had not touched food handled money.
- Several behaviors not conducive to food safety were observed, such as having long or dirty fingernails (34%), spitting (64%), or performing personal hygiene other than handwashing (68%), and sneezing or coughing near the food (22%).
- Conversations between vendors and customers on topics relevant to food safety (e.g., freshness, cleanliness, healthfulness) were noted in 42% of shops, initiated by both vendors and consumers, across all commodities, for both men and women vendors. Safety/healthiness was the topic most often discussed and breached more often by fish vendors than vendors of other commodities (40% vs. 18-27%), while freshness was discussed often across all commodities (20-27%), followed by cleanliness (14%).

3.8. Occurrence of Foodborne Disease Hazards in Foods and Beverages Consumed in Nigeria: A Systematic Literature Review (Activity 1.6.1, PY1)

This systematic literature review identified FBD hazards in foods and beverages consumed in Nigeria. The review studied fewer food studies (30 articles identified 2017 - 2020) that covered a shorter time span than beverage studies (81 articles identified from 2000 - 2020), as other studies had previously covered food during that time span. Mycotoxins were the most frequently reported hazard, along with other bacterial and chemical hazards in animal sourced foods (ASF). Learnings include:

- Though food safety research has increased in Nigeria, the literature does not sufficiently cover the hazards responsible for the highest health burden. Major data gaps prevent accurate risk ranking and identification of hazard occurrence levels,

including the absence of studies covering microbial pathogens in ASF, fruits/vegetables, and beverages.

- Semi-quantitative risk assessments are possible for selected commodities and hazards, though significant gaps exist for new data to support quantitative burden estimates.
- Food safety hazard characterizations should include beverages. While some studies showed evidence of heavy metals in beverages, no similar study on microbial pathogens was identified.
- Risk assessments that estimate the burden of disease require data on both prevalence and concentration of hazards, as well as information on supply chain and consumption practices. Because prevalence alone does not provide sufficient information to estimate risk, studies should also measure concentration.
- Given the absence of relevant information, the best available guidance is the WHO's Foodborne Disease Burden Epidemiology Reference Group burden estimates, pending novel data collection.

3.9. Food Safety Hazards and Risk Associated with Select Nutritious Foods: Assessment from Three Traditional Markets in Birnin Kebbi, Nigeria (Activity 1.6.8, PY2)

This report details the methods and results of three EatSafe field studies that took place in three markets in Birnin Kebbi (i.e., Central, Tsohon, and Yaryara markets). The three studies included a field reconnaissance, consumer survey, and microbiology food sampling survey and laboratory analysis. Results from these field studies were used to calculate exposure to Non-typhoidal *Salmonella* enterica bacteria*,* which, combined with other parameters from the literature, was used to conduct qualitative risk assessment (QRA) modelling. Results of the QRA fed into the risk ranking of EatSafe's seven priority commodity value chains – i.e., maize, rice, fish, beef, *moi moi* (a steamed pudding made from cowpea), *awara* (a fried fermented soybean cake) and fresh vegetables. EatSafe also conducted a desk review to analyze dietary exposure to aflatoxin, a fungal toxin, and the risk of hepatocellular carcinoma associated with consumption of maize, rice, cowpeas, and soybeans, often susceptible to aflatoxin contamination. Learnings include:

- The QRA provided valuable data on hazards present in foods commonly sold in traditional markets in Birnin Kebbi, data previously unavailable.
- The findings from the risk assessment complements the FES and cohort studies in identifying some key risk practices such as: lack of basic hygiene in markets, storage of food at ambient temperature, and regular consumption of products which are highly contaminated. Consumption of ready to eat without subsequent cooking is also a risk factor.
- The risk ranking outcome of the QRA model indicates many products carry a high risk of causing salmonellosis in consumers, highlighting the "riskiest" products that merit further consideration for additional food safety interventions.

- *Salmonella* is only one bacterial hazard, though high levels of total bacterial counts in food samples highlight poor hygiene practices in the markets.
- Interventions based on improving basic hygiene practices to reduce bacterial contamination in foods could have far reaching effects in reducing FBD risks in traditional markets.
- While the study of food preparation within the home was beyond the remit of this study, the lack of cross contamination within the QRA model doesn't mean it doesn't happen. Taking safer food into the household is protective to all consumers in the household.
- Logistic challenges should be considered carefully in all field work. Due to the global pandemic, some data collection was hampered by late access to the field. This situation also reduced the ability to cross-validate some of the data collected. Logistical distances in getting to the field was an additional challenge.
- Market stakeholders were very supportive throughout the field work, however, during the last visit to the field they did point out that they would appreciate feedback from the study before continuing with future engagement.

3.10. Nigeria Policy, Monitoring Systems Analysis and Stakeholder Mapping Report (Activity 1.7, PY2)

This report presents the summary of the findings of three sub-activities – including a desk review of food safety policy documents, assessment of food safety legislation in Nigeria, and food safety stakeholder mapping. The stakeholder mapping exercise collected quantitative data through questionnaires and identified 67 stakeholders relevant to EatSafe goals. Learnings include:

- There is a relatively low level of public awareness on food safety in traditional markets and poor communication links. This will require a focus on capacity building and stakeholder education for all food supply chain actors.
- Food safety champions are needed at the State and Local Government Levels who can use their knowledge, power, and platforms to raise awareness while advocating for change.
- The Nigerian Institute of Food Science and Technology has conducted research and training on street foods vending, and can be a promising partner for EatSafe.
- Stakeholders agree that selecting commodities and designing interventions would benefit from a risk assessment to profile and rank foods based on potential or existing hazards.
- A variety of previous projects – including the New Agricultural Transformation and Self-Help Initiative, Growth Employment in States, Agricultural Transformation Agenda, and Strengthening Partnerships, Results, and Innovations in Nutrition Globally – show the need to empower women in food safety interventions.
- Legislation to modernize food safety policy is needed. The 2014 National Policy on Food Safety and its Implementation Strategy has not been supported with an enabling

law five years after it was first developed. Before the Food Safety and Quality Bill (FSQB) 2017 is enacted by the National Assembly, additional hearings are needed.

3.11. Review of Citizen Engagement in Safe Food Markets in Kebbi State, Nigeria (Activity 1.7.4, PY2)

This review aimed to help EatSafe identify individuals and organizations who are or could become champions for improving food safety in traditional markets in Kebbi State. The review compiled results from virtual and face-to-face stakeholder interviews, gray literature scans, media reviews, and questionnaires. Respondents included 93 people (15 females/78 males), representing MDAs, market associations, NGO, the private sector, research and academia, development partners, and professional associations. Learnings include:

- Since EatSafe began, stakeholders have emphasized that many respondents are aware of EatSafe. The program should maintain those relationships and build on them.
- Though consumers are the largest stakeholder group interested in food safety, they often feel disempowered. Respondents noted that EatSafe was unique, and the consumer-focused perspective is welcomed.
- EatSafe should partner with lead citizen engagement stakeholders, including civil society organizations (e.g., Bright Girls; Consumer Association of Nigeria), international non-governmental organizations (e.g., Oxfam); government, (e.g., the Ministries of Health, Agriculture, Environment, Animal Health, Women Affairs, and the Ministry of Budget and Economic Planning); and Federation of Agricultural Commodity Association of Nigeria.
- Because Kebbi currently does not have a functional consumer association(s) to drive the food safety agenda, EatSafe should consider supporting partners in creating one.
- Given their position in the community, key faith and traditional leaders can be critical food safety advocates.
- Possible channels proposed by stakeholders for communicating food safety messages include: social media, town hall meetings, volunteer events, and awareness walks.

3.12. Story Sourcing in Birnin Kebbi, Nigeria (Activity 1.8, PY2)

This report shares 24 stories from traditional food market vendors in three markets in the city of Birnin Kebbi in northwest Nigeria. In January 2021, "Story Scouts" conducted 61 in-depth interviews with primarily Hausa men and women aged 18-70 years old who sold a wide variety of foods, including staple grains, vegetables, meat, fish, and oils.[3] Learnings include:

- Future Story Sourcing activities should continue to involve Scouts of diverse backgrounds to provide a comprehensive picture of the target audience.

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[3] Story Sourcing is the semi-formal process that uses journalistic techniques to gather stories directly from the audience of interest. Story Scouts are native Hausa speakers from the area who conduct the interviews and then draft the culturally-resonant and -relevant stories to inform media-based interventions.

- Given anecdotal information Scouts collected from vendors about how they receive news, entertainment, and information, EatSafe should consider a) radio programming, b) collaboration with respected vendors for message dissemination, and c) videos during captive audience occasions (e.g., in-person training session).
- EatSafe should create communications materials that build on the themes emerging from vendors' stories, as they provide context for the development of immersive stories and identifiable characters for the food market vendor audience (**Table 1**).

Table 1. *Themes from the Vendor Story Sourcing*

THEME	DESCRIPTION
Learning from errors	Characters model safe food behavior in narratives with this theme. It may be useful, particularly in the absence of significant infrastructure improvement.
Service to others	Stories about service to others are valued in the vendor community and could be effective in a food safety context where protecting consumers is a variable.
Resilience and motivation	Vendors shared many stories of resilience and motivation to improve their businesses. Reminding vendors of their resilience is particularly important because the intervention will likely ask them to change a process or practice – a change that may add to the challenges associated with running their businesses.
Pride and success	Pride and success are motivating factors for vendors. Keeping customers healthy, as another source of pride and success, may also resonate with vendors. Tying food safety with business success may be another way to reach vendors.
Occupational hazards	Stories featuring occupational hazards (e.g., burned in a fire, cursed by a jealous competitor) may be dramatic, which – in certain kinds of media programming – could be highly effective at capturing the audience's attention.
Reliance on government for business help	Many vendors noted that their business was constrained by lack of infrastructure improvements or the unavailability of interest-free capital government investments). This tension provides a useful background for narratives, particularly when addressing infrastructure-related food safety concerns.
Seizing market advantage	Vendors are highly adaptable, eager to strengthen their business, and increase sales.
Religious norms and values	Because religious norms and values organize community life, narratives about vendors and food safety practices should highlight sociocultural values.
Women in the market	Although women may not be primary market vendors, women's roles in society and in the life of vendors is often significant. Women's stories can be woven into media and narratives about food vendors.

3.13. Targeted Behavior Research (1.9)

This research included iterative rounds of qualitative research in Kebbi markets to gain deeper insights into vendor and consumers' cultural beliefs, practices or social expectations that influence food buying and handling. It also sought to better understand how an individual's personal hygiene behavior influences their risk perception and self-efficacy in practicing food safety. The data collection methods included a qualitative study, in-depth interviews, and focus group discussions. Key learnings included:

Vendors

- Islamic teachings influence vendor decisions on what food to sell, encourages fulfilling needs of other Muslims, and encourages making an honest living.
- Vendors understand food safety and believe it is relevant to their work. Their understanding is centered around the promotion of health, proper handling of food and ensuring the food is not contaminated.
- Due to the importance of customer demand, satisfaction and retention, vendors say they are open to receive consumer feedback and are willing to incorporate changes requested, if they can.
- Vendor food safety is applicable to their handling practices/decisions such as keeping stall/ business area clean; regular handwashing; proper washing/sorting and storage of food; and personal hygiene.
- To the extent that consumers value and appreciate food safety, cleanliness and hygiene, the vendors may consider these as a business motive.
- Sources of information on food safety include: parents; media (TV and Radio); hospital, school, religious leaders, etc.
- Fear of getting themselves or their customers sick and avoiding associated costs of treatment seems to be a motivator. For the most part, vendors will improve their personal hygiene practices, because customer's sickness appears to be associated in part with a failure in their personal hygiene practice.
- Vendors believe that more can be done to improve food safety, e.g. relevant authority makes selling more equitable (prices, quality); more awareness in the community and state; and engaging religious leaders
- It seems viable to leverage vendor personal appearance and cleanliness values to attract customers to vendors and/or potentially to influence customer retention.
- Health and its associated costs is a big motivator, and responsibly incorporating this topic in the messaging is important.

Consumers

- Widespread understanding of personal hygiene, its aspects and importance, mainly first heard from parents, elders and in school.
- Relationship between perception of personal hygiene of the vendor and perception of food safety is seen in their focus on vendor's hygiene when purchasing food:

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- o Physical appearance of vendor, especially clothes
- o Cleanliness of the environment in which the food is kept
- o Food packaging that keeps flies away
- o Cleanliness of the store
- Buyers' beliefs on hygiene are more influenced by negative consequences than positive lifestyles. Contracting diseases is the main reason that makes salient the importance of personal hygiene.
- Knowledge of important aspects of personal hygiene are learned and influenced by family members (mostly mothers), religion, and culture:
  - o In Islam, for prayers to be accepted one must practice personal hygiene
  - o Culture requires married women to maintain a clean home
  - o Parents and grandparents have been practicing hygiene for a long time
- Vendors are selected more through an elimination-by-aspect heuristic. The buyer assesses the vendor's looks, clothes and environment, and selects vendors to approach based on those cleanliness aspects.
- However, buyers will switch to other vendors if the products do not meet acceptable quality standards (e.g., stones seen in maize or rice)
- Women consumers (buyers and preparers) expect a high standard of hygiene practices from vendors
- Religion and cultural values are more salient at different points in the customer food safety journey map. Interventions should leverage culture and religion at points where they are most salient.

4. LEARNINGS APPLIED DURING THE EATSAFE INTERVENTION DESIGN SPRINT (ACTIVITY 1.20)

At the end of Phase I, EatSafe was fully informed on the relevant background research related to food safety in the focus markets in Birnin Kebbi and has engaged the key actors in the markets where EatSafe interventions will be tested.

The preliminary design of novel interventions in Nigeria took place in the latter part of Phase I. Using the learnings from evidence generated in Phase I, EatSafe conducted a Human Centered Design Sprint to generate preliminary prototypes that would fill knowledge gaps and generate new evidence on how best to empower consumers to demand safe nutritious foods in traditional markets (additional details on the Sprint are available in Appendix 2). The preliminary intervention ideas were designed to be consumer and market actor focused, behavioral in nature (i.e., centered in behaviors and their drivers, not infrastructure or technology), measurable over time, and informed by community norms, local priorities, values, and cultural practices. The five intervention prototypes developed during the Sprint will be further refined and tested in Phase II.

Below are brief descriptions of the five intervention prototypes along with some of the key learnings generated in Phase I that reinforce their design.

4.1. COMMODITY FESTIVAL

A commodity festival (e.g., Fish Festival, Vegetable Festival, etc.) that takes place in the market is an out-of-the-ordinary, exciting, and immersive environment that can act as a positive emotional reinforcement to make participants feel more engaged and more receptive to new activities and messages. For consumers, a festive environment where food safety is emphasized could lead them to pay greater attention to the importance of food safety and increase their confidence and self-efficacy in how to engage with vendors to express their demand for information and safer food. For vendors, the opportunity to showcase their business and attract customers can provide a powerful incentive to prepare for an event by "shaping up" their stall and engaging in preparatory activities including trainings in improved food safety practices and ways to engage with consumers on food safety matters. In turn, seeing a clear "return on investment" during the event could provide positive reinforcement that motivates vendors to continue food safety improvements in their shop and practicing improved food safety behaviors. Months before the event, EatSafe will collaborate with the commodity's vendors and market association to design and implement business training opportunities linked to food safety including innovating around safe food business practices. By leveraging the consumer engagement with the festival and making the link between improved safe food practices and business success, EatSafe seeks to motivate commodity vendors to collaborate and invest in food safety improvements.

Phase I learnings that support design: EatSafe's research has shown that many vendors act in accordance with their fellow vendors' actions, especially if they belong to a trade group or informal cooperative. Additionally, our studies have shown that vendors are highly motivated to avoid food safety issues and that vendors would likely welcome change in practices that make foods more attractive to consumers, thereby increasing demand without requiring active recruitment of consumers loyal to other vendors. EatSafe believes the Festival will test key foundational themes such as the collective safety of the community, civic contribution of vendors, long-term consumer-vendor relationships, and the continued earning of consumer trust. In particular, the strong ties between some vendors and consumers creates social capital that can be celebrated as well as leveraged during the Festival to motivate the use of improved food safety practices.

From the review of citizen engagement and support by other studies, it was suggested that Faith and Traditional Leaders (FTLs) can serve as food safety advocates since they are influential and well respected by the citizens. It will be instrumental to include key FTLs as part of the commodity festival. Additionally, to reconcile the tension between the breadth of food safety determinants in the market and time/resource constraints and leverage vendors' collective pride, EatSafe could design the festival to focus on only one commodity at a time.

4.2. CLEAN VENDOR BRAND AND AWARD

Partnering with local authorities and existing vendor and consumer associations, EatSafe will establish a clean food vendor brand. The brand will be awarded to vendors that adhere to the minimal acceptable standards for cleanliness in traditional markets. Customers will provide feedback and awards on a regular basis to vendors for exceptional performance in cleanliness and food safety. The Branding Seal will be displayed on the vendors' stalls (in the form of a seal), and Cleanliness Awards will be awarded to vendors episodically (in the form of a badge) to reinforce positive changes and allow customers to identify "clean food vendors." As interest in awards (cleanliness and safety) and growing customer bases increase, new vendors will be compelled to meet the minimum standards and earn the brand.

Phase I learnings that support design: Through Phase I research, EatSafe found that consumers have some food safety knowledge, and most shoppers use general cleanliness attributes (vendor looks clean and practices good hygiene, food is fresh and not on the ground, etc.) to make choices about who to buy from. When assessing a shop's cleanliness specifically, the most important factor considered by consumers (46%) is the tidiness of the shop, followed by whether food is covered (44%), cleanliness of surfaces such as countertops (41%), waste management (~33%). We seek to build on existing consumer agency and cleanliness attributes used in purchasing decisions by augmenting their criteria with food safety characteristics and creating a visual signal (the brand) to support their decision making. Studies found that consumers use visual clues (presences of flies, smell, vendor hygiene) to select where to buy foods (vendor selection criteria) and a customer-driven brand and award would allow customers to determine and celebrate the cleanliness achievements of vendors. This emboldens customers' self-efficacy in demanding safe foods, while also reinforcing the incentives for vendors to improve and maintain high standards of cleanliness.

EatSafe's research showed that where groups of vendors rely on the same supplier, actual quality of the goods is unlikely to differ within that category of goods. This makes it hard for a vendor to distinguish himself based on his product alone (and elevates the importance of vendors' other documented strategies: pricing; personal service; credit). Thus, the brand and award may elevate the importance of non-product-related food safety attributes, e.g. stall and vendor hygiene, that consumers can use to make choices between vendors.

4.3. SAFE FOOD MARKET STAND

EatSafe will lease a stall (or other space) within the market that will be daily staffed by community members with food safety training to provide consumers with context-relevant food safety information, serving as a hub for market customers (and vendors) to learn about food safety related topics important to market shoppers. The Safe Food Stand will seek to distribute food safety information in an attractive and reusable form drawing on EatSafe's acceptable food safety practices developed for all interventions. It will combine food safety information with other appealing information on topics that consumers already care about, such as safe food

preparation and extending family food budgets. Its activities could include demonstrations on cooking; testimonials and visits from traditional/religious leaders and influencers; and regular consumer surveys on the market's cleanliness (this could be coupled with the Clean Vendor Branding Award activity).

Phase I learnings that support design: EatSafe's research showed that consumers have numerous knowledge gaps regarding the exact causes of foodborne illness, how to distinguish FBD from other types of illness, which foods are highest risk, and risks related to cross-contamination. However, many consumers already use relevant cues on vendor and stall hygiene and feel a lot of confidence and agency about choosing 'good' (quality) foods. The Safe Food Stand will test whether it can leverage consumers' agency to choose quality food and enhance their knowledge with easy to understand, trusted information about food safety. EatSafe's stakeholder engagement activities continually highlighted the need to increase awareness of food safety for consumers in the market. The FES showed that men and women have somewhat different shopping styles at the market. While many men are proud of their 'get-in/get-out' shopping, many women take pride in being discerning shoppers and like taking their time and asking multiple questions to vendors and especially enjoy a good bargain. With this knowledge, it is likely that the Safe Food Stand will be used most frequently by women in the market, and that they will be receptive to new information that they can use to bargain with vendors.

Observations that were part of the cohort study showed that consumers and vendors regularly discuss topics related to food safety (including quality, cleanliness, healthiness, and safety) at the point of sales/purchase. The FES showed that when asked directly about safety/cleanliness, nearly all consumers see it as important but also found a fairly low level of salience compared to other concerns when the topic was not specifically primed or prompted (most foods were seen as safe or hazards as easily manageable in home). Jointly, these results suggest that food safety is recognized – and people can likely be convinced to make it more central in decision making if given the right cues and motivators. EatSafe will use the physical stand as a permanent, reinforcing source of motivation and conduit for increasing food safety salience.

4.4. CLEAN FOOD RADIO SHOW

EatSafe will leverage the community's broad interest in radio programming to help drive consumer demand for safer foods with a specific aim to change purchasing and selling behavior of various members of the household. The Clean Foods Radio Show (name to be tested) will draw on entertainment-education theory and practice to develop a compelling, story-based radio program—or tie new storylines into existing radio programs—that will draw in listeners. Through an entertaining story, the show will provide important food safety information, model practical food safety practices, and help listeners understand their opportunity as consumers to improve food safety standards in the market. Key food safety

messages and practices will be naturally woven in a way that does not feel didactic or forced, but rather a part of the natural flow of the story and the actions of the show's characters.

Phase I learnings that support design: EatSafe's FES indicated that various members of a typical household engage in one or many parts of the meal preparation process – either in planning, stating their preferences, shopping at the market, providing the money, or eating the food at home. As all family members can influence choices made at the market, reaching several members of a family with food safety messaging has the potential to expand behavioral change related to food safety beyond the physical market. EatSafe's Phase I communication channel analysis and Story Sourcing activity showed that radio is a widely accessed communication channel and reaches a wide audience in Birnin Kebbi.

As formative research suggested, entertainment-education programming can be and has been effective in helping to change behaviors, particularly when part of a larger cohesive initiative. The show will highlight some of the health consequences of consuming unsafe foods because EatSafe's research highlighted that if consumers had a better understanding of the consequences of unsafe food, it may assist in identifying trade-offs between food safety criteria, price, and convenience. Additionally, Feed the Future activity, Breakthrough Action, has successfully reached audiences in Birnin Kebbi through radio programming with several public health messages. This provides EatSafe with a partnership opportunity that leverages an existing audience.

4.5. ALLIANCE FOR CLEAN FOOD: A PLATFORM FOR COMMUNITY ENGAGEMENT

Under this activity, EatSafe will establish and launch an Alliance (or integrate food safety into existing alliances) that brings together vendors, consumers, other market actors, and governing representatives in the traditional market system to establish a collective goal of "clean" and safe food for all in Birnin Kebbi's markets. The proposed *Alliance for Clean Food* (name to be tested) will serve a supporting function for consumer and vendor activities that support EatSafe's food safety interventions, advocacy for clean food environments and behaviors, benchmarks for minimal food safety practices, and evaluative measurement services. The Alliance will provide a regular forum and home for consumers and vendors to interact and learn from government agriculture and health officials, municipal and market leaders, and each other – a town hall for "clean" and safe food knowledge, innovation, and exchange. The Alliance will develop tools for tracking progress and invest in advocacy to attract new members and commitments to safe food in Kebbi markets.

Phase I learnings that support design: EatSafe's Phase I research confirms that food safety is a joint responsibility. While most consumers believe that it primarily falls on government and health officials, some also expect vendors to take certain actions; thus, there is a recognized role for each stakeholder. An alliance brings together multiple stakeholders around a common goal of improved food safety and advance each member's collective interests and pool their

capabilities. EatSafe's policy reviews and stakeholder engagements strongly suggest that for a consumer-driven movement for safer food to take hold in traditional markets that have minimal food safety infrastructure or oversight, consumers must work with vendors and market managers and government officials to align the incentives to sustainably gain access to safe and nutritious diets.

Vendor associations appear to have significant relevance to vendors. In particular, they appear to have secured vendor compliance while at the same time being seen by their members as a genuine advocate for their interests. The Alliance could potentially create a space for various vendor associations to come together to share challenges and ideas on how to improve food safety in their market. On the consumer side, EatSafe research showed that a functional consumer association is lacking in Kebbi State and that an alliance may provide a springboard to initiate a new consumer association. By bringing together the collective voices of consumers and vendors, the Alliance has the potential to create a powerful forum to collaboratively discuss and improve food safety with market and government authorities.

EatSafe's research clearly shows that engaging policy makers and market authorities to better understand and invest in improved food safety in traditional markets will be necessary to ensure long-term impact. In line with the project's objectives, EatSafe's interventions focus primarily on changing consumer and vendor food safety behaviors, attitudes and practices. However, we acknowledge that in addition to these changes, infrastructure-related constraints will need to be addressed to improve food safety in a long-term, sustainable way. As such, the Alliance is one possible mechanism to advocate for improved food safety policy and investment in traditional market infrastructure.

5. APPENDICES

5.1. Appendix 1: Links to Full Reports

REPORT TITLE	LINK
GLOBAL	
Review of Measures and Indicators for Food Safety Performance (Activity 1.1, PY1)	GAIN Website
Global Review of Consumer and Vendor Perspectives on Food Safety (Activity 1.11.1, PY1)	GAIN Website
Food Safety Education, Training and Technology Interventions in Africa and Asia: A Review of Studies Relevant to Traditional Markets in Low Resource Settings (Activity 1.12, PY2)	GAIN Website
EatSafe Innovation Inspiration Tool (Activity 1.12.3, PY2)	GAIN Website
Assessing Food Safety Intervention Relevant to Foodborne Zoonoses in Low- and Middle-Income Countries (Activity 1.13.2, PY2)	GAIN Website
Perspectives on Food Safety: A Review of Ethnographic Studies (Activity 1.14.1, PY1)	GAIN Website
Stories from the Forefront: Interviews with SBCC Media Professionals (Activity 1.15.2, PY1)	GAIN Website
Training with Media for Social and Behavior Change: A Review (Activity 1.16, PY1)	GAIN Website
Report on Normative Guidelines for Governments to Promote Safer Traditional Markets (Activity 1.18, PY2)	GAIN Website
Literature Review Linking Food Safety and Nutrition (Activity 1.2.2, PY1)	GAIN Website
Integrating Food Safety and Nutrition for Improved Health and Wellbeing: A New Lens on Food System Frameworks (Activity 1.2.4, PY2)	GAIN Website
Consumer-Facing Interventions to Improve Food Safety Perceptions and Practices in Low- and Middle-Income Countries: A Review (Activity 1.3.1, PY1)	GAIN Website
NIGERIA	
Analysis of Food Safety Investments in Nigeria: A Review (Activity 1.17.1, PY1)	GAIN Website
Report of Municipal Roundtable Engagement with Stakeholders (Activity 1.19.4, PY2)	GAIN Website
Report of Review of Indicators in Nigeria (Activity 1.2.6, PY2)	GAIN Website
Publicly Available Food Safety Information: Grey Literature Resources for Consumers and Practitioners, with a Focus on Nigeria (Activity 1.3.2, PY1)	Internal only
Consumer and Vendor Perspectives and Practices Related to Food Safety in Nigeria: A Review (Activity 1.4.1, PY1)	GAIN Website
Focused Ethnographic Study on Food Safety Values, Knowledge and Practices in Traditional Markets in Birnin Kebbi, Nigeria (Activity 1.4.8, PY2)	GAIN Website
Baseline Report on Food Safety Attitudes and Practices (Activity 1.5.9, PY2)	Upcoming

Occurrence of Foodborne Disease Hazards in Foods and Beverages Consumed in Nigeria: A Systematic Literature Review (Activity 1.6.1, PY1)	GAIN Website
Technical Report on Food Safety Hazards for Select Nutritious Foods in Traditional Markets (Activity 1.6.8, PY2)	Internal only
Nigeria Policy, Monitoring Systems Analysis and Stakeholder Mapping Report (Activity 1.7, PY2)	GAIN Website
Review of Citizen Engagement in Safe Food Markets in Kebbi State, Nigeria (Activity 1.7.4, PY2)	GAIN Website
Story Sourcing in Birnin Kebbi, Nigeria (Activity 1.8, PY2)	GAIN Website
Targeted Behavioral Research (Activity 1.9, PY2)	Upcoming

From August 2-6, 2021, over 30 EatSafe consortium members participated in an intensive collaboration process known as a Design Sprint – a rapid, prototyping process often used in the private sector to convene a variety of stakeholders to brainstorm solutions for problems. The EatSafe Design Sprint used Human-Centered Design (HCD), an approach for solving complex problems that prioritizes people's lived experiences. HCD asks program and intervention designers to empathize with those they seek to benefit. HCD participants are continually reminded of the end-user as problems are identified and contextualized, as well as when alternative solutions are conceptualized, developed, and tested. HCD was well-suited to help identify interventions under EatSafe's behavior change goals.

A core element of ensuring a productive Design Sprint is agreeing to a long-term goal that acts as a guiding principle. The long-term goal of the EatSafe Design Sprint was to: *Empower consumers and vendors to sustainably prioritize safe, nutritious, and healthy food in informal markets.*

Each day of the Sprint included a set of activities organized around a component of the problem-solving process. Participants were divided into four teams containing six or seven individuals from the EatSafe consortium and other key stakeholder groups. Each team was composed of a geographically diverse group, with each participant assigned a role, as shown in **Table A1**.

Table A1. *Sprint Roles*

ROLE	FUNCTION	ORGANIZATION(S)
Researcher	Expert on food safety	ILRI; Busara, GAIN Research
Decider	Has institutional authority to make decisions	GAIN Project Management
Challenger	Asks critical questions to help the team come to a shared understanding	GAIN Research
User Reps	Brings proximate perspective and context	GAIN Nigeria, Busara, Kebbi Stakeholders
Storytellers	Experts on communications and information sharing	Pierce Mill
Messenger	Share prototype and questions with the translator via WhatsApp and relay test user responses to the team	Busara, GAIN Nigeria, Pierce Mill

Over the five-day Sprint, each team chose a single fictional persona and visualized their experience on a "Journey Map" – a representation of a specific time during which an intervention could positively influence food safety behaviors. As shown in Table A2, two teams chose vendors while the other two chose consumers. The teams then chose a specific moment on the User Journey Map to intervene. Once the teams chose a moment, they brainstormed

problem statements in the form of "How Might We…" (HMW) questions, aiming to reconceptualize a challenge as an opportunity. With dozens of HMWs developed, the teams chose a single question on which to focus. Over five brainstorming activities followed, with the intent of developing as many possible ideas for solutions as possible. After condensing and categorizing ideas, the teams voted on a single intervention. **Table A2** describes the results of this process for each team.

After refining a single intervention idea, the teams drafted a testing script in which users were asked to respond to five multiple choice questions in a WhatsApp message. The teams then met to evaluate the feedback, identify learnings, list what to test next, and note potential impacts. These final stages are described by team in **Table A3**.

Table A2. *Intervention Sprint Results, by phase and team – Part 1*

PHASE	TEAM 1	TEAM 2	TEAM 3	TEAM 4
Persona	Dalhatu	Alhaji	Princess	Mohammed
Profile	Fish vendor	Chicken vendor	Practiced shopper	Novice shopper
Moment Chosen for Intervention	Customer chooses fish and Dalhatu guts and cleans the fish	Killing and cutting of the chicken	Making choices at the market	Information from family about the market before leaving home
Selected "How Might We" for Design	…Help Dalhatu see the business opportunities connected with better food safety practices?	…Get Alhaji to be receptive to consumers during cutting and killing?	…Make Princess a change agent who shares information through informal grapevine?	…Communicate food safety information to various members of the family?
Intervention Idea	**Central Market Fish Festival**: Package that incentivizes and make it easier for vendors to grow; business model that embeds food safety in their customer care and ties to a clear ROI	**Consumer Cleanliness Award and Brand:** develop opportunities for business development tied to food safety	**On-site Stand for Consumer** Education: in the market, staffed with consumer food safety advisors and branded around the '5 keys' of safer foods	**Radio Campaign**: leverage popular community and cultural events to develop and communicate family-specific food safety messages

Table A3. *Intervention Sprint Results by team – Part 2*

TEAM 1 – DALHATU, FISH VENDOR

Central Market Fish Festival

Test vendors (6):
- Are interested in participating in the event and showcase their business during it.
- Are eager to learn new tools and practices to expand business.
- See festival as opportunity for themselves.
- Are interested in more info about event.
- Want to gain new customers during the event by drawing attention to their business.
- Are interested in collaborating with other vendors.

Possible impacts:
- "Event" allows multiple channels pre-, during, and post-event
- Increased organization and collaboration for food safety among vendors
- Build pride and identity in market as a clean space (virtuous cycle)
- Introduce or establish improved practices in emotionally engaging and motivating setting
- Increased vendor improved practices that positively impact food safety (both business practices and specific fish handling steps)
- Increased consumer demand for improved vendor practices that reduce food safety risks

## TEAM 2 – ALHAJI, CHICKEN VENDOR

Consumer Cleanliness Brand and Award

Test vendors (6):
- Would "*very likely*" join an organization associated with branding because of training/education, marketing, and improved business practices.
- Felt that a recognized group's brand would improve their business because consumers value cleanliness.
- Expected the brand to help with marketing and generate interest in cleanliness.

Possible impacts:
- Receptivity of the vendor to the consumer's preferences for clean spaces and sale of hygienic food
- Increased interaction/ collaboration of the vendors and consumers through the association
- Empowerment of the consumer to demand cleaner food through cleanliness behavior awards given to vendors
- Increased vendor income through increased number of customers and sales
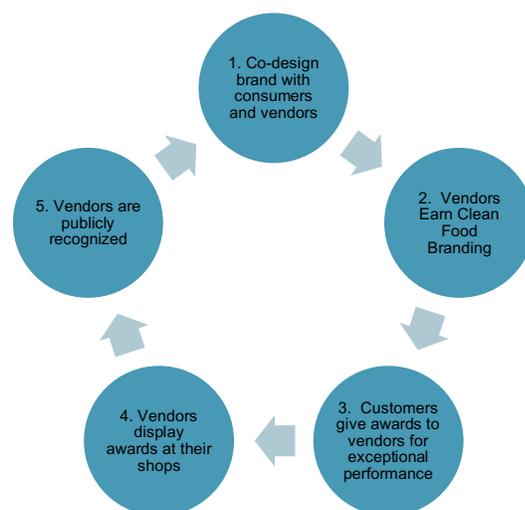
TEAM 3 – PRINCESS, PRACTICED SHOPPER

On-site stand for consumer education and engagement on food safety: Lease a stall within the market staffed by trained community members

Test consumers (5):

- are likely to stop at the Safe Food Stand in the market.
- were most likely to want to talk to a staff person.
- 3 of 5 wanted to receive info from trained staff
- were interested in trainings on food safety

Possible impacts:

- Safe Food Stand would increase the consumers' sensitivity to food safety in the market.
- Safe Food Stand could equip consumers with the skill and confidence to ask food safety questions to vendors and to make better food safety decisions.
- Safe Food Stand could help create the environment to engage vendors, local officials and market authorities.
- Safe Food Stand helps empower consumers to demand food safety changes from the vendors and from market and local officials.
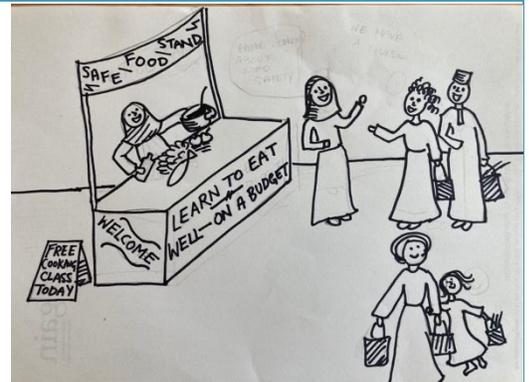
TEAM 4 – MOHAMMED, NOVICE SHOPPER

Radio campaign on VisionFM during popular call-in radio show:
Well-known host recommends a new radio program.

Test consumers (5):

- were willing to listen to a new radio program when a popular radio host recommends it, and they would then recommend it to the people close to them.
- mentioned that cleanliness, health and hygiene is an important determinant of their food purchasing and would like to know more.
- said the story should find what people care about - e.g. education, negotiation skills, being busy, healthy living - to draw people in.

Possible impacts:

- Increase knowledge of food safety and intention to change food purchasing behavior
- Stimulate public interest in discussions about food safety and its public health impact
- Increase awareness on benefits of safe food/dangers of unsafe food
- Increase positive associations to healthy food practices and pride in communities concerned about the safety of food.