



Research article

Barriers to ensuring and sustaining street food safety in a developing economy

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ABSTRACT

Street foods are one of the highest contributors to foodborne illness in most developing economies around the world. In Ghana, diarrhoeal diseases, which are usually food or waterborne, are among the top ten causes of death. Most street food safety risks are avoidable when all food safety regulations are complied with. This paper identified and examined the barriers to the implementation of street food safety regulations in Ghana. A qualitative research approach was adopted by collecting data from nine focus group discussion sessions involving a total of 94 participants and five key informant interviews. The research uncovered three broad but interconnected categories of challenges to ensuring and sustaining street food safety: street vendor anonymity as a central challenge; poor trust in the regulatory system as root challenges; and vendor practices that risk the safety of street foods as consequential challenges. These findings have tangible policy implications. To best serve their purpose, policymakers need to understand these food safety challenges and ensure that food safety policies are responsive to the challenges.

1. Introduction

Street foods are freshly prepared meals, snacks, fruits or drinks vended by the wayside, open places or hawked. They provide essential nutrition and convenience for a large population of many developing countries but are also relevant worldwide partly due to their affordability, accessibility, and convenience [1]. Street foods, therefore, meet the needs of low-income, those whose lifestyle keeps them in a race against time, and provides access to ethnic foods that are otherwise only available to niche populations. Street food vending businesses are micro-enterprises with the aim of profiting from the sale of assorted local foods. Selling street foods in developing economies requires basic facilities, simple skills, low startup capital and minimal prohibitory regulations. For that reason, they are easy entry points for employment for persons with all scales of formal and no formal education.

The profile of street food vendors across developing countries is similar. Several studies have reported that females dominate street food vending businesses. Street food vendors in Ethiopia, Uganda, South Africa and Ghana are respectively about 79 %, 88 %, 90 % and 91 % women [2–5]. Most street food vendors have a level of basic education. Street vendors in major cities in sub-Saharan Africa,

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including Accra (82 %), Addis Ababa (78 %) and Benin City (93 %) have a minimum of primary education [3,4,6]. The average daily net income of Street food vendors in previous studies in Ghana is about \$11¹ to \$14.00 [4]. This puts street food vendors at a higher daily income than the national daily minimum wage of about GHS 18.15, an equivalent of US\$ 1.65 for the year 2024 [7]. Street food vending, therefore, creates a source of livelihood for individuals in developing economies who would otherwise have been unemployed [8].

Despite the foregoing importance of street food vending to consumers and vendors, the street food sector has been identified to be fraught with unsanitary practices in raw material acquisition, transportation, storage, preparation and final food retail on the streets. This poses several concerns spanning consumer health to vendor profitability. It is considered that most street food safety risks would be avoided when vendors comply with stipulated regulations [9–11]. The safety of food, however, is recognized to be the result of the actions and inactions of the stakeholders including food service operators, regulators and consumers [12].

Food safety addresses the handling, preparation, transportation, storage and distribution of food in ways that prevent foodborne illnesses. It outlines the procedures for managing food across all the stages of the production process. According to the [13], food safety is the “Assurance that food will not cause adverse health effects to the consumer when it is prepared and/or eaten according to its intended use”. Food safety is recognized as a fundamental component in ensuring food security. As indicated in the report on the state of food insecurity in the world, food security “exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” [14].

Food safety hazards could be microbiological, chemical or physical. The presence of such hazards in ready-to-eat foods at medium to high levels could lead to short- or long-term foodborne disease risks and even death among consumers [12]. Asia and sub-Saharan Africa have the highest incidence of foodborne illnesses and the highest mortality due to foodborne illnesses [12]. Street foods are considered one of the highest contributors to foodborne illness in most developing economies around the world [15]. Among Ghana's top ten causes of death, diarrhoeal diseases rank number eight [16]. The estimated public health burden of foodborne diseases for low- and middle-income countries is estimated to be US\$ 110.2 billion [12].

In the last decade, a number of policies and institutional frameworks have touched on food safety. However, Ghana recognized the need for a National Food Safety Policy and released the same in 2022 [17]. This policy aims to strengthen food safety governance in Ghana, strengthen institutional coordination and collaboration, and promote and ensure harmonization, synergy and enforcement of laws and regulations on food safety in Ghana [17]. The gains of a food safety policy may not trickle down to the street foods sector given its one-size-fits-all nature. Yet, by altering awareness, capabilities and providing appropriate incentives, the policy objectives could be achieved [2,9,10,12]. When street food vendors and the government regulating authorities have different perspectives on food safety issues it becomes difficult to achieve the food safety objective. How policymakers understand the challenges militating against street food vendors' compliance also affects how they address it.

This paper aims to contribute to the food safety literature by highlighting the challenging factors to ensuring and sustaining food safety in the street food sector in Ghana. This should provide the critical dimensions for policymakers, vendors, consumers and other stakeholders to focus on and manage to enhance street food safety. Although the study is situated in Ghana, its results could apply to other sub-Saharan African countries when the profile and the characteristics of street food vendors in those other countries are not different to the Ghana experience.

1.1. Role of street foods in developing economies

The sale of street foods is an entrenched enterprise in many developing economies though they are often seen as temporary enterprises [18]. The rapid entry and exit of street food vendors make it unlikely to go away soon. Street food vending is classified under the informal sector previously expected to disappear with development in a country. However, until permanent employment opportunities can be created through developmental initiatives, the informal sector will be the first point of call for unskilled individuals [19]. Therefore, individual characteristics and sheer high unemployment rates would always ensure that the informal sector remains.

Street food vending is relatively attractive because it is a form of self-employment that promises more income than the minimum wage of some developing economies [4,20]. It also requires low start-up capital and simple skills and therefore serves as a social inclusion of the poor. Street foods exhibit the culture of local people. It, therefore, tends to be attractive to tourists and other visitors. Nevertheless, their contribution to most developing economies and Ghana is often ignored [21]. There is barely any official record of the volume of street food trade, enterprises, and income generation.

The relatively low capital expenditures of street food businesses are also attractive for certain types of sellers. Furthermore, vendors can choose their work hours, have few constraints on their movements and be self-employed. In spite of the benefits of street food trade, vendors may have to work long hours under adverse conditions and the risks are borne exclusively by the seller.

1.2. Food regulatory system in Ghana

Ghana adopts a decentralized system of governance which creates a framework for citizens to be part of decision-making and local governance. In this system of governance, authority, responsibility and resources trickle down from the central government to the district level [22]. At the district level there is the local government and administration. The local government comprises the

¹ 1USDollar = 3.91 Ghana Cedis, average period rate for 2016 <https://data.worldbank.org/indicator/PA.NUS.FCRF?locations=GH>.

Metropolitan, Municipal, and District Assemblies (MMDAs). The Ministries, Departments and Agencies, form the local administration.

The MMDAs fall under the Ministry of Local Government and Rural Development. There are 261 Metropolitan, Municipal and District Assemblies (MMDAs) in the 16 regions of Ghana. The Greater Accra Region which is the focus of this study has 29 MMDAs [23]. The responsibilities of the assemblies include ensuring public health; environmental protection; sanitation; basic education and the setting and collecting of local revenue [22]. The assemblies regulate all enterprises or entities including street food vendors under their jurisdiction.

At the national level, various Ministries, Departments and Agencies oversee food safety in Ghana. The recently established national food safety policy pools involves about 15 ministries [17]. Three main agencies lead in food safety regulations. One, the Ghana Tourism Agency (under the Ministry of Tourism, Arts and Culture) regulates tourism enterprises including street food catering. Two, the Ghana Standards Authority (under the Ministry of Trade and Industry) is responsible for developing, publishing and promoting standards including hygiene standards for food preparation and sale. Three, the Food and Drugs Authority (under the Ministry of Health), in collaboration with the Environmental Health Officers at the MMDAs, enforces standards for food sale, as mandated by the Public Health Act [24]. The primary regulation for food safety is the Code of Hygienic Practice for Food Service Establishments [25].

1.3. Managing street food safety in developing countries

Street food safety management in developing countries varies depending on local regulations, available resources and infrastructure. One prevalent strategy involves the implementation of regulations governing food service provision and mass catering, albeit enforcement levels can differ [10,26,27]. These regulations typically encompass areas such as food hygiene, sanitation, waste disposal, communicable disease testing and licensing requirements. Street vendors often operate in open-air spaces be it public or private and their practices and investments are influenced by the regulatory framework in place. The rationale behind these regulations includes managing motorized and pedestrian traffic flow, ensuring product safety and maintaining the economics of the food market [28].

In Zambia, street food vending is viewed as a public nuisance leading to regular clearance operations aimed at modernizing urban areas [29]. Conversely in Hanoi, Vietnam, street food vending is prohibited on many streets [28]. In developed cities, violation of location regulations incur substantial fines [28]. Meanwhile, in Ghana, the determination of vending locations, penalties, and fees for street food vendors lies within the discretion of the Environmental Health Practitioners (EHPs) as per the Local Governance Act [22].

Advancements in food safety awareness and regulation has cast street food vending in a new perspective, highlighting it as a less modernized culinary environment [30]. Consequently, street food vendors are often mandated to acquire permits or licenses to operate legally as a means to ensure adherence to required food safety protocols. These permits often involve food safety inspections and monitoring to ensure compliance.

In India, a study showed that only a minority of street food vendors had obtained necessary registrations to operate, with registered vendors demonstrating better compliance with food safety regulations compared to their unregistered counterparts [31]. Similarly, research conducted in Kenya highlighted the significance of inspections in influencing vendor's adherence to food safety requirements [32]. However, the frequency and effectiveness of these inspections can vary considerably. For instance, studies in South Africa indicate that Environmental Health Practitioners (EHPs) may not consistently enforce legislation leading to inconsistent outcomes in legal proceedings for offenders [33]. Furthermore, businesses often perceive EHPs, as applying inconsistent food safety requirements, even when circumstances remain unchanged and the same EHP conducts subsequent inspections [33]. In certain regions of Ghana, the enforcement of sanctions for non-compliance with local food safety regulations was generally found to be lacking [34].

Advanced economies like Germany, Denmark and Canada implemented innovative enforcement measures such as transparency schemes that provide consumers with access to food inspection results [35]. In China, a public-private coregulation strategy has also been embraced to regulate food safety due to limited public resources [36]. Conversely, in Ghana, the media primarily serves as the conduit for reporting of foodborne diseases [37]. Developing economies, including Ghana, have also taken proactive steps such as establishing national food safety surveillance systems and implementing national food safety policies [17,26]. Nonetheless, despite efforts to bolster food safety legislation in many developing nations like Ghana, Nigeria and East African communities, instances of foodborne illnesses often linked to street foods persistently arise [38].

This study explores how to ensure and sustain food safety compliance in the street food sector in developing countries through two perspectives. First, the barriers that impede food safety compliance among street food vendors are explored, as these provide the foundation and lessons for any actions by policymakers and other stakeholders. Second, the implications of the lessons for policy action are discussed.

2. Methods

2.1. Research design

The exploratory nature of this research lends itself well to a qualitative research design [39] This is because the evidence required to meet the research objective is in the form of the shared perspectives of relatively small informants with varied experiences of food safety within their scope of work. The research, therefore, used focused group discussions and key informant interviews to give an in-depth understanding of the challenges to achieving street food safety [40]. The dynamics of the groups as well as the interaction allow the participants to establish connections with the issues and hence validate common practices and ideas [41]. To support discussions that are open and devoid of any influences, groups of participants were kept as homogenous as practicable [40,42,43].

Therefore, vendors selling similar foods were put together. Further, the triangulation design was also employed therefore three of the groups were a mix of participants as in Table 1. The idea was to triangulate the perspectives of the homogenous groups regarding the food safety challenges under study as well as to benefit from the diversity of experiences from participants [44].

2.2. Participants recruitment

The target participants were street food vendors, consumers and regulators who have a core stake in food hygiene and safety issues. Street food vendors were recruited through the metropolitan, municipal and district assemblies and the street food vendor associations. Street food vendors who sold snack foods (local chips and pastries such as plantain chips, *Banfo bisi*, *Kurikuri*, and *Agbelekaklo*), main meals (local maize and rice meals such as *Banku*, *Kenkey*, *Tuo Zaafi*, *Waakye*, and *Jollof*), fruits (cut local fruits such as pawpaw, pineapples and watermelon), and beverages (local drinks such as *Sobolo*, *Brukina*, *Lamugin* and *Asaana*) and were recruited for the focus group discussion. Invitation letters were also sent to seven district level and national food safety regulating bodies whose regulatory scope includes street food vendors. Five responded and were interviewed as key informants. Consumers recruited for the focus group discussions were students and workers. Lower-level students (Junior high school) were recruited through the Ghana Education Service, the school heads and parents. Tertiary-level students were recruited conveniently from various tertiary institutions in Accra. Working consumers were conveniently recruited from households and workplaces. Ethical procedures were followed as all participants were duly informed of the purpose, risks and benefits of the research, their right to participate voluntarily and a guarantee of confidentiality was spelt out to them. All participants willingly consented to participate. Additionally, parental consent was obtained for the Junior high school students (aged under 18 years) to participate. Assent was obtained from the Junior high school students.

2.3. Data collection instrument development

A focus group script was developed to guide the discussion facilitators and ensure the consistency and reliability of data collected across the different discussion groups. The questions on the script stem from the thorough analysis of the Code of Hygienic Practice for Food Service Establishments. They are framed based on the regulatory requirements applicable to street food vendors, serving as the foundation for inquiry. Further, the focus group discussion and key informant questions were developed around challenges that mostly confront the street food vendor and regulator's role in ensuring food safety in Ghanaian street foods. Questions also bordered on issues that prevent consumers from ascertaining safety of the street foods. The script was also continuously refined to include relevant new issues or perspectives raised in previous discussions and interviews.

2.4. Focus group discussion and key informant interview organisation

A total of nine (9) focus group discussions and five (5) key informant interviews were organized. The nine focus groups comprised three groups of consumers (Junior High School students, tertiary students and working people), three groups of street food vendors (local snack vendors, local main meal vendors and local fruit and beverage vendors) and three groups each being a mix of street food vendors, consumers and regulators. To promote effective discussions a range of 9–12 participants were allocated to each focus group discussion hence a total of 94 participants as shown in Table 1. The key informant interviews were conducted from July 12, 2022, to July 30, 2022, and the focus group discussions were held from September 19, 2022, to September 24, 2022. An agreement was secured to have each key informant interview and focus group discussion recorded.

2.5. Data analysis

The recorded key informant interviews and focus group discussions were transcribed and the resulting data was analysed in two stages. The first stage involved reading the raw textual data several times in search of patterns, themes, and ideas that align with the study objectives [45]. In the second stage, Nvivo version 14 and Microsoft Excel were used in the analysis. This stage involved: coding of the data from an iterative reading of the transcripts to gain insights into the main patterns embedded in the data; generation of themes using an inductive coding strategy; and development of higher-order themes through clustering of lower-level categories based

Table 1
Focus group discussion participants.

Group	Focus Group Discussion	Number of Participants
1	Junior High School Students, Consumers	11
2	Tertiary Students, Consumers	9
3	Working People, Consumers	10
4	Local Snack Food Vendors	9
5	Local Main Meal Vendors	11
6	Local Fruit and Beverage Vendors	10
7	A mix of consumers, snack food vendors and regulators	11
8	A mix of consumers, main meal vendors and regulators	12
9	A mix of consumers, fruit and beverage vendors and regulators	11
	Total	94

on the researcher's interpretation of the data in the light of the objectives [39,45]. The transcript for each key informant interview and focus group discussion was analysed independently however, themes and subthemes were tracked across all transcripts.

3. Results and discussion

3.1. Challenges to implementation of street food safety regulations

The challenges to street food safety compliance identified through the focus group discussion and the key informant interviews can be structured into three components. The first component is the "anonymity and low incentive to comply" on the part of street food vendors. This forms the central challenge around which other challenges revolve. The second component entails the shortcomings in the regulatory system which form the roots of the low compliance incentive. The third component presents the more conspicuous challenges that result from street food vendors' low compliance incentives. Fig. 1 shows the structure of the challenges to street food safety compliance.

3.1.1. The central challenge

3.1.1.1. Street vendor anonymity is an incentive for poor compliance with food safety regulations. The street food vendor is the central figure whose role is to carry out the stipulated regulations to warrant the safety of the food sold on the street. Participants agreed that many street food vendors do not follow the required practices for food safety. The challenge of street vendors' non-compliance to food safety regulations was identified and discussed by the street vendors as if it was normative behaviour. "I am a street food vendor,² so I know what I am saying because when you go there [food preparation and handling areas] what they are doing is below average. Let's be truthful to ourselves here". This was one of the sentiments from the street food vendor discussions.

Other sentiments shared by participants suggest the challenge is one of sheer apathy on the part of the vendors or an intention to game the food safety regulations by not acting in good faith. As stated by one street vendor, "To be frank, some of us I mean the vendors the way we do our things we are very much aware we are not doing the right thing but because of the profit we will make through these wrong procedures we care less about the safety of what we are doing". A consumer also quipped in the consumer focus group discussions, "It depends on the attitude of the people selling the food some of them when you complain to them, they would conform in your presence but when you leave then they go back to their old ways".

The street food vending start-up process lends much anonymity to the vendors. One regulator explained the street food start-up process as "You just get a place, put up your small structure and then you start selling". Another regulator put it this way, "The street food vendors are very fluid if I should say. Today, the person is here, and tomorrow the person is not there again,". Consumers also confirmed this in the focus group discussions as one consumer shared, "that is how I see it, they [hawkers] just prepare food, sell, make money and go but you are not able to trace them". This shows immense opportunity for easy entry into the street food business and suggests that there is no prohibition to starting a street food vending business. When street food vendors have a feeling of anonymity, it creates room for moral hazard and street food vendors would act in their own interest [46].

"Generally, I will say that street food vendors, ...they just want to do their business." One regulator said bluntly in one of our key informant interviews.

3.2. The root challenges

3.2.1. Street food vendors not recognized

Though street foods are known for their contribution to affordable and easily accessible food for consumers, street food vendors are often considered a nuisance to urban planning. Local regulating authorities perceive most places where street vendors sell to be illegal. In one of the mixed focus groups one regulator expressed her sentiments thus, "Zongo Junction for example, we don't expect anybody to put a table or anything over there to sell. It's illegal. You [vendors] are not allowed to sell there". Attempts to evict street food vendors from some locations have often been without success. Street food vendors perceive that the local regulating authorities do not consider their interest in the relocation processes and such relocation causes them to lose their customers hence a reduction in their sales. One consumer shared an observation thus, "Recently, the Accra Mayor came around and moved them [Street food vendors] from the Zongo Junction. The place became very clear, but they returned to the same place after a short while.". Street food vending is an age-long trade that has developed an entrenched position in serving particularly the low- and middle-income groups in the Ghanaian economy. Achieving food safety could therefore be possible if street food vendors and regulators use a common lens to engage the food safety regulations. Prohibitive measures such as threats of eviction are more likely to increase unsanitary practices [12].

3.2.2. Poor regulator coordination

Uncoordinated regulatory activities of the regulating authorities who are to ensure compliance with street food safety are a concern for street food vendors. For example, street food vendors indicate that one regulator may permit a vendor to set up and operate but another regulator may show up at another time to ask them to vacate the place. One street vendor in a mixed focus group summed up

² The detailed description and location mentioned by the street food vendor is withheld to preserve anonymity.

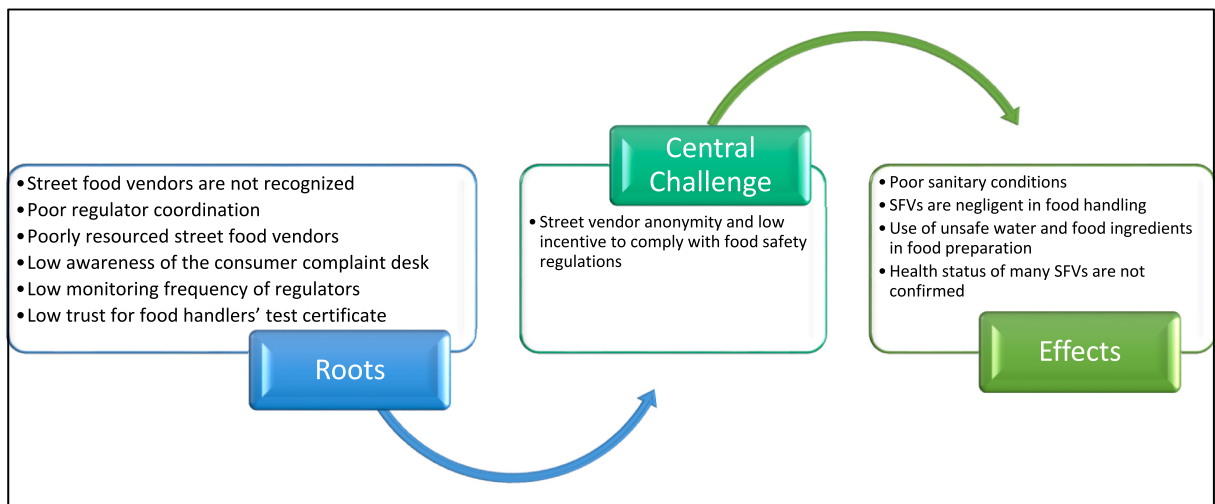


Fig. 1. Causal Map of Challenges to ensuring of Street Food Safety.

the sentiments as follows, “Errm I think you [regulator] and those in authority need to sit up and strategize because each one [the regulators] comes to me and they think their certificate or what they are going to give me is superior. So, if I don’t have it, I cannot sell [street food]. And so far, as I need to survive, then I give you, my money. You give me what you must give me. And then another will also come. If you don’t have this ... they don’t even take into consideration what you are selling or the profit you are making. They just tell you the amount you pay. And if you don’t pay, they lock your shop”.

The aspect of the collection of money indicated that the street food vendors could not distinguish the local revenue collection and food safety regulating activities of the Local Governance Act.

3.2.3. Poorly resourced street food vendors

Though the street food business requires little upfront investment, most street food vendors are often poorly resourced and want to prepare their food at the lowest cost. However, food safety regulations require food vendors to acquire modest structures to protect the food they are selling and therefore one regulator put it this way, “It is money, so, then it becomes a challenge. So, you realize that he [food vendor] will probably do something [put up a structure] to a point, but you are not getting the enclosure the regulations require. And he tells you that when I get a little money, I will continue to get it completed.” So, then you realize that it’s the capital issue.” the regulator added.

Some Street food vendors also try to cut costs by being the sole worker which leads to non-compliance when fatigue and pressure to deliver set in. One regulator mentioned in the individual interviews, “Maybe one person [vendor] is the jack of all trades. He’s doubling as supervisor, erh doing all the things because they don’t want to employ more people to help with the things. So, then it also creates a problem because the person almost always is working tired, So, he also tries to ... instead of washing his hands as he’s supposed to, it will take longer. He goes on to do other things”.

3.2.4. Low awareness of a consumer complaint desk

Negative feedback about anything is never pleasant to any receiver. Consumers noted this to be even more so with street food vendors when one tries to draw their attention to food safety issues encountered. Many consumers want to avoid any unpleasant experiences hence they shy away from giving feedback to street food vendors. One consumer, a Junior High School student shared that “Some of them (vendors) will embarrass you in the presence of others”. Another consistent sentiment was shared by a consumer as follows:

“I was in a street food joint waiting for my turn to buy *kenkey* when the vendor coughed into a napkin in her hand, and she proceeded to pick the fish with that hand. I did not like that, so I waited until everyone had left and decided to engage the vendor about that action”. “The response I got from the vendor was” she continued, “Are you the only one who saw me do that?” This response here meant that the action was obvious to everyone so ignore it like everyone else. One consumer summed it up, “Many people just fear to talk”. However, in the focus group discussion with various tertiary students, some indicated some street vendors have been receptive to their feedback as they knew the authorities of their campus were concerned about the safety of the food they sold. Generally, consumers are not aware that regulators have complaint desks or platforms. In the focus group discussion with consumers. One of them amid laughter asked a seemingly rhetorical question, “But who will you report that [food safety issue] to? That’s the question.” The others laughed in support. Where to send their street food safety complaints is a challenge for consumers.

3.2.5. Low monitoring frequency of regulators

Both the street food vendors and consumers in the focus group discussions point to the regulator for vendors’ non-compliance with

street food safety regulations. The street food vendors indicated that the regulators visit to monitor hygiene practices and other food safety issues at monthly or more intervals which they consider low hence their poor compliance. Regulators in the eyes of the street vendor are more interested in collecting taxes from them than inspecting their practices. Regulators clarified in the focus group discussions that they do not collect taxes from street food vendors. That is instead the duty of the local revenue authority in the same local government. However, indicative from the focus group discussions is that the street food vendors are unable to distinguish the revenue authority from the regulating authority. A street food vendor noted, “One thing I have observed is when it’s time for them to take their money that’s when you will see them but after they take their money you won’t see them again, they won’t even come and inspect what you do.” Consumers agreed that they could only pay heed to food safety practices of street food vendors that are observable and hence they depend on the regulators to devise effective means to enforce the regulations. A consumer summed it up by saying, “I do not have a problem with the vendors but with the regulators because they are supposed to ensure that the right things are done”.

3.2.6. Low trust for food handlers’ tests certificate

The food handlers’ test certificate is a requirement for all food handlers under the Code of Hygienic Practice for Food Service Establishments and street food vendors are expected to comply [25]. However, a general perception of street food vendors in the focus group discussion was that the food handlers’ test certificates could not be trusted. This perception was based on the street food vendors’ observation that the certificates are sometimes issued without taking any bodily samples from them [Vendors]. Even when samples were taken, street food vendors perceived the results to be doubtful as they were consistently good for all tested street food vendors.

“The test certificate involves the regulators, medical personnel who would conduct the test and the person who would educate us. If they charge GHS40 they will share it but now all of them have seen that there is a lot of money involved so they just come for the blood samples and go and throw them away and take the money. So, now everything about the test is all fake”, one street vendor quipped.

“One thing also is that for all the tests we are doing the results always come as good, it doesn’t look genuine it’s amazing.” Another street vendor added. The lamentation continued amidst murmurings of agreement. “I have a problem with them and when you complain they just ask you ... eehm how much did you pay? Is it, not just GHS 40 (the equivalent of US\$4.2³)?” said the street food vendor.

Yet some of the street food vendors in the focus group discussions reported receiving authentic and credible food handler’s test certificates. “Yes, they [regulators] bring lab technicians and take blood samples, they take your blood samples and after 2 weeks they call you to come for your certificate but if there is a problem with the test, they will tell you”, a street food vendor declared without batting an eye.

This suggests that certain members of regulatory agencies may not be aligning with their roles or mandates to issue authentic food handlers’ test certificates and ensure foods were safe for consumption.

3.3. Effect of central and root challenges

Central and root challenges identified include: poor sanitary conditions, negligence in food handling, use of unsafe water and food ingredients in food preparation; health status of street food vendors among others may be part of challenges that jeopardize the safety of street foods.

3.3.1. Poor sanitary conditions

The most visible aspect of the street food vending business is the immediate surroundings of the food sale point, the food preparation area and the general outlook of the vendors. Street food vendors are often sited in areas with poor sanitary conditions. Even street food vendors whose sale points seemed to be sited in areas with fair sanitary conditions may prepare the food from abysmal areas. Such discoveries are followed by a resolve never to purchase street foods. “I buy kenkey from a certain place and one of my colleagues at work always says you people I am surprised at you that you buy this kenkey if you know where they prepare the kenkey you will never buy from there”. Shared by one consumer in a focus group discussion.

One street vendor in the focused group discussions who had been pensive for a while shared his sentiments bluntly, “We that are into this street food business, we have problems, and we need help. We are here and nicely dressed but down there [food preparation areas] what do we wear while working or preparing our drinks?” He continued rhetorically, “How do we even wash the fruits we go to buy; do we even wash them?”

Some street food vendors indicated that some locations were generally less sanitary than others. The open spaces that street vendors find attractive (because they are brought close to consumers) are often littered with refuse and have gutters with stagnant water. One consumer explained, “Let’s say you live in *Nima* [A slum-like community], what we know is there are a lot of open and choked gutters, but we see it to be normal because we are used to it. In places like *Kasoa* [a developing suburb with middle-income people] we don’t have a lot of open gutters except in front of the market where refuse can sometimes be left for several weeks if refuse collectors do not get the work done. This situation, however, does not deter us [street vendors] from continuing our sales. The market was there before the refuse came”.

³ 1USDollar = GHS9.5, Bank of Ghana Interbank Historical Foreign Exchange Rate for 23rd September 2022, when the focus group discussions took place (<https://www.bog.gov.gh/treasury-and-the-markets/historical-interbank-fx-rates/>).

3.3.2. Street food vendors negligent in food handling

In the focus group discussions and key informant interviews, consumers, regulators, and street food vendors attested to street food vendor negligence in ensuring the safety of street foods. Since the push to take proper care of the food is low, street food vendors are often lethargic in ensuring the right temperatures for the food being sold. They tend to juggle several things at the same time and often miss some details during food preparation and introduce foreign materials into the food. The Street food vendors also cut corners when the pressure to serve the food at the peak hour mounts. This increases the tendency to be negligent. A consumer shared sentiment from buying a drink from a hawkler in the traffic, “a woman who sat by me in a public vehicle bought *brukina* [a drink made from ground millet and pasteurized milk] in traffic. She was quick to buy before the vehicle moved but when she opened it, behold, it was fermented-it was spoilt you could even tell how long it had been under the sun”. Another consumer chimed in, “I have bought *kenkey* and seen someone’s finger nails in it before”. “I went to buy this *rice* and I ate the first scoop off when I took the next scoop, I saw a big housefly inside. It is painful, at the end of the day I can’t eat it, I have wasted my money.” One consumer lamented and others supported him with their nods.

Street food vendors who also attested to their own negligence shared their sentiments thus:

“We forget what they [regulators] teach so we end up doing our own thing”. A main meal street food vendor.

“Let’s say you have a lot of things to cook at the same time and your workers are just walking around you end up being mad. You can’t go with all the ethics you have been taught”. A main meal street food vendor.

“Sometimes we get tired, I remember one time one of my workers was supposed to light a coal pot to heat the *okra stew*. She didn’t do it and I found the stew foaming-it was spoilt. But for tiredness when you realize the food is getting cold you put it on fire again to make it hot.” A main meal street food vendor.

“You see we use flour, and we sieve it, so sometimes while sieving it, the air blows some away and we forget to sweep until even the next day. So, this together with the sugar and the other things brings insects, cockroaches, rodents and other pests to the kitchen”, a street snack food vendor.

One regulator in a key informant interview said, “More than 60 % of the street food vendors do not comply with the code of hygiene practices. Some of them, only come in the evening so you will not even see them in the daytime.”

3.3.3. Use of unsafe water and unsafe food ingredients in food preparation

Street food vendors perceive that the quality and safety of water and other food ingredients do not matter if they are cooked together with other food ingredients. They therefore noted they disregarded the conditions of the water and other food ingredients they use. Some consumers in the focus group discussions reported having chanced on street food vendors fetching water from unsafe sources. For instance, from burst water pipes, which is common issue in urban areas. Consumers explained that street food vendors would always want to take advantage of this ‘free’ water regardless of its quality and cleanliness of the access point. As one consumer shared, “There is this big gutter in my area with water pipes laid close to it. However, the pipes are often broken and water flows into the gutter where people fetch. One street vendor fries yam over there and she uses that water for everything. You will find her fetching that water when you pass there in the night.”

Participants in the focus group discussion also explained that most street food vendors purchase the worst quality vegetables. One consumer shared his sentiments thus:

“Some of the vendors buy unsafe vegetables to prepare their food because that one is cheaper”. When asked about how he knows this, he indicated that “if you want to know go to where they have been blending it, they buy the tomato, the pepper, and the onions from the market. They blend it at the commercial millers in the market. When you go there you will hardly see them blending fresh ones”. This disclosure suggests that the milling station is not only a source of food contamination but also a good source of information concerning the quality of ingredients street food vendors use in food preparation.

Another key finding was the street food vendors use of additives like paracetamol to tenderize meat. One vendor disclosed, “Yes. Yesterday my brother told me that he went to a place and they were boiling meat with paracetamol”. While some participants expressed surprise, others confirmed saying, “Yes, they use paracetamol. The study of [47] which reviewed literature from four African countries, corroborates this unethical practice of using paracetamol as a meat tenderizer.

3.3.4. The health status of many street vendors not confirmed

Street food business owners will endeavour to get the food handler’s test certificate for themselves however, getting the certificate for all workers, to them is not a prudent use of resources. This is because they believe the test certificate is not credible, and they find the cost of the certificate prohibitive given the high turnover rate of workers. Some sentiments were shared thus:

“What I can say about the lab test [food handlers’ test] is that I can challenge the lab test,” one street vendor said nodding and pointing to himself, “But what they say is that health issues are confidential.”

Another street food vendor continued, “The GHS 50 [fee for the food handler’s test certificate] is too much because some of us have about five workers, I have eight workers and you are telling me to pay that amount”. “You see” he added, we must renew and the way our work is nowadays when they [workers] come for some time and get a boyfriend then they stop”. The others laughed in agreement.

Another street food vendor chimed in about the cost of the test, “I have five workers and you charge each worker GHS 50 including me. That’s GHS300 to screen all of them. If I don’t, I will be sanctioned. And these workers won’t allow you to take the money from their pay”. The others laughed again indicating the issue expressed resonated with them.

A regulator in the mixed focus group discussions indicated that they have been advising the street food vendors that before employing a worker, one criterion should be that the potential worker has a food handler’s test certificate. A street food vendor responded to this, “I’ve been in this business close to 20 years. I started very young because that was what my mother was doing. And

she left it for me. We have even been told by other regulators to give them a contract to sign. And if you tell them to bring their food handlers' test certificate before employing them, you alone will be working in the kitchen cooking four foods at the same time and by the time you realize lunch is over. It's something we've tried and tried, it doesn't hold." She ended confidently.

3.4. Discussion

The barriers to ensuring and sustaining street food safety from the three main categories (the central challenge, the roots and the effects) also highlight two important dimensions that stakeholders need to pay attention to in addressing street food safety issues.

First is the street food vendor dimension. Street food vendors, as producers of street foods, procure food ingredients, transport, store, process and sell them to consumers. Thus, they have a significant influence on the safety of the food sold on the streets. However, in practice, they have little incentive to comply with food safety regulations and are often caught in the trap of opportunism driven by financial goals. The incentive theory under asymmetric information points to such moral hazard problems [48–50]. This theory explains not only the poor compliance of street food vendors but also how to avoid them. For example, the great liberality in when, how, and where a vendor sets up a street food enterprise means that several street food vendors could operate without an identity until discovered by regulatory authorities and regulatory requirements inspected. This situation influences opportunism [46]. Hence, implementing mechanisms to improve the identification of street food vendors becomes crucial in ensuring their accountability. The metropolitan, municipal and district assemblies can take the lead in strengthening the vendor registration processes to enhance accountability as research conducted in India suggests that registered vendors exhibit higher levels of compliance compared to their unregistered counterparts [31].

Second is the regulatory system dimension which forms the roots of the street food vendor's little incentive to comply with food safety regulations. Providing regulators with more resources to enforce regulations would be useful but not enough. Street food vending is a pervasive phenomenon. Ensuring the safety of street food can be achieved and sustained by policymakers recognizing that street food is an integral part of the economy, rather than viewing it as a hindrance to the urban development. Prohibitory measures may invoke rent-seeking behaviour among vendors leading to more unsanitary activities [12]. Such measures may therefore prove counterproductive. A case in point is the Odorna market in Ghana, where after vendors were relocated, challenges persisted even years after displacement. Many vendors resorted to hybrid strategies of maintaining a presence in the relocated market while also returning to the streets to cater to consumer needs [30]. In other countries such as Nigeria, resorting to violent measures against street vendors often resulted in a futile game of cat and mouse. Despite crackdowns, vendors persisted in their operations, adopting a strategy of evading regulators when they were visible and resuming activities once the coast was clear [51]. This dynamic creates a cycle of temporary compliance followed by a return to informal vending practices, thus perpetuating the challenge of regulating street food vending activities.

It is necessary for regulators and street food vendors to have a shared vision. A shared vision may not exist when street food vendors feel powerless in addressing their concerns because they do not understand the operations of the various regulating authorities. Addressing the challenges of street food safety could be initiated by considering the praxeological context for economic action as outlined by Ref. [52]. This emphasizes positive expectations rather than normative ones. The advantage of praxeology is its independence from factors like location, culture or economic status which are typically used to explain why people do what they do. It avoids categorizing people as poor or illiterate, instead, it demands a deliberate focus on their actions that contribute to achieving their desired performance outcomes. By closely examining the decisions made by street food vendors in allocating resources to meet their value objectives, rich information on sustainable decision-making could be gained. Understanding their pre-existing choices, especially regarding the location of their sales, could inform the design of interventions that align with their inherent objectives. This alignment reduces the risk of entitlement issues and enhances the potential for sustainable outcomes, particularly concerning food safety practices [53].

The research findings highlight that street food vendors prefer areas with high consumer traffic which guarantees sales of their food. Studies conducted in developed economies such as Bangkok, Thailand and Montpellier, France indicate that street food vendors consider certain locations unprofitable [28]. Another insight derived from the study was that street food vendors operated with a cost-advantage strategy and hence procured cheap ingredients to keep their food prices low. This emphasis on cost often left them with little incentive to comply with food safety regulations thus resulting in poor sanitary conditions, the use of sub-standard ingredients, negligence in food handling and failure to carry out the necessary health checks. Others are also ignorant of the adverse effects of deteriorated food ingredients, unpotable water and the unethical use of additives such as paracetamol.

Regulatory efforts that focus on revamping the registration of street food vendors as an identification strategy could serve as a crucial step in addressing key issues. This must be complemented with collaborative strategies involving vendors to determine optimal sales locations. Given that street food vendors prefer low-cost food ingredients, ensuring compliance with food safety regulations regarding the procurement and use of safe food ingredients necessitates a re-evaluation of the supply chain. The Food and Agriculture Directorate of the Metropolitan, Municipal and District Assemblies (MMDAs) could facilitate linkages between farmers and street food vendors, a practice known to reduce transaction costs as documented by Ref. [54]. Additionally, organizing street food vendors into associations could give them the critical mass to engage farmers for a steady and affordable supply of their food ingredients [55]. These measures could help mitigate the problem of street food vendors gleaned the poorest quality food ingredients from the local markets.

In cases where street vendors are ignorant of the consequences of their practices on food safety, continual food safety training and sensitization programmes are necessary as they align with the responsibilities of the MMDAs [22]. In addressing the unethical use of additives like paracetamol for meat tenderizing, sensitization and exploration of alternative solutions are essential. For example, research suggests the use of papaya leaves containing the enzyme papain as a natural tenderizer [56]. Unsanitary conditions of the

environment are often characteristic of open spaces in developing economies and therefore MMDAs should champion aggressive education and facilitate sanitization of areas attractive to street food vendors. Consumers are often left out of the regulatory system, however, given the limited resources for the operation of regulators, consumers could be leveraged by sensitizing them to purchase from vendors who possess the food hygiene permit given by the Food and Drugs Authority. These permits, renewable upon satisfactory compliance with food safety requirements following inspections mimic the transparency schemes seen in developed nations [25].

4. Conclusions and limitation of study

Efforts aimed at enhancing food safety such as the Code of Hygienic Practice for Food Service Establishments [25] and the National Food Safety Policy [17] in Ghana are laudable. However, as with any policy or regulation, the implementation of these measures by relevant agents often occurs under unacknowledged circumstances, potentially resulting in unintended barriers. This study has discovered three interrelated categories of challenges to ensuring food safety in the street food industry: (1) central challenge – Street vendor anonymity is an incentive for non-compliance with food safety regulations as vendors are more concerned about their economic objectives (2) Root challenges – generally the shortcomings in the regulatory system that do not provide the nudge for street vendor's compliance; and (3) Performance related challenges giving evidence of vendors poor compliance with food safety regulations.

These challenges are critical, and necessary to be managed and would require efforts and commitments from stakeholders such as food safety regulatory authorities, street food vendors, consumers and professional bodies to address them. Practical interventions should address the root causes of non-compliance, such as the preference for low-cost ingredients and lack of awareness regarding food safety. This includes revamping registration processes, facilitating linkages with farmers for quality ingredients, and providing continuous training and sensitization programs. Additionally, involving consumers in the regulatory process through education and incentivizing purchases from vendors with hygiene permits can enhance transparency and accountability. By fostering collaboration, understanding local contexts, and implementing targeted interventions, policymakers can create a regulatory environment that promotes both public health and economic prosperity in the street food sector.

The barriers to ensuring and sustaining street food safety as identified in this study are limited to the collation and analysis of patterns, themes and subthemes in the raw textual data derived from the focus group discussion and key informant interviews. However, the study did not collect data on individual socioeconomic characteristics such as age, education, and income of the participants. Future research should consider incorporating such statistics on participant demographics, as well as statistics on the occurrence of identified themes.

Ethics statement

This study was developed from a main project which was reviewed and approved by Ethics Committee for Basic and Applied Sciences, University of Ghana, with the approval number: ECBAS 008/22-23.

Both written and verbal informed consent were employed. Parents provided written informed consent for their wards to participate. Verbal informed consent was also used to keep the participants completely anonymous as street food vendors are often treated as illegal entities. Assent was obtained from participating minors in addition to their parent's written informed consent.

All participants provided informed consent for the publication of their anonymized data.

Data availability statement

Data associated with this study has not been deposited into a publicly available repository however, the data will be made available on request.

CRediT authorship contribution statement

Abigail Ampomah Adaku: Writing – original draft, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Irene Susana Egyir:** Writing – review & editing, Validation, Methodology, Funding acquisition. **Cynthia Gadegbeku:** Writing – review & editing, Methodology, Investigation, Funding acquisition. **Angela Parry-Hanson Kunadu:** Writing – review & editing, Validation. **Vincent Amanor-Boadu:** Writing – review & editing, Validation, Methodology, Investigation. **Amos Laar:** Writing – review & editing, Validation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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