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EatSafe - Evidence and Action Towards Safe, Nutritious Food

Perspectives on Food Safety: A Review of Ethnographic Studies

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USAID FROM THE AMERICAN PEOPLE

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

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ACRONYMS

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

FES	Focused ethnographic study
GAIN	Global Alliance for Improved Nutrition
LMIC	Low- and middle-income country
MNPs	Micronutrient powders
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

Central to addressing the global problem of foodborne disease is understanding the beliefs, values, and motivations of both consumers and value chain actors vis-à-vis food safety. While quantitative, survey-based research on food safety perceptions is widespread, such techniques may not be ideal for examining sensitive and complex topics like beliefs and values. In contrast, the qualitative research techniques used in ethnography and similar disciplines (such as in-depth interviews, observations, or shadowing) have been designed to examine topics such as emotions, values, and cultural context in depth. While they have not been widely deployed within food safety research, it is expected that they could yield many useful insights for the design of better food safety research and programming, including for the EatSafe project.

This report is intended to contribute to the work of EatSafe by bringing knowledge from ethnographic and other relevant social sciences sources to inform the design of its intervention and evaluation. As such, this review examines prior research on food safety-related topics using ethnographic and related methods, then uses the results to glean insights for the design of EatSafe research and intervention activities. By amassing a range of prior focused ethnographic studies on food and nutrition topics and undertaking a targeted search for other studies using similar methods to examine the topic of food safety, reviewers identified a total of 35 relevant studies. Reviewing the studies' main results and conclusions allowed us to highlight a set of key recurrent themes, with clear implications for future research and intervention design. The review made clear that consumers have strategies to mitigate food safety risk, but these strategies are not equally available to everyone in a population. Similarly, gender is a fundamental determinant of food safety beliefs and behaviors, including differential risk. Third, informal food markets are just one source of risk among many faced by consumers. Fourth, new messaging (on food safety and other topics) is perceived and evaluated in concert with other information circulating in the social and media environment.

Promisingly, the review indicates that there are specific circumstances in which individual agency is expanded and food safety-promoting behaviors can be more readily adopted. It also suggests that vendors may face personal or business-related risks in situations involving food safety, which could provide incentives for them to act. Finally, the review confirms that ethnographic methods are well-suited to examining the topic of food safety perceptions, and that the resulting data may be valuable if the investigation is focused on specific foods. Based on these results, EatSafe will aim to: understand and leverage any existing food safety-risk mitigation strategies, identify constraints consumers face when seeking to mitigate risk and potential ways to mitigate these constraints, and ensure its research activities are sufficiently narrowly focused and context

specific. We will also consider any potential implications for vendor livelihoods when designing potential interventions.

1. BACKGROUND & MOTIVATION FOR THE REVIEW

1.1. Motivation and Scope

Foodborne disease[1] is a critical global issue, responsible for an estimated 600 million illnesses and 420,000 premature deaths annually (1,2). The majority of this disease burden falls on those living in low- and middle-income countries (LMICs) (2,3), who make up about 75% of deaths from foodborne illness. In Africa, in particular, the per-capita burden of foodborne disease is about 27 times that of Europe or North America (1), and young children are particularly susceptible, shouldering about 40% of the burden (1). In addition to the human costs in both acute illness and raising the risk of long-term disease (4,5), foodborne illnesses also entail economic costs estimated at about $20 billion USD per year, due to sickness and loss of life, treatment costs, and impacts on trade (6).

To address this challenge, it is essential to reduce exposure to foodborne disease by ensuring food is safe at the point of purchase and that it remains safe until it is consumed. EatSafe – Evidence and Action Toward Safe, Nutritious Food focuses on food safety issues at retail outlets, particularly the types of informal markets where a large share of consumers in LMICs purchase their foods (7). These markets can be especially susceptible to transmission of foodborne pathogens due to a number of contextual factors, including poor market infrastructure (8,9), poor hygienic conditions (10,11), and inadequate storage practices (12). Informal markets, so-called "wet markets," have received considerable attention recently because of their potential role in creating the conditions for new viral pandemics, including the coronavirus pandemic (25). In addition to reducing risks associated with informal markets, improving food safety at the community level includes influencing consumers' food buying practices to enable them to acquire safer foods and to take appropriate steps to keep those foods safe.

To influence vendor practices and consumer choices, it is essential to understand the motivations, attitudes, beliefs, and practices that shape their decisions (13,14). Much of the research on these topics has been done using quantitative survey-based methods. For example, a recent EatSafe review of research on food safety perceptions among consumers and vendors in Nigeria found very heavy reliance on the use of cross-sectional closed-ended surveys (used in

[1] Foodborne disease is caused by a variety of pathogens, including viruses, bacteria, molds, protozoa, helminths (worms), and/or chemicals in food.

95% of studies) (15). Similar reliance on surveys has been found in other reviews of food safety research (16).

The application of survey-based methods to obtain information on food safety perceptions among consumers and vendors is useful, as such methods have an ability to provide a snapshot of characteristics across a large sample. However, surveys also have several weaknesses when it comes to studying of food safety perceptions and practices. The framing of questions and the restricted categories to code the answers reflect the assumptions and perspectives of the scientists, program developers, and/or marketing professionals who design the surveys. This feature means that respondents frame their answers in relation to those assumptions. Thus, the surveys provide little knowledge or insight into individuals' emotions and beliefs, their personal value systems, or key contextual social and cultural factors that are critical determinants of behavior.

In contrast, the qualitative methods (such as in-depth interviews, observations, or shadowing) used in anthropological and other social sciences aim to examine topics such as emotions, values, and cultural context in considerable depth. These methods typically involve in-depth interviews, and use guiding questions to elicit respondents' views and experiences (beliefs, values, and behaviors). Such methods can uncover respondents' food safety-related beliefs, values, behaviors and contextual social and cultural conditions—complementing the broader, high level information obtained from surveys and similar methods. However, such data may be found not only in research that was specifically undertaken to obtain information on food safety but also on related topics, such as food preferences or feeding/eating behaviors.

This review seeks to uncover relevant insights on the perspectives of community members (i.e., consumers) and vendors in anthropological and other social science research undertaken primarily with qualitative methods, with a focus on LMICs.

1.2. Relevance of the Review for the EatSafe project

The EatSafe program aims to generate evidence and knowledge of the potential for increased consumer demand for safe food to substantially improve the safety of nutritious foods in informal market settings in LMICs. The five-year program is funded by USAID and undertaken by a consortium led by the Global Alliance for Improved Nutrition (GAIN), with partners the International Livestock Research Institute and Pierce Mill Education and Media. In order to understand whether and how increased consumer demand can be used to improve food safety, it is important to generate evidence on how consumers and vendors perceive food safety, both as a concept and in their daily lives, and how food safety-related decisions are made. To probe these issues, EatSafe will use a mix of methods, including literature reviews, a cohort study, a

focused ethnographic study (FES), choice experiments, risk assessments, and stakeholder consultations.

The motivation for this review, is the assumption that understanding motivations, beliefs, and behaviors is essential for developing interventions and designing effective communications to facilitate behavior change (17–21). This report is intended to contribute to the work of EatSafe by bringing together knowledge from ethnographic and other relevant social science sources to inform the design of its intervention and evaluation.

This review will thus complement EatSafe's other research by highlighting, in detail, specific areas for consideration and inquiry related to individuals' beliefs and practices, based on the results of prior ethnographic and related research. Instead of seeking to provide an exhaustive or comprehensive record of past research, this review will showcase a select number of relevant insights and discuss their implications for the design of research methods and eventual interventions under EatSafe.

Following a section on the methods used for the review, the results are organized in four main areas:

- Consumer Perceptions of Risk,
- Consumer Strategies that Minimize Food Safety Risk,
- Knowledge and Agency, and
- Safety and Risk as Contingent Attributes.

Additional sections discuss the results, their implications for EatSafe, and conclusions.

2. METHODS

2.1 Approach & Scope

This review can be classified, using the Grant et al. typology (22), as a "non-systematic, critical qualitative evidence synthesis." The aim was to identify key themes that emerge from studies in different contexts that would be useful for informing EatSafe, both in terms of its methods and its selection of interventions. This review sought to identify and synthesize relevant studies that included a range of approaches and contexts. The decision not to use a comprehensive systematic review approach was made for two reasons. First, the systematic identification of sources and subsequent distilling of material on such a broad topic is challenging and poses significant challenges for analysis, data presentation, and interpretation, especially as the studies use diverse non-quantitative approaches to analysis and results presentation. Second, the review aimed to focus closely on specific insights resulting from high-quality, relevant studies—as opposed to providing a higher-level, more exhaustive overview.

Information was obtained through two separate methods:

(1) A review of previous FES studies, from which the findings related to food safety are extracted.
(2) A review of broader ethnographic and qualitative work related to food safety.

The decision to focus on earlier FES studies was made for three reasons. First, we anticipated that the theme of food safety might emerge in ethnographic work focused on food and feeding practices, even if it was not an explicit topic of these studies. Second, reviewers recognized that GAIN and USAID have made considerable investments in such work in the past, including, for example, the funding and implementation of a number of FES studies in Kenya and Ghana over the past five years.[2] These studies and the reports and analyses underpinning them contain rich, in-depth data not often found in other types of nutrition research, and it seemed important to extract maximum value from these to inform programming. Third, as the FES approach will be used in the EatSafe research, understanding how food safety has manifested in prior studies using this method will be useful for planning the EatSafe FES work.

The second data source, non-FES ethnographic and qualitative literature that contained material related to food safety, was intended to broaden the scope of the contexts and methods covered in the examined studies, as well as of the findings and concepts emerging from them.

2.2 Methods for study identification, review, and synthesis

Prior FES studies to include in the review were identified through GAIN's existing archives, those of the authors, as well as requests to other organizations known to have conducted FESes in the past (e.g., UNICEF, Johns Hopkins University). Reviewers conducted a search for additional studies on food-related topics using FES,[3] and included studies that did not use the label FES but employed at least three of the following methods from the FES toolkit (63):

- a multi-stage research cycle
- free-listing
- open-ended interview questioning frames
- domain item ratings or rankings.

Using these criteria, reviewers identified a total of 14 published and five unpublished FES studies to include.

[2] The FES approach was originally developed by one of this review's authors at the World Health Organization, where it was used to examine childhood acute respiratory infections and, later, diarrhea. In was then adapted for use in nutrition and specifically on infant and young child feeding, with the active involvement of both GAIN and USAID.

[3] The search was conducted in Google Scholar using the search terms "food 'focused ethnographic study"; the titles of first 300 results (of 601, sorted by relevance) were reviewed.

Identifying sources of data in the broader ethnographic and qualitative work on food safety was done in several ways:

- Directly contacting individual researchers known to be active in the application of ethnographic and qualitative methods. Reviewers asked them for recommendations about potential sources for food safety and related topics.
- A request to the members of the Society for Anthropology of Food and Nutrition, via their listserve, to ask for and share relevant studies.
- A search of four social science journals (*Qualitative Research, Qualitative Health Research, Medical Anthropology Quarterly,* and *Social Science and Medicine*) for the terms: "food safety," "food hygiene", "food poisoning", "food risk", and "food scare" over the period 2000 – 2020.
- A search of three food safety journals (*Food Control, Journal of Food Protection,* and *Comprehensive Reviews in Food Science and Food Safety)* for key terms related to "ethnographic" and "anthropology" over the period 2000 – 2020.
- Review of reference lists and citations in papers identified by the steps described above.

For all areas of the review, the scope for study contexts was global. However, to be included, a study needed to have some applicability to the LMIC context. For instance, a study detailing the use of ethnographic methods to improve hygiene in the North American food service context was screened for possible inclusion, but omitted since the context and findings were directed to the franchise operations of large corporations, which reviewers deemed inapplicable to informal markets in the LMIC context. We included studies using ethnographic techniques and other qualitative methods, or mixed methods, but reviewers did not include studies with an exclusively quantitative data analysis focus. Reviewers also excluded studies in which the food safety risks described were (i) mainly chronic in form and related to poor diet quality, as opposed to safety *per se* (e.g., diabetes); (ii) related to genetically modified organisms (GMOs); or (iii) concerned with food security (i.e. hunger), as opposed to food safety. It is important to note that the results of the search procedures cannot be assumed to contain all of the relevant research or emerging themes, nor do they definitively reflect the frequency with which a given theme occurs in prior research. Instead, they are meant to give a snapshot of the most relevant themes emerging on this topic specifically from studies using ethnographic and similar methods.

For the non-FES papers in our review, the keyword search of periodicals yielded 15 articles, of which 11 were screened out based on their title, and a further three discarded based on content of the abstracts. An additional 16 papers were received in response to our requests, or identified

from the citations in those of papers, from which two were ruled out. This yielded a total of 14 non-FES papers. In all, a total of 35 papers (19 FES and 14 non-FES) were reviewed.

The diverse, integrative, and iterative approach to study identification and synthesis employed in our review is similar to that used successfully in (24). Reviewers began by "mapping" the main relevant themes that emerged in previous FES studies. New examples from the FES studies were added to this mapping as they were reviewed. This map was used to inform our assessment about whether we had reached "saturation" with respect to a specific theme; that is, that no additional FES studies on that theme were required. As new non-FES studies were identified, they were reviewed and their main insights were used either to bolster the themes emerging from the FES or to identify new themes, to which subsequent studies might also add. In general, reviewers chose to include a theme if it recurred in at least two studies, thereby ensuring that these themes are at least somewhat universal and relevant for EatSafe's work.

3. RESULTS

3.1 Consumer Perceptions of Risk

This section focuses specifically on cultural constructs: the organized system of implicit and explicit concepts that underlie people's belief systems and affect their behaviors (26, 27). Anthropological mixed methods are particularly well-suited for eliciting and analyzing underlying cultural constructs—and thus revealing important components of consumers' decision-making concerning risk. A central objective of anthropological writings and ethnography is to present the "emic" view – the perspective of the "cultural insider." The emic view differs from the "etic" view of the cultural outsider—such as that held by a researcher, or policymaker. In contemporary ethnography, "domains" and "cultural constructs" within domains are widely used as theoretical tools to identify, organize, and describe cultural beliefs. For the EatSafe project, the broad domain of concern can be characterized as "(emic) beliefs and values related to the etic (i.e. scientists') concept of 'food safety.'"

The literature review revealed that some of the relevant constructs related to food safety are often expressed by respondents as binary or dichotomous categories—for example, food being either hot or cold, or from inside or outside; a vendor being trustworthy or untrustworthy. Other relevant constructs may be more appropriately characterized as containing multiple categories or as gradations, which occur in between the two ends of a dimension. For example, the humoral system of hot/cold classification holds that foods have an intrinsic quality (unrelated to temperature) that makes them either "hot" or "cold" and thus suited or unsuited for particular people to consume at particular times. In many places where the dimension of 'hot' and 'cold'

foods is present, there are foods that occur in a neutral position: neither hot nor cold. From the perspective of behavior change, these foods are often the most acceptable to be changed, precisely because of their neutrality. The research findings we discuss in this section take several forms. Some of them are expressed by respondents as binary opposites. Others are tripartite or involve more differentiated breakdowns of a dimension.

Better understanding these types of constructs is central to the work EatSafe, as a basic premise of the research project is that communications directed to community members (i.e., "consumers" or, more precisely, household members who shop at informal markets) are frequently designed without recognizing the important food safety-related (and health-related) cultural categories that local people use to process information. This is an important consideration, as messages and advice that do not fit with these existing constructs run the risk of being rejected outright. Alternatively, such messages require the recipient to develop explanations and rationales for herself or himself, in order to overcome the contradictions inherent in messages that are not in line with cultural cognitive categories.

Multiple micronutrient powders (MNPs[4]—a topic of focus in several prior FESes) provide an excellent illustration of the adaptive process that is required of caregivers when there is a disjunction between basic cultural concepts and information from a trusted professional. From a cultural perspective, this dilemma is nicely illustrated by the dichotomy captured in the concepts: "inside (i.e., home prepared) food is safe" and "outside food is unsafe." Faced with this construct, what does a caregiver do about the fact that MNPs are clearly an outside food? How can they give it to their child? Past research and program experience show that many women are able to develop explanations or rationales to reconcile these contradictions, such as "MNPs are not really food." However, it is probable that there is often a subgroup of caregivers who do not develop a rationale that permits them to try MNPs, and others who remain uneasy and watchful and ready to reject them if anything bad occurs (e.g., a diarrhea episode)—thus potentially undermining the success of an MNP intervention (44). Analogous examples likely exist with regards to food safety messaging.

In the following paragraphs, reviewers describe the main cultural constructs related to food and food safety identified through the literature review. Reviewers discuss the implications such constructs in the Discussion section.

3.1.1. "Natural / Unnatural" Foods

[4] Multiple micronutrient powders are single-dose packets of powdered vitamins and minerals that can be sprinkled onto a child's food to increase the micronutrient content of the diet and help prevent micronutrient deficiency.

A common binary of relevance to food safety is the distinction between "natural" foods and "unnatural" foods. Subsumed in this classification are several different ideas, including concerns about toxic residues (natural vs. chemical); genetically modified foods (natural vs. unholy); and nutritionally healthy foods (natural vs. processed). In a critique of theories attempting to explain consumer attitudes, Knox (54) argued that in the study of risk, food risks have a unique place because of the importance that culturally constructed ideas of the "natural" play in risk perception. A 2016 FES investigating consumer food habits in peri-urban Rwanda, for instance, identified a profound distrust of commercially produced foods, which respondents referred to as "factory" foods and which they counter-posed against "natural" foods that are grown locally (31). The report concluded that, for Rwandan food manufacturers wishing to market healthy products, the challenge would be to establish a third category of packaged, but natural foods – resolving the natural food/factory food dichotomy.

3.1.2. "Inside / Outside" Foods.

Bailey et al. (47) observed that for young Indian women in Delhi, a critical distinction was between what they referred to as "inside" versus "outside" foods. Foods cooked in the home (inside) were considered safer and healthier than foods purchased for consumption outside, which were widely referred to by the women being interviewed as "junk food". While this may seem an unsurprising distinction for a society in which there remains a significant separation between the domestic and public spheres, the authors go on to show that counter-intuitively, several types of commercial packaged foods, like biscuits, are excluded from the junk food category. The authors conclude that this is due to their association with the routine of the tea break, an important routine of domesticity. This underlines the fact that cultural classifications may not align to "logical" (i.e., etic) expectations.

An FES undertaken in Bangladesh in 2015 on the topic of MNPs revealed a similar inside/outside food distinction among rural mothers (38). As in the above discussion on reconciling conflicting information, this study found that mothers were uncertain whether MNPs were healthy for their children. One reason for this was that local health extension workers had recently undertaken a campaign against "outside" foods in order to reduce household expenditure on non-nutritious snack foods, yet the same workers were selling MNPs, which were clearly not an "inside" food.

In a study of the public discourse related to cholera outbreaks in Hanoi, Vietnam in 2007, Lincoln (56) found that the distinction between "inside" and "outside" foods was a recurrent theme in both official government health communications directed at consumers and in the wider media and development discourse relating to disease. The author argued that the distinction served the interests of a government that was opening the public sphere to commercial and entrepreneurial interests after years of close state regulation – a policy direction that was jeopardized by the emergence of cholera. The state was able to deflect attention from the role that Hanoi's decrepit

sewage treatment infrastructure played in the outbreaks by labeling the consumption of street food as a main source of cholera. In this case, the inside/outside dichotomy combined in a powerful way with several other recurrent ideas and anxieties (and was leveraged for a specific, political purpose). Street foods (outside foods) were associated with dubious ingredients and hygiene, but also with a class of entrepreneurs – the poorer, rural-to-urban migrant women who prepared and sold street foods – who seemed to embody the dissolution of the state-managed economy, the emergence of disorder in the public sphere, and the new profit motive. These vendors were vilified and accused of "concealing cholera." Food prepared at home ("inside food"), by contrast, was portrayed as safe due to its preparation by known family members, who were depicted as virtuous because the household was seen as a repository of normative gender and kinship relations – part of an ideology of the "happy and civilized family" promoted by state media. The inside/outside distinction thus carried with it important ideas of moral order, which made being "outside" doubly or triply bad, and not simply a matter of physical health (56).

3.1.3. "Hot / Cold" Foods

The humoral system of hot/cold classification, which is found in Ayuravedic cultures, as well as other cultural areas, is part of a highly developed framework for achieving health through maintaining "balance." As noted above, foods are thought to have an intrinsic quality that makes them either "hot" or "cold" (unrelated to temperature). People, too, can be in a temporary state of hot or cold, or their particular humoral classification may also incline them towards a hot or cold state. Foods, therefore, have an important role in re-establishing humoral balance. Conversely, the consumption of the wrong food – e.g., a "hot" food while one is thought to be in a hot physical state – risks exacerbating the imbalance. A 2015 FES on infant and young child feeding in Bangladesh (38) found that mothers structured their feeding choices in relation to this framework and exhibited consensus about which foods occupied the most extreme positions on the hot-cold continuum. Parents believed that the best food for a child suffering a "hot" illness was a "cold" food like banana. In that situation, offering meat (a food to which they attributed the strongest of "hot" qualities) would risk increasing the humoral imbalance and placing health at risk.

3.1.4. Food / Non-Food

Shifting from specifically food safety-related cognitive cultural organization *per se* to other examples of how cognitive classifications affect perceptions about food, and how food safety and nutrition messages may be received, the distinction between "food" and "non-food" is instructive. This distinction was reported by Santos-Aquin et al. in the Philippines (30) with respect to foods for infants, in which the investigators found that human breastmilk occupied a unique status that lay outside existing cultural classifications of types of food.

An FES study in Accra, Ghana (36) conducted in 2011, offers another clear example of how an emic classification of "foods" can differ from etic (scientists') classifications. An interview transcript reproduced in the study report shows how the investigator tried to reconcile two conflicting pieces of information: the respondent has just listed "healthy" foods she feeds her child. The list did not contain fruits. The interviewer then asks her if she feeds her child fruits, and she says she does. One might have concluded that the respondent felt that fruits were not particularly healthy. However, in probing by the interviewer, the explanation the respondent offered was: "We were talking about foods and not fruits. Fruits are not foods." Asked to explain why fruits are not foods, the respondent said, "Fruits do not give energy. But they protect the children against diseases and make them grow well." This exchange illustrates how a concept as general as "food"—which investigators might assume to be universal—acquires culturally specific meanings. It also shows how triangulation of narrative data, a key ethnographic method, is indispensable, both in real-time interviewing and in the process of data analysis.

Similarly, in an FES study in South Africa (37) the investigators concluded that one culturally acceptable form of a supplement for infants and young children would be a fortified peanut butter that could be added to porridge, as caregivers commonly put a "dollop" of peanut butter on infant porridge. The solution for how to promote a nutrient-fortified supplement might not have presented itself had the investigators relied on a discussion of "foods" alone, as peanut butter was *not* among the foods listed by respondents. A respondent explained that she had not mentioned it because peanut butter was considered "more of a condiment than a food."

Clarifying what constitutes a food in a given culture or population is a precondition for investigator-respondent dialogue on a mutually understood range of items. Without this shared understanding, investigators could find themselves deep into a conversation in which they are talking about one topic and the respondent is talking about another. Such misunderstanding also makes it difficult to develop a complete picture of diets and the priorities and openings for intervention, including interventions to improve food safety. More broadly, each of the different classifications noted above could be related to perceptions of food safety or could represent ways in which consumers understand food classifications in the absence of any particular cultural connotations with "safety." Understanding such concepts should be central to EatSafe research and leveraging such concepts could be a powerful platform for intervention design.

3.2 Consumer Strategies that Minimize Food Safety Risk

Another primary theme in the studies identified in the review consisted of descriptions of actions consumers take to minimize risk. The reports yielded examples that illustrate the ways in which consumers are resourceful, seeking to minimize food safety risks through a variety of strategies. These strategies include: i) using trusted vendors, ii) actions to shorten household food supply chains, and iii) assuming greater control of food processing, as described below.

3.2.1. Using Trusted Vendors

Perhaps the most frequently reported risk-reduction strategy is the establishment of relations of trust with a specific vendor (a phenomenon documented in qualitative work from Vietnam (52, 48, 55), Ghana (51, 45), and Rwanda (31)). Following illness episodes, consumers are quick to implicate vendors as being to blame; conversely, they value the reliability of vendors whom they do not associate with food safety problems. Wertheim-Heck et al. (52), writing about informal markets in Vietnam, noted the strain that vendors endure in this situation, given that they are largely powerless to counter accusations from customers who fall sick, regardless of whether there is a connection to their produce.

In the course of the review, *trust* emerged as a key cross-cutting theme. Many studies noted the importance that consumers place on being able to trust the vendors from whom they purchase. Rheinlander et al., in a study of consumer interactions with street food vendors in Kumasi, Ghana, characterized trust explicitly as a consumer "coping strategy" (51). One reason trust assumes such importance is that many food safety hazards are undetectable to the senses, which are among the few cues that consumers use to assess their risk level when they purchase foods in a market. Is this vendor someone who seems conscientious about food handling and storage? Is she likely to be truthful about where their food originated? Would she let me know it if she had doubts about its safety on a given day? These questions are central to consumers' food purchasing decisions in situations where they cannot rely on certifications, standards, or inspections to guarantee food safety.

Anthropological techniques are well suited to reveal the forms and meanings of trust in communities. They typically incorporate elements of empirical observation and statements from respondents that reflect underlying assumptions and reveal culture-specific concepts. The study in Kumasi, Ghana (51) found that trust is built around ideas of order and neatness. Consumer expectations appear to be related less to actual hygiene and food handling practices of the vendor than to a kind of *performance* of hygiene, the key features of which are a vendor's personal appearance, including manner of dress, as well as an ordered presentation of produce and wares.

Another study from the Kumasi marketplace (45) showed that trust is built around a vendor's reputation and that reputation is only partially related to the quality of their produce. In their purchase decisions, consumers appeared to be equally concerned with aspects of traders' moral character. Consequently, vendors work assiduously to curate their reputations, taking care to demonstrate courtesy and respect in their interactions with customers, providing credit even when caution dictates they should refuse it, and acting outside the marketplace with equal attention to propriety (e.g., by assuming reciprocal social obligations such as attending funerals and other community events). Despite these efforts, traders live in fear of damage to their

reputation, which may be jeopardized by even a momentary lapse in courtesy with customers. As the study noted, “malicious gossip is feared more than complimentary gossip is desired.”

In a similar vein, Wertheim-Heck et al. (52) described consumer-vendor relationships in Vietnam—where consumers continue to seek out small vendors of green leafy vegetables in a rapidly modernizing retail environment, noting the “precarious balance of risk and trust.” The authors view this as reflecting a balance that embodies key elements of Asian social relations: reciprocity, gratitude, and mutual indebtedness. They suggest that “buyers [consumers] depend on providers [vendors] for safe vegetables, while sellers [vendors] simply cannot afford to lose customer trust.”

3.2.2. Shortening the Supply Chain: Going to the Source

Trusted personal consumer-vendor relationships are sometimes at odds with other forces within food systems, such as a drive toward “modernization.” Consumer persistence in the face of such forces has been richly documented in a series of articles by Wertheim-Heck and colleagues (48, 52, 53, 55) showing the “work arounds” that urban consumers in Vietnam have developed in response to the government policy of “supermarket-ization.” Green leafy vegetables are an important and culturally indispensable component of the traditional Vietnamese diet, but consumers are increasingly anxious about the risk of bacterial and chemical contamination of produce from large-scale farming operations.

As officially designated wet markets (where animal products are sold) are now being systematically closed in favor of modern supermarkets (partly to improve food safety), consumers who cannot afford supermarket prices or those who seek to re-establish relations with a trusted vendor have begun purchasing from a new class of individual sellers who operate informally on street corners or on the ground floor of residential complexes. In Vietnam, consumers trust these vendors because they are “backyard farmers,” selling small surplus amounts of the produce they themselves both grow and consume (52). For more middle-class Vietnamese, the issue with supermarkets is not price so much as convenience, since they are far less numerous than the informal markets they have replaced. Strategies employed by middle-class households to ensure access to vegetables they perceive as safe include: taking advantage of friends’ trips outside the city to purchase from small producers; forming buyers’ clubs among office workers; and establishing social media groups to make bulk purchases from presumably safe vendors (56).

The abovementioned FES conducted among urban and peri-urban consumers in Rwanda (31) documented a similar allegiance to fresh vegetable sellers and resistance to modern stores, as well as similar anxieties about chemicals in the food supply. That research documented several consumer sourcing strategies. For instance, consumers traveled to the surrounding countryside

to make purchase agreements with individual farmers – in some cases even specifying the plot from which they wished their produce to be harvested.

3.2.3. Taking Control of Food Processing

Another strategy described by consumers in a variety of settings, including rural Northern Ghana, urban Rwanda, and rural India, is to take control of some aspects of food processing to ensure the quality and safety of the products they purchase (64, 31, 62). This strategy is a response both to worries about food safety *per se* and also to more general concerns about food quality (which may include the risk of being cheated with substandard ingredients). Caregivers who were interviewed in a FES on infant and young child feeding in Northern Ghana (64, 34) described taking their purchased millet and maize to be milled while they stood by in order to be certain the finished product contained only their own grains. Rather than opt for the convenience of buying pre-milled maize or millet, they went to the trouble (and additional time) of buying the grains whole and then having them milled in their presence. The FES on consumer perceptions in Rwanda (31) found a similar strategy. There, despite the availability of numerous commercial blended porridge flours, consumers expressed a determination to blend their own, after first purchasing two or three different types of grain, and then having these milled. They explained this both as an anti-fraud measure and as an attempt to protect against illness stemming from adulterated flours. That study also identified several other common cooking ingredients (groundnut flours and ground dried fish powders) for which apprehensions of adulteration were high but self-processing was not an option.

Similarly, in Bihar, India, mothers who were interviewed for a FES commissioned by the World Bank (62) expressed a strong preference for pressing their own home-grown mustard seeds to ensure the purity of the resulting oil. In contrast, they suggested that the purchase of "loose" mustard oil entailed receiving a product adulterated with lesser oils that lacked the healing qualities of their own pure oil.

These examples illustrate consumers' existing ingenuity when it comes to mitigating food safety risk—types of behaviors that EatSafe can build upon. It is worth noting that all of these cases involved ingredients intended for infants and young children – a vulnerable group for whom concerns about food safety are likely to be particularly acute. These examples also suggest that consumers' inability to rely on food to be safe and unadulterated leads to a need to invest additional time and energy into the process of acquiring food – a burden that is most commonly borne by women, who typically play a major role in food acquisition and preparation in LMIC households. The Rwanda example also highlights a tension between choices that could improve nutrition (i.e., buying a pre-blended flour intended for young child's porridge, which could in some cases be fortified) and those made to ensure food safety (i.e., opting for own-produced or own-blended flours).

3.3. Knowledge and Agency

In this section we present examples of ethnographic research findings that illustrate tensions between consumer knowledge on the one hand and possessing the "agency" or capacity to act on that knowledge on the other. The issue of agency (i.e., whether to "privilege" the role of the individual and his/her freedom of action, or to stress instead the constraints on action arising from structural characteristics of the environment or system) has been a preoccupation in contemporary anthropology. This tension also appears in anthropological writings on food safety. A multi-year case study that appears to hold both these factors in balance is found in the work of Wertheim-Heck et al. (52). Their analysis of the difference between poor urban consumers and middle-class consumers in Vietnam is instructive. Poor consumers are unable to shop at the comparatively expensive supermarkets that are gradually replacing official informal markets but react creatively and in concert with vendors to reconstitute relations of trust that characterize informal markets. Middle-class consumers seek to ensure the safety of green leafy vegetables by utilizing professional networks and social media to make purchases collectively. Vietnamese consumers (both poor and middle-class women) evidently retain sufficient agency to avoid some food safety risks, notwithstanding the impact of urban renewal policies and modernity.

Other studies have documented the challenges faced by individuals and communities who enjoy less latitude for food safety actions. Bailey et al. (47), in their study of the nutrition transition in Delhi, India, observe that although food safety was the most frequently cited of 12 factors influencing purchases, and although women believed that cooking at home was the way to ensure that the family was healthy, they were obliged to yield to the preferences of husbands and children, which tended towards less safe street foods. The author also concluded that, due to this shift in roles, the moment of marriage (a key transition point in a woman's life) could represent a point at which new "food choice" behaviors, including food safety in relation to procurement, preparation, and consumption, could be formed.

The example from India highlights an important cultural dynamic that strongly affects agency. The 2015 FES in Bangladesh also revealed a role of cultural expectations of propriety in shaping women's agency. These expectations impeded mothers' freedom of movement, which affected their ability to make the healthy purchases they preferred. Grocery shopping in a public market (informal or commercial) was done by men or was possible only at times when a male family member could accompany female shoppers (38). Both of these studies are examples of a common obstacle in behavior-change scenarios: the person with the information or motivation must rely on someone else to achieve the desired end. They are also examples of a common constraint on agency and action: gender norms or roles that restrict the actions of women and block them from making their preferred decisions.

A common finding in the materials is that woman often have clear (and frequently accurate) ideas about food safety, healthy foods, and diet, but they are severely constrained by material circumstances. A 2015 FES in Kenya revealed the psychological stress mothers experience when they face a formidable combination of obstacles derived from environmental degradation, time pressures, single-parenthood, insufficient land under cultivation, and insufficient income. Analysis showed that respondents were well-aware of the nutrient-rich foods that would support their children's health but could not afford anything but the simplest carbohydrate-based porridges (42).

Another illustration of the role that social structural conditions play in influencing purchase decisions is contained in the results of a recent FES with low-income adolescent girls in Bangladesh. In the community where the study was conducted, men made the purchases in the informal market. The investigators found that the fathers in the poorest households were reserving food shopping until just before the market closed when vendors dropped their price on perishable produce. This strategy was aimed at achieving better (i.e., more diverse) diets with limited means, but it may have put the households at risk of consuming unsafe food, as fathers also described knowingly purchasing produce that they described as rotten (32). This example illustrates consumers' dilemmas in attempting to balance competing health goals (i.e., safe food, nutritious food) with the constraints of limited resources and how different gender roles result in different levels of agency: women in these households would have little control over what food was purchased (or when).

Lastly, whereas the examples above illustrate gender effects on agency (often to the disadvantage of women), it is also clear that gender can affect risk directly, through consumption. A 2016 study of risk factors for Rift Valley Fever conducted in a pastoralist community in Northeastern Kenya showed how a variety of factors converge with gender to heighten the food safety risk for some groups. An important feature of this risk scenario is the fact that most cases of Rift Valley Fever are asymptomatic; this inclined pastoralists (who saw little empirical evidence of a connection between consuming herd animals and falling sick) to dismiss government warnings about the disease. A gendered pattern of animal husbandry and consumption was practiced, with cattle being associated with men while sheep were more associated with women, due partly to the special role that milk, blood, and fat from the animal play in female health therapies. Since sheep were also the animal most at risk of Rift Valley Fever, women's close association with the animals made them more vulnerable to foodborne illness (50). In this example, the gendered nature of consumption augmented food safety risk for women. It is also conceivable that in other settings, "male" foods could be implicated, creating differential risk in the other direction; however, our review found no studies that either described or expressly investigated this possibility.

3.4 Safety and Risk as Contingent Attributes

While researchers may assume that the safety of a given food is defined by the characteristics of the food itself, for many consumers, purchase decisions may depend on a determination a food's appropriateness in a given situation. This is particularly evident with respect to foods during sickness. In most societies, some foods that are eaten normally are considered dangerous when one is afflicted with specific illnesses. Here the risk lies not in the food *per se*, but in its consumption while in a vulnerable state. Similarly, the same principle can be seen in restrictions on the diets of infants and young children.

Prior studies by the authors, GAIN, and many other anthropologists and qualitative scientists have catalogued the significance of young age and old age, as well as reproductive status (including pregnancy and lactation), for determining the appropriate foods for specific categories of family members. Perceptions of vulnerability and the consumption practices that follow from them are not limited to age or illness. Mothers who were interviewed for a FES on snacking practices among young children in peri-urban Lilongwe, Malawi, expressed concerns about how young children's vulnerability to food-related risks varied by the time of day. Solid foods were safe for children at most points in the day but were not considered to be safe in the morning. Mothers described their children's internal organs as still being in a state of sleep at breakfast and stated that intestines needed encouragement to "wake up" with lighter, more liquid foods (29). The 2016 FES on infant and young child feeding in Northern Ghana observed that parents were reluctant to feed solid foods to children well after the recommended juncture, owing to a belief that doing so might cause young children to fail to walk (61).

The humoral system of hot/cold classification, discussed above, also reflects the idea of food suitability or safety being connected to one's temporary state of being, such as illness, making the suitability of foods contingent on the consumers' current state (38).

Time-variant classification systems have implications for food safety research and interventions. The most productive way to think about food safety may be not as something absolute, but rather situational. For most foods, a more correct framing of the question is not whether it is perceived to be categorically "safe" in any given population but to ask "for whom it is safe? When, or under what conditions is it unsafe?"

4. DISCUSSION

In this section we consider the implications of those findings for interpreting and understanding food safety challenges in populations, excluding challenges that reside in household preparation and storage conditions and behaviors. This is not an exhaustive examination of population food safety issues and challenges. Our purpose, rather, is to highlight information we feel is of direct relevance for the EatSafe project, both for the design of the formative and evaluation research components and potentially for the interventions that will be tested. Each main take-away message is presented in its own sub-section, followed by the resulting implications for EatSafe.

4.1 Consumers have strategies to mitigate food safety risk, but these strategies are not equally available to everyone in a population

The review showed that consumers do not passively accept the risk of unsafe food. They have developed a repertoire of mitigation strategies, several of which have been documented to recur in different settings and populations. However, within any population, some consumers are in a better position than others to employ food safety risk mitigation strategies.

As is true for a wide range of public health threats, differences in socio-economic standing affect the capacity (agency) of individuals to employ mitigation strategies to reduce threats to their health. Threats to health from purchased foods are no different in this respect than other threats. The data presented above in Section 3 are illustrative. For instance, the Vietnam green leafy vegetables case shows how poorer consumers face greater challenges in accessing safe green leafy vegetables than their middle-class compatriots, who can pay the higher prices demanded by safer retail options and who can also act collectively to secure safe food through workplace and social networks (56). Similarly, the impoverished Bangladeshi laborers who purchase spoiled produce are most certainly aware of the risk created for their families. With greater disposable income, they would be in a position to avoid this economically motivated practice (32).

Implications: The review revealed a menu of mitigation strategies that EatSafe investigations can examine and test in greater depth. However, as the EatSafe research moves into its next phase, it is important to ensure that intra-population differences are taken into account in the sampling design and in data collection instruments. For future intervention planning, it is essential to ensure that intra-population constraints and opportunities with respect to strategies for mitigating the risk of contamination in purchased foods are addressed.

4.2. Gender is a fundamental determinant of food safety beliefs and behaviors, including differential risk.

Another indisputable determinant of intra-group access to mitigation strategies is gender. In addition to cultural restrictions that limit or prevent women in some societies from engaging in

food purchases in informal markets, multiple other gender-associated cultural and social organizational features constrict the ability of women to fully employ food safety risk mitigation strategies. We expect that the findings of Section 3, above, do not fully illustrate the extent of the influence of gender dynamics and suggest that this may be a consequence of insufficient research attention paid to the subtle but pervasive effects of gender in relation to food safety in food acquisition-related research.

Implications: It is important that in the design of EatSafe research, the training of interviewers, and in subsequent monitoring and evaluation, there is consistent attention to the important role of gender in all of activities related to beliefs and behaviors.

4.3. Informal markets are just one source of risk among many

Any understanding of consumers' perceptions of food safety needs to be contextualized within the full range of consumer interactions that generate risk—including but not limited to the informal markets that are the focus of EatSafe. In fact, much of the research on food safety outside the home has emphasized the significance of food safety risks from types of informal street-sellers (outside of organized markets) and unregulated food purveyors. The Vietnam green leafy vegetable studies show that informal markets are not the only places where consumers are exposed to food safety risks (48, 52, 53, 55). Other sources of potential risk include supermarkets, street-corner sellers, a new class of retailers operating in residential buildings, and a range of group-purchasing arrangements for people connected in a variety of ways (e.g., professionally, or technologically through online groups). Similarly, the 2016 FES of urban and peri-urban consumers in a Rwandan district town (31) revealed the utilization of a diversity of vendors, including neighborhood kiosks that sold small, daily quantities of food; vendors in the main covered marketplace for fresh produce; vendors operating market stalls around the perimeter of the covered market; and town food stores known locally as "alimentations." An additional, fifth point was revealed by ethnographic interviews with consumers: some urban families were making purchases of staple foods directly from growers in the countryside. The table in Appendix 1 illustrates the different sources that respondents reported using in the Rwanda study. We believe that such diversity is characteristic of consumers in most, if not all, LMICs.

Implications: Ideally, EatSafe research should present the results of its research in informal markets contextualized within a general description of potential sources of foodborne diseases for the population, including those other than informal markets. This need not be a definitive

examination of these other, potential sources but should provide a general description sufficient for providing a roadmap for future investigations and efforts to reduce exposure to unsafe foods.

4.4 Public health messages do not reach consumers by discrete, project-ordained channels but are instead perceived and evaluated in concert with other information circulating in their environment

The 2015 MNP-focused study in Bangladesh revealed the complexity of intra-group behavioral responses and the cognitive processes underlying them. As noted earlier, the study sought to understand how caregivers viewed MNPs, which were being promoted for consumption by infants. It found a lack of consensus among mothers, many of whom were uncertain about the whether it was advisable to feed MNPs to their children. Investigators theorized that mothers' uncertainty was attributable in part to an inability to reconcile two messages: on the one hand, MNPs were promoted by a prominent organization as a safe way to ensure the healthy development of their young children. The extension workers promoting and selling the MNP sachets were also trusted members of the community. On the other hand, in the preceding year the same extension agents had been involved in a well-funded, separate campaign to expand exclusive breastfeeding, which also included messages about food and nutrition for young children. These messages emphasized self-sufficiency and were intended to boost the confidence of mothers by showing them that, together with breastfeeding, they already had within their homes and gardens the resources needed to raise healthy children. Actively discouraging the purchase of "outside" foods—which were characterized as unhygienic, unsafe, and unhealthy—was also part of this campaign. Project management had in mind street foods, especially fried snacks, when they referred to "outside foods," since these were also believed to be consuming scarce household income that could be directed towards more nutritious foods. However, it is easy to see how, when MNPs were introduced, parents exposed to the earlier campaign might have struggled to situate this new product in an inside/outside dichotomy, or to accept that it was necessary for young child development, given the earlier assurances about the adequacy of existing foods and repertoires (38).

Implications: To maximize the effectiveness of food safety messaging, it is essential to understand and anticipate the broader information ecosystem in which consumers operate and monitor their reactions and behaviors as the interventions progress.

4.5 There are specific circumstances in which individual agency is expanded and food safety-promoting behaviors can be more readily adopted

Agency is not a static condition, and some intriguing observations have been made in recent studies of interventions to increase agency that suggest that the timing of intervention needs to be examined. Recall that Bailey et al. (47) concluded that (at least in Delhi, India), the moment of

marriage could represent a key transition point in a woman's life and thereby a point at which new food choice behaviors, including those related to food safety, could be formed. This suggests the value of providing nutrition and health education messages to brides or others that are at a critical life juncture (e.g., moving out of their parents' home, having a first child). It may also be appropriate to use this as an opportunity to reach other family members—especially new husbands, mothers, and grandmothers. In a similar vein, another study noted that young, salaried workers in Vietnam (who were not yet living in multigenerational households) were more open to trying new forms of shopping (48). Writing outside of the LMIC context, Young and Wadell (in a review of barriers and facilitators to safe food handling among consumers (49)) similarly concluded that young adults appear most amenable to adopting new routines and that a major life event may also create a greater readiness to behavior change.

Implications: For EatSafe, these data point to the value of identifying lifecycle changes or situations in which consumers are likely to be more open to messages about food safety issues and precautions in connection with purchasing in informal markets. These could be explored during the formative research and then built into communications intervention planning and program implementation monitoring.

4.6 Vendors may face additional risks in situations of poor food safety

The conditions and specific venues of the vendors who were described in the studies covered in Section 3 do not fit a uniform profile. Some were sellers of raw produce, while some were cooking what could be characterized as street foods and selling them in informal markets. Some were members of the same community as the people who bought the foods they were selling; others entered cities and markets from rural homes on the periphery. Consequently, it is difficult to generalize about vendors as a broad group. Nevertheless, one nascent theme in the data is that vendors are highly vulnerable to consumer opinion. Conditions in LMIC settings seldom permit reliable, routine monitoring of foodborne pathogens in the marketplace. This fact does not prevent consumers from forming and sharing information about market vendors and the foods they sell. Therefore, vendors have little recourse when they are the subject of rumor, except to manage their reputation through their conduct inside and outside the marketplace. In addition to the risks faced by individuals, one of the Vietnam case studies indicated that broad classes of vendors may find themselves stigmatized as a result of social and cultural anxieties that attach to specific social classes – often outsiders – and because the institutions actually implicated in food safety failures find it convenient to deflect blame.

Implications: Vendors may have as much interest as consumers in improving food safety and might be willing allies in food safety campaigns. However, their livelihoods need to be considered carefully in the design of interventions, and it will be important to minimize any risk of alienating

their consumers (and thereby reducing their incomes) by raising suspicions about the safety of their foods.

4.7 The topic of food safety (and also perceptions of food safety) may be best understood by investigating foods individually, not in general

It is probably not a coincidence that the most insightful account of risk response within a cultural context identified in this review – the work of Wertheim-Heck and colleagues in urban Vietnam – has revolved around a single commodity, green leafy vegetables. Holding the commodity constant appears to have allowed investigators to generate in-depth data on an exhaustive range of contextual factors, including inter-generational differences in shopping habits, class or socioeconomic status-based variations in mitigation strategies, Asian cultural themes that explain consumers' relations with vendors, and the changing retail and policy environments in the context of modernity. These insights emanate from a series of studies and author configurations over several years, all focused on one commodity type.

Implications: EatSafe's identification of "focus foods" in Nigeria narrows the number of different foods that need to be examined for interventions. However, within that broad group, it may be worth evaluating the potential benefit of examining one to two foods through more intense investigations—for example, by focusing on those for which there is persuasive scientific evidence that they are often vehicles of foodborne illness.

4.8 Studies that use an ethnographic approach or methods to understand consumer beliefs and practices are likely to yield actionable knowledge and entry points for EatSafe

A key feature of the ethnographic and qualitative studies reviewed here is that they move us beyond an understanding of "what?" to any understanding of "why" or "how?" Well-executed ethnographic and similar studies yield information about critical issues, including culturally appropriate intervention content, effective program delivery and utilization pathways, and content for behavior-change communication. Consider, for example, the finding from the study in Kumasi (Ghana) that consumers judge vendors' stall presentation and orderliness – and not their food handling practices – as a marker of their trustworthiness. Knowing this, promoters of food safety in that context could support the adoption of more conscientious food hygiene among vendors, while simultaneously seeking to expand consumers' ideas of trust to encompass these. Or, the finding from a different Kumasi market study that vendors devote considerable time and resources to preserving their reputation as active and upright members of the community: this finding could be the basis for food safety programing that promotes and organizes vendor food hygiene training not as an obligation emanating from a regulatory apparatus, but as another way they can demonstrate their commitment to their community.

***Implications**:* The design and execution of the EatSafe research phase should include systematic attention to the points we have flagged in items 4.1 to 4.7, above.

5. CONCLUSIONS

This narrative review has examined prior research on food safety-related topics employing ethnographic and related methods, using the results to glean insights for the design of the EatSafe project's research and intervention activities. By amassing prior focused ethnographic studies on food and nutrition topics and undertaking a targeted search for studies using similar methods to examine the topic of food safety, we identified a total of 35 relevant studies. Reviewing the studies' main results and conclusions allowed us to highlight a set of key recurrent themes, with clear implications for future research and intervention design. This review did have some limitations: using a non-systematic review approach, it undoubtedly did not include all possible relevant research; its decisions interpretations were necessarily subjective; it included no assessment of study quality; and there is a certain level of cultural specificity inherent in ethnographic research that limits the ability to make broad generalizations based on its results. At the same time, it had several strengths, including its focus on a topic that (to our knowledge) has never before been explicitly reviewed; a diverse and iterative search approach; and a focus on highlighting certain key themes with depth as opposed to giving a broad overview, as in a traditional review.

- The review made it clear that there is a **rich repertoire of mitigation strategies in consumer responses** to food safety risk, which EatSafe studies can identify and, where appropriate, support. At the same time, it is evident that there are groups and individuals whose agency is constrained. These groups should be identified and defined for each context that EatSafe operates. EatSafe research needs to identify the hurdles to risk mitigation for these disadvantaged groups and devise ways to build their ability to act to demand safer food.

- Second, prior studies indicate that **trust is central to consumer-vendor relations**—but is frequently detached from any actual observation of hygienic practices. EatSafe research must carefully examine local beliefs and assess their potential to act as barriers or enablers to improved food safety procedures.

- Third, **vendors also face risks** and are likely to be interested in avoiding food safety issues, which can threaten their reputations and livelihoods and—in situations of more widespread food scares—potentially their property and personal security, as well.

- Fourth, studies examined in this review indicate how, within any given society, **consumer assessments of food safety are nuanced and contingent partly on states of vulnerability**.

Within EatSafe, investigations of food safety must thus be constantly confirming: “Safe for whom”? “Safe under what circumstances”?

- Fifth, it is **important to better understand the relationship between gender and food safety**; this may be facilitated by focusing on specific foods, which would control some of the other factors influencing perceptions and permit a close examination of the complex interactions between risk and gender, agency, and other factors.

Research on food safety has investigated a wide range of social and cultural factors, including cultural themes and principles, consumer class and economic differences, generational changes, the policy and regulatory environment, and the discourse around food safety anxieties. Analysis of each of these factors has produced valuable insights for intervention actions, suggesting that EatSafe research should cast a wide net to identify practical, actionable suggestions for intervention content and approaches. One way to reconcile the tension between breadth of examination of determinants and time/resource constraints is to focus the research on a defined set of foods. Overall, this review has confirmed that the application of ethnographic methods to study food safety holds promise because the methods reveal potential areas of intervention (the “what?”); in addition, they can provide crucially important knowledge about effective impact pathways, culturally appropriate intervention design, and behavior-change communication content (the “why?” and “how?”).

Recommendations for the Design of Future Studies and Interventions within EatSafe

EatSafe aims to generate the evidence and knowledge on leveraging the potential for increased consumer demand for safe food to substantially improve the safety of nutritious foods in informal market settings. Central to EatSafe's work is understanding (and potentially shaping) the motivations, attitudes, beliefs, and practices of consumers and food vendors. While EatSafe will undertake novel primary research on consumer and vendor motivations and practices, it is essential to ensure that this work is informed by and builds on what has already been done—both in terms of methods used and results obtained. Based on the results of this review, we recommend EatSafe consider the following in the design of its methods and interventions:

- Ethnographic methods have high potential for use in the study of food safety because they reveal potential areas of intervention (the "what?") and can provide crucially important knowledge about effective impact pathways, culturally appropriate intervention design, and behavior-change communication content (the "why?" and "how?").
- Consumers may already have existing food safety risk-mitigation strategies, which should be examined and understood within their cultural context.
- There are groups and individuals whose agency to mitigate risk is constrained. EatSafe research needs to identify these constraints as well as ways to build on consumers' ability to act to demand safer food. As consumer trust in vendors may be detached from any actual observation of hygienic practices, EatSafe research will need to carefully examine local beliefs and assess their potential to act as barriers or enablers to improved food safety procedures.
- Vendors are likely to be interested in avoiding food safety issues, making them promising partners for intervention, but program designers must carefully consider any implications of the project interventions on vendor livelihoods.
- As consumer assessments of food safety can be nuanced and contingent partly on states of vulnerability, EatSafe investigations must be constantly confirming: "Safe for whom"? "Safe under what circumstances"?
- It is important to better understand the relationship between gender and food safety.
- Analysis of cultural factors in prior research has produced valuable insights for intervention actions, suggesting that EatSafe research should cast a wide net to identify practical, actionable suggestions for intervention content and approaches.
- To reconcile the tension between breadth of examination of determinants and time/resource constraints, it may be advisable to focus the research on a defined set of foods.

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APPENDIX I

Table 1 – Typology of store types in Rwanda (example from an FES)				
	Local Kiosk	**Open Air Market**	**Market Stall**	**"Alimentation" stores**
Typical purchases reported	Small quantities of items for daily use: Cooking oil; cereal flours; flavor packets or bouillon cubes; dried fish, onions, tomatoes and tomato paste. Some snack foods	Rice; beans; freshly harvested vegetables and fruits; roots and tubers	Bulk quantities of cereal flours, oil, or other large-volume staple items	Snack foods including *mandazi*, *sambusas*, Occasional purchase of packaged pasta
Defining features	Highly convenient due to: (i) proximity to home, and (ii) sale of small quantities, which allows buyers to select meal ingredients according to cash on hand	Trusted main source of fresh produce, with minimal processing. Food is in its natural state	Better value than kiosks on a per-unit basis but will not sell in small quantities.	Main vendor of imported processed food items for children, including Cerelac, Quaker oats. Regulation by authorities ensures authenticity of products
Perceived food safety risks	No regulation of kiosks, so goods may be expired	Open-air setting reduces cleanliness, due to dust, pollutants	Processing performed at this level – e.g., of blended flours – may not be conscientiously performed (food fraud)	Commercially processed foods may not be "natural"