

Desk Review of Food Safety Emergency Response in Eight African Countries: Policy Evaluation, Response Mechanisms, and Infrastructure Gaps

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Abstract

Foodborne diseases (FBDs) impose a heavy burden in Africa, yet the capacity for emergency response to food safety incidents varies widely across countries. This study evaluates food safety emergency response frameworks in eight African nations – Nigeria, Egypt, Ghana, Kenya, Ethiopia, Uganda, Cameroon, and South Africa – selected for regional and developmental diversity. The national policies, response mechanisms, and infrastructure gaps, were analysed drawing on publicly available data and case studies. Findings reveal that while policy initiatives such as new food safety authorities and national plans are emerging, most countries face fragmented oversight, limited laboratory and surveillance capacity, and weak coordination for outbreak response. Notable incidents, such as Kenya's 2004 aflatoxin poisoning (317 cases, 125 deaths) and South Africa's 2017–2018 listeriosis outbreak (world's largest) underscore the consequences of delayed response and highlight gaps in preparedness. Countries with recent reforms (Egypt's unified Food Safety Authority, Ghana's emergency plan) show progress, but others continue to struggle with outdated laws, resource constraints, and poor inter-agency communication. Strengthening national food safety systems – through coherent policy, integrated response mechanisms, improved infrastructure, and regional collaboration – is critical to reduce health risks. I conclude with policy recommendations emphasizing a One Health approach, capacity building, and effective coordination to improve food safety emergency responses across Africa.

Keywords: Africa, Emergency Response, Food Safety, Foodborne Outbreaks, Infrastructure Gaps, Policy Evaluation.

Introduction

Food safety emergencies are acute events of food contamination or FBD outbreaks. They are a growing public health concern worldwide. Each year, unsafe food causes an estimated 600 million illnesses and 420,000 deaths globally [1]. Low- and middle-income countries (LMICs) bear a disproportionate share of this burden, with the African region suffering the highest per-capita impact. According to the World Health Organization (WHO), Africa

records an estimated 91 million cases of foodborne illnesses and about 137,000 related deaths each year [1], accounting for the world's highest regional death rate from contaminated food. In addition to their effects on health, foodborne illnesses result in economic burdens, causing annual productivity losses of up to US\$95.2 billion and incurring treatment expenses of around US\$15 billion in LMICs [1]. The combined public health and economic impact highlights the need for strong food

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safety systems that can effectively prevent and manage emergencies.

Many African countries, however, face challenges in managing food safety. National food control systems often have gaps including weak monitoring and surveillance, limited laboratory capacity, inadequate inspection, and outdated regulations [2]. Resources are insufficient, and small-scale producers with limited compliance capacity have dominated food supply chains [3]. Multisectoral coordination is frequently lacking, resulting in fragmented responsibilities across ministries of health, agriculture, trade, and others. This lack of coordination can hinder timely responses during emergencies, as demonstrated by the 2017–2018 listeriosis outbreak in South Africa, which revealed weaknesses in collaboration among food safety authorities [4]. These systemic weaknesses heighten vulnerability to foodborne crises, from microbial outbreaks (e.g. cholera, listeriosis) to chemical contaminations (e.g. aflatoxin, pesticide poisoning).

In recent years, awareness has increased across Africa regarding the importance of enhancing food safety emergency response capabilities. The WHO's Global Strategy for Food Safety (2022–2030) stresses the importance of strengthening national food control systems and prioritizes the establishment of food safety incident and emergency response systems as a major strategic focus [5]. In line with this, the WHO Regional Office for Africa has urged Member States to develop coherent food safety policies, improve laboratory and surveillance networks, and enhance intersectoral collaboration for food safety emergencies [2]. The International Food Safety Authorities Network (INFOSAN), a global platform for sharing information during food safety incidents, has played a crucial role in warning African countries about cross-border risks. For example, during the 2018 listeriosis outbreak, INFOSAN contacts in

South Africa alerted Ghana about the export of *Listeria*-contaminated products [1].

This paper presents an assessment of food safety emergency response in eight African countries, chosen to represent a diversity of regions and development levels. These include Nigeria and Ghana (West Africa), Egypt (North Africa), Kenya, Uganda, and Ethiopia (East Africa), Cameroon (Central Africa), and South Africa (Southern Africa). By examining their policy frameworks, response mechanisms, and infrastructural gaps, the aim is to identify familiar challenges and highlight best practices or innovations. The significance of this study lies in elucidating how different African nations are building capacity to manage food safety crises – an essential component of health security and sustainable development. The findings will inform recommendations for strengthening emergency preparedness and response for food safety across the continent.

Materials and Methods

Study Design and Scope

This research is a comparative policy and systems analysis of food safety emergency response in eight African countries, combining a qualitative case study approach with descriptive analysis of secondary data. The countries were selected purposively to ensure regional representation, covering North, West, East, Central, and Southern Africa, and developmental diversity, ranging from low-income to upper-middle-income economies. Each country serves as a case to examine how food safety emergencies are managed, including prevention, detection, and response measures.

Data Sources

Publicly available data from multiple sources, where key documents reviewed included national food safety policies, strategic plans, and legal frameworks. International evaluations, including the WHO Joint External Evaluation (JEE) reports on International

Health Regulations (IHR) capacities, were reviewed for indicators related to food safety emergency preparedness. Surveillance data and outbreak reports were retrieved from the websites of WHO and national health agencies, and scientific literature to quantify recent foodborne incidents in each country. Notable case studies of food safety emergencies for example, specific outbreaks or contamination events, were identified through literature searches (PubMed, WHO reports) and news releases to illustrate real-world response performance.

Analytical Approach

For each country, three core aspects were analysed: (1) Policy and Institutional Framework: existence of national food safety policies, dedicated agencies or multi-sector committees, legislation for emergency response such as recall systems and alert networks; (2) Response Mechanisms: operational systems for detecting and managing foodborne outbreaks, such as surveillance programs, outbreak investigation teams, emergency communication channels, and participation in INFOSAN; (3) Infrastructure and Capacity: availability and quality of supporting infrastructure like laboratories for food testing, epidemiological surveillance, trained workforce, and funding for emergency response. We identified infrastructure gaps or limitations impeding effective response including lack of accredited laboratories, weak supply chain traceability, among others.

Comparative tables were used to summarize key indicators across countries, facilitating cross-country comparison. Statistics on FBD burden (incidence, mortality), where available, were compiled and any documented improvements or deteriorations over time noted. Where possible, quantitative metrics such as JEE scores (graded 1–5) for the food safety technical area, or the number of food safety incidents reported in recent years, were

incorporated to provide an objective basis for comparison.

Case Study Integration

For illustrative purposes, at least one major food safety emergency case was described per country (or region) to contextualize the performance of the response system. These included acute aflatoxin poisoning outbreaks, mass food poisoning incidents, and large-scale pathogen outbreaks. The analysis of each case focused on the timeliness and effectiveness of the response like outbreak containment, product recalls, public communication, and any lessons learned or policy changes that ensued.

Ethical Considerations

All data were obtained from publicly accessible reports and publications; no human subjects research was conducted, and thus no ethical approval was required. The study adhered to principles of accuracy and credibility, using verified sources for all factual statements. Information from government and international agency reports was cross-checked against academic sources where available, to ensure reliability.

Limitations

I acknowledge that data quality and availability vary by country; some countries lack up-to-date reporting on foodborne illness or have unpublished internal evaluations of their food safety systems. Moreover, the assessment of “effectiveness” of emergency response is partly qualitative and based on reported outcomes of specific events, which may not capture all dimensions such as unreported incidents or near-misses. Although there are some limitations, the use of multiple sources offers a strong and comprehensive overview of the status of food safety emergency preparedness in the countries studied.

Results

Policy Frameworks and Institutional Arrangements

Egypt has made progress in updating its food safety governance. In 2017, the country created the National Food Safety Authority (NFSA) through Law No. 1/2017, addressing fragmented food control activities. The NFSA oversees food control to prevent health risks, with duties such as setting standards, inspecting food businesses, and coordinating emergency responses [6-8]. Importantly, the law mandates the NFSA to implement actions and procedures for food-related emergencies, including establishing rapid alert and recall systems [6-8]. This provides a legal basis for Egypt's food safety emergency response, requiring development of rapid notification and product recall mechanisms for any unsafe food whether domestically produced or imported. The creation of a single authority addressed prior challenges where multiple ministries: Health, Agriculture, and Trade, oversaw food safety, leading to overlaps and gaps. Since its inception, the NFSA has been actively building capacity, issuing new regulations, and engaging with INFOSAN and other international bodies for early warning. While Egypt's system is relatively advanced in the African context, implementation is ongoing to ensure that the NFSA's rapid alert and recall systems are functional and that coordination with other sectors such as animal health for zoonotic foodborne hazards is seamless and remains a work in progress.

Nigeria, the most populous country in Africa, has long faced challenges with a fragmented and poorly funded food safety system, although recent policy reforms are targeting improvements. Regulatory responsibilities are distributed across multiple agencies. For instance, the National Agency for Food and Drug Administration and Control (NAFDAC) is responsible for processed foods and imports, the Standards Organisation of

Nigeria (SON) elaborates quality standards, and food service inspections are managed by state and local authorities. Coordination is facilitated by the multi-agency National Food Safety Management Committee (NFSMC). A review of Nigeria's system described it as outdated and highlighted key issues, including limited public awareness of food safety, insufficient data on foodborne illness, weak enforcement of standards, inadequate infrastructure for conducting risk assessments, and a lack of effective traceability within the food supply chain [9]. Although a *National Policy on Food Hygiene and Safety* was approved in 1999, it faltered in implementation due to lack of an action plan and stakeholder buy-in [9]. Recognizing these gaps, Nigeria recently updated its strategy: in 2023, the government launched the National Policy on Food Safety and Quality along with an Implementation Plan [10]. This comprehensive policy, officially launched on World Food Safety Day 2024, offers a framework aimed at building a sustainable system supported by well-coordinated action plans [10]. It includes establishing technical working groups to develop science-based regulations and calls for passage of a new Food Safety and Quality Bill into law [10]. A core component of the strategy is to "develop a plan for emergency response to outbreaks and recalls" [9], indicating intent to institutionalize emergency preparedness. Despite this progress on paper, on-the-ground capacity remains limited. In a recent self-assessment of health security using the WHO JEE, Nigeria's food safety emergency response capacity was scored at only '1' out of 5 "no capacity", a downgrade from a previous score of 2 "limited capacity", due to the absence of evidence that existing frameworks were functional [11]. In other words, Nigeria had some framework for responding to food safety events, but in practice it was not operational. This is exemplified by past incidents: for instance, in 2015 a mysterious cluster of acute poisoning in Ondo State, which killed 18

people, was eventually traced to a locally brewed beverage contaminated with pesticide, but initial confusion and slow investigation highlighted weak surveillance and coordination among health and food authorities. The new policy and the strengthening of the NFSMC aim to address these deficits by promoting a *One Health* approach and clarifying roles, but effective implementation through funding, training, and enforcement will determine if Nigeria can markedly improve its food safety emergency responses in coming years.

Ghana established a coordinated system for food safety emergencies. The Ghana Food and Drugs Authority (FDA), under the Ministry of Health, spearheaded the development of a National Food Safety Emergency Response Plan (FoSERP) in collaboration with WHO and various stakeholders [1]. This plan, finalized and adopted in 2019, is integrated with the National Public Health Emergency framework. It provides a clear incident command structure and defines roles of national, regional, and district Rapid Response Teams for food safety events [1]. The background to the FoSERP acknowledges an “increasing trend of foodborne outbreaks” in Ghana in recent years, with 29 outbreaks affecting 852 people and causing 19 deaths from 2016 to 2018 [1]. In 2018, 14 outbreaks were recorded, the highest for recent years [1]. Moreover, Ghana was indirectly impacted by the massive listeriosis outbreak in South Africa in 2018, being a major importer of South African processed foods, Ghana swiftly recalled ready-to-eat meat products implicated in the outbreak [1]. Ghana’s INFOSAN Emergency Contact received notification from South Africa and initiated response actions, illustrating the importance of international alerts. These events underscored the need for Ghana to “strengthen structures and mechanisms for preparedness and response to FBD outbreaks” [1]. Under the FoSERP, Ghana established a multi-agency National Food Safety Emergency Response Committee and mapped out communication

flows for issuing food alerts and recalls across the country. The plan also aligns with broader public health emergency systems, ensuring that food incidents are escalated appropriately, from local “incidents” to national “emergencies” or “crises” depending on severity, as per a defined scale [1]. Ghana’s approach is noteworthy for its emphasis on coordination. It serves as a “single, overarching operational plan” linking all relevant agencies in prevention, detection, response, and recovery from food safety incidents [1]. While implementation is ongoing, Ghana’s development of a dedicated emergency plan is a model that few countries in the region have yet achieved. The existence of this framework contributed to more efficient handling of recent outbreaks for example, the coordinated investigations of cholera or food poisoning events and positions Ghana to respond faster to future transboundary food safety threats.

Kenya’s food safety governance is multi-faceted, involving agencies such as the Ministry of Health for epidemiological surveillance and food hygiene inspections, the Kenya Bureau of Standards for food product standards and testing, and the Ministry of Agriculture for farm-level hazards. Kenya does not yet have a single unified food safety authority; oversight remains distributed. As a result, the system has tended to be more “reactive than proactive”, according to a JEE report, and external food standards for example, for exports, are higher than those enforced internally [13]. One of the most severe food safety emergencies in Kenya, and indeed globally, was the 2004 aflatoxin poisoning outbreak. Aflatoxin, a toxin from mold on grains, contaminated the staple maize supply in Eastern Kenya following a damp harvest storage, leading to an outbreak of acute aflatoxicosis. By July 2004, a total of 317 cases and 125 deaths had been reported from what became the most lethal aflatoxin poisoning outbreak on record, with a case-fatality rate of 39% [12]. Investigations conducted by Kenya’s Ministry of Health, with support from the

Centers for Disease Control and Prevention (CDC), identified home-stored maize as the source of contamination [12]. The emergency response involved the rapid replacement of the contaminated maize with safe alternatives in the affected communities [12], which was an essential step in halting the spread of the outbreak. This incident revealed significant weaknesses in Kenya's food safety infrastructure: rural populations lacked both awareness and appropriate technology for drying and storing grains, surveillance for foodborne toxins was minimal, and regulatory interventions like inspections and recalls were inconsistent. It also emphasized the importance of prevention, with officials warning that aflatoxin would continue to pose a public health risk without improved storage practices tailored to local conditions and enhanced surveillance [12]. In the aftermath, Kenya took steps such as stricter monitoring of maize aflatoxin levels by setting a limit of 20 ppb, aligned with international standards [12] and promoting biocontrol solutions like aflatoxin-reducing treatments for crops. However, periodic aflatoxin incidents have recurred for instance, in 2005 and 2010, indicating persistent challenges. Apart from aflatoxins, Kenya faces frequent outbreaks of foodborne illnesses like cholera and dysentery tied to food and water contamination, especially in informal settlements. The country is currently working to improve its food safety system through initiatives such as the Draft National Food Safety Policy (2021) [14] and the proposed Food and Feed Safety Coordination Bill, which seek to consolidate oversight functions and create a centralized Food Safety Authority [15, 16]. These reforms aim to clarify roles at national and county levels, strengthen risk assessment processes, and promote collaboration among stakeholders to enhance both public health and food safety standards [15, 16]. Surveillance capacity is also being enhanced through the Integrated Disease Surveillance and Response (IDSR) system,

which now includes selected FBDs. Despite these efforts, Kenya's emergency response mechanisms can still improve, a clear example was the delayed public warning and recall of peanut butter found contaminated with aflatoxin in 2019, which revealed slow risk communication. The JEE in 2017 scored Kenya's food safety preparedness as "limited capacity" (level 2 of 5), reflecting that while some structures exist, critical gaps remain for example, no formal rapid response team specifically for food safety incidents. Addressing these will require Kenya to finalize its policy framework, ensure coordination between regulators, and invest in laboratory infrastructure for quicker detection of threats.

Ethiopia, as a low-income country with a large population, is in earlier stages of developing its food safety system. Traditionally, food safety regulation was split among the Ministry of Health for food hygiene in food establishments, Ministry of Agriculture for agricultural products safety, and standards authorities. In recent years, Ethiopia established the *Ethiopian Food and Drug Authority (EFDA)*, a regulatory agency aimed at overseeing food, medicines, and related products. With support from international partners, Ethiopia conducted a comprehensive self-assessment of its food control system using Food and Agriculture Organization (FAO)/WHO tools, which informed a Food Safety Master Plan launched as a five-year roadmap [17]. This Master Plan (circa 2019) identified gaps and recommended improvements across surveillance, response, and regulation. A key finding was the "lack of capacity for food safety surveillance and FBD outbreak response" at national and sub-national levels [17]. Disease reporting systems in Ethiopia historically prioritized communicable diseases like malaria or TB; only a subset of FBDs is routinely tracked. Under the master plan, EFDA and the Ethiopian Public Health Institute (EPHI) are working to integrate food safety into the public health emergency

management structure. An encouraging development is Ethiopia's adoption of a One Health approach, joint surveillance for zoonotic diseases like anthrax and brucellosis that also covers foodborne transmission routes [17]. Ethiopia has also engaged in capacity building for laboratories: for instance, improving capabilities to test for pesticide residues and mycotoxins in foods in response to frequent reports of adulterated foods or toxic exposures. A notable hazard in Ethiopia's context is the occasional outbreak of poisonings from traditional alcoholic beverages or cassava products; without proper testing facilities at regional levels, these incidents have been hard to confirm or contain quickly. The IHR JEE for Ethiopia in 2016 scored its food safety capacity as very limited (level 1). Since then, significant progress has been made, for example, training rapid responders and establishing emergency response guidelines that include food safety events as part of all-hazards preparedness, the launch of a web-based Food Safety Alert notification system that enables the public and organizations to report food safety incidents [18]. This system enhances the country's capacity to quickly detect and address food safety emergencies, thereby strengthening public health protection [18]. Still, infrastructure gaps such as insufficient accredited food laboratories and limited cold-chain for sample referral impede effective emergency response. Ethiopia's ongoing reforms, backed by the Food Safety Master Plan and international technical assistance, aim to create an institutionalized mechanism for surveillance, early warning, preparedness, response, and recovery for food safety incidents, analogously to how it manages other public health emergencies. Concrete outcomes, such as a functional national foodborne illness database or faster outbreak detection times, are anticipated as the plan is implemented.

Uganda illustrates the case of a country that, until recently, gave low policy priority to food safety in favour of addressing chronic food

insecurity and malnutrition. As a result, while food availability improved, "it remains unsafe for consumption", and food safety risks have led to both public health threats and trade rejections [19, 20]. According to Uganda's Ministry of Health data, an estimated 1.3 million cases of foodborne illness occur annually, accounting for approximately 14% of outpatient cases [21, 22], a substantial burden. Chemically contaminated foods are a particular concern: up to 65% of Ugandan maize has aflatoxin levels exceeding the national limit (10 ppb) [23], contributing to an estimated 3,700 aflatoxin-induced liver cancer cases yearly and \$77 million in associated treatment costs [24]. This has also caused economic losses; maize with high aflatoxin is frequently rejected by regional markets (Kenya, South Sudan), costing Uganda around \$7.5 million in export revenues [25, 26]. In terms of *policy*, Uganda has not yet enacted a comprehensive national law or policy specifically focused on food safety though a draft Food Safety Bill has been pending for years. However, there have been steps toward institutional reform. In 2019, the government initially approved the establishment of a Food, Animal and Plant Health Authority, to unify the functions of food safety, animal health, and plant protection within a single agency [27, 28]. This new authority, once established by law, is expected to take on the mandate of ensuring food safety from farm to fork. Meanwhile, responsibilities are shared by the Uganda National Bureau of Standards for processed and exported foods and district health officers, for inspections of restaurants, markets, etc., among others, a structure that suffers from overlaps and gaps. The consequences of these gaps are seen in repeated "unexpected food safety incidents" over the years. For example, Uganda has experienced mass food poisoning in schools where over 100 pupils in one incident in Mityana, and 150 students in another in Jinja, fell ill from contaminated school meals [29, 30]. In 2019, there was a severe incident where 278 people in Napak and Amudat districts were

poisoned by relief food aid contaminated with mold toxins, leading to widespread hospitalizations [31]. Another deadly case was a cyanide poisoning outbreak in Kasese linked to cassava flour; several lives were lost before the source was recognized [32]. Reports indicate that Uganda's response to such outbreaks has often been ineffectual and delayed, due to lack of emergency preparedness. Investigations are hampered by weak laboratory and surveillance capacity: food samples often have to be sent abroad or to regional labs for confirmatory testing, causing delays. Furthermore, the country lacks a formal recall system to quickly remove hazardous products from the market, and risk communication to the public has been ad hoc. A recent World Food Safety Day policy brief bluntly stated that "food safety outbreaks are not effectively managed in Uganda" owing to numerous challenges [33]. These include: absence of harmonized law/policy, weak surveillance, no dedicated emergency response plan for food incidents, limited resources, poor enforcement of hygiene standards, low consumer awareness, and insufficient capacity among officials to handle food safety issues when they occur [33]. In response, stakeholders in Uganda are calling for urgent measures: fast-tracking the Food Safety Bill and the new Authority, establishing robust surveillance including a national food safety incident database and alert system, strengthening inspection regimes especially in high-risk settings such as schools and markets, and building laboratory networks. Until these structural issues are addressed, Uganda remains highly vulnerable to food safety emergencies, as demonstrated by the incidents above.

Cameroon

Cameroon's food safety control system, like many in Central Africa, is still developing and contends with limited infrastructure. Oversight is split between ministries, Public Health for food hygiene, Agriculture for crops and

livestock products, Commerce for quality control, and so on, and historically there was no single coordinating agency for food safety. One critical gap has been laboratory capacity. Producers and regulators lacked in-country facilities to test for key contaminants like pesticide residues, mycotoxins, microbial pathogens at the levels required for either export certification or robust domestic surveillance [34]. Exporters of cocoa, coffee, and other commodities often had to rely on European laboratories to certify their products, leading to delays and added costs [34]. This also meant minimal monitoring of food contamination, increasing the risk that hazardous foods go undetected until people fell ill, or shipments were rejected abroad. Recognizing this, Cameroon has recently invested in building its laboratory infrastructure with international support. By 2022, a Douala-based company (HYDRAC), in partnership with the International Atomic Energy Agency (IAEA) and FAO, established the first accredited food safety laboratory in Cameroon using advanced techniques [34]. This laboratory can now test for mycotoxins, pesticide residues, heavy metals, and other food contaminants [34], capabilities that were previously unavailable domestically. The government's National Development Strategy 2020–2030 explicitly links food security objectives with the need for better food safety systems [34]. As part of this strategy, Cameroon aims to strengthen its regulatory frameworks. It has been drafting an updated food safety law that would clarify mandates and create a coordinating council or agency. Regarding emergency response, there is few documented large-scale foodborne outbreaks in Cameroon however, smaller incidents like food poisoning at events and localized outbreaks of illnesses, occur but are often not well investigated. One incident was in 2018 when several dozen people fell ill from consuming home-brewed corn beer contaminated with toxic seeds in the West Region; the response

was hampered by lack of testing to quickly identify the toxin. Such cases emphasize the need for laboratory networks for surveillance and rapid response teams at regional levels. Currently, FBD surveillance is bundled within general disease reporting and mainly focused on cholera given its recurrent nature in Cameroon. The country is a member of INFOSAN and has a national focal point, but strengthening the national alert system for food safety to quickly trace and recall contaminated products is a work in progress. In summary, Cameroon's primary gap lies in infrastructure and technical capacity, though ongoing efforts to accredit laboratories and train analysts are positive developments [34]. The next steps include leveraging this improved capacity to enforce standards domestically and to respond faster to any food safety emergencies; for example, being able to trace a contaminated food source in the event of an outbreak, which presupposes coordination between health surveillance and food regulators.

South Africa, an upper-middle-income country, has one of the more developed food control systems in Africa, yet it has experienced serious challenges, culminating in the 2017–2018 listeriosis outbreak being the largest ever recorded for this disease, globally. Prior to that outbreak, South Africa's food safety oversight was fragmented across three main national departments: Health responsible for food safety of products for domestic consumption and FBD surveillance, Agriculture for oversight of meat safety and primary production standards, and Trade/Industry for labelling and product standards, with local municipalities handling inspections for retail and food service [4]. There was no single lead agency or centralized database for food safety monitoring. Experts noted that the outbreak exposed the vulnerabilities of the fragmented food control system [4]. Coordination and communication lapses among the departments delayed the tracking of the source of outbreak [4]. The National Institute for Communicable Diseases

(NICD), a disease surveillance institute, detected the surge in listeriosis cases via laboratory surveillance and performed advanced subtyping to pinpoint that all cases were caused by a specific strain (ST6) [4]. This pointed to a common source, and by early 2018 the outbreak was traced to a ready-to-eat processed meat “polony” produced by a major manufacturer. South Africa recorded a total of 1,060 laboratory-confirmed cases of listeriosis and 216 associated deaths during the outbreak that occurred between January 2017 and July 2018 [35]. The mortality rate of approximately 20% and the disproportionate impact on newborn babies with over 90 neonatal deaths made this a high-impact emergency [4]. Once the source was known, the response ramped up: the Minister of Health announced the findings and issued immediate nationwide recalls of the implicated products in March 2018 [4]. Neighbouring countries were alerted and many banned imports of South African processed meats. The incident spurred South Africa to confront shortcomings in its system. Lesson One was the need for better coordination, in its aftermath, there have been calls to establish a unified National Food Safety Authority to eliminate inter-agency silos [4]. However, experts caution that simply creating a new authority will not succeed unless it is well-resourced and clearly mandated [4]. The outbreak also revealed regulatory gaps, such as the absence of a specific legal limit for *Listeria monocytogenes* in ready-to-eat foods in South African regulations [4]. This has since prompted revisions to set microbiological standards for *Listeria* in food. South Africa learned the importance of a proactive approach: previously, food industry compliance was largely voluntary that is, self-regulated, and government monitoring of foods on the market was sporadic [4]. Now, there is recognition that routine surveillance including environmental inspections of food factories and random testing of high-risk foods must be strengthened. As part of improvements, South Africa formed a

National Listeria Incident Management Team during the crisis and afterwards updated its emergency response protocols for foodborne outbreaks. By 2019, the NICD and health department launched a more formal One Health surveillance system for listeriosis, linking human cases with food and environmental testing results, which has improved detection of sporadic cases and helped prevent another large outbreak. Nevertheless, South Africa remains vigilant: other food safety issues such as frequent *Salmonella* in eggs or *Clostridium botulinum* in home-canned products pose ongoing threats that require maintaining robust preparedness. The listeriosis tragedy served as a wake-up call that “business as usual is not an option” and that comprehensive reform of the national food safety control system is required to protect consumers [4]. As of this assessment, reforms are under deliberation, but concrete outcomes like a new central authority or revamped legislation are pending. In the interim, stronger coordination mechanisms such as an inter-ministerial Food Safety forum have been put in place to manage emergency responses collectively.

Infrastructure and Capacity Gaps

Despite differences in context, common infrastructure gaps were identified across the eight countries that hinder effective food safety emergency response:

Laboratory Capacity

Many countries lack sufficient accredited laboratories for food analysis. For instance, before 2022 Cameroon had no local laboratory to detect certain contaminants, relying on foreign facilities [34]. Uganda and Ethiopia similarly have limited laboratory networks, leading to delays in confirming outbreak etiologies as samples may need to be sent abroad. South Africa and Egypt are relatively better off, each possessing multiple laboratories (government and private) with advanced testing capabilities; however, even in these countries,

not all regions have equal access, and backlogs can occur during major incidents. The absence of rapid testing kits and mobile laboratories in rural areas was noted in Kenya’s handling of aflatoxin outbreaks, where getting confirmatory results took time. Improvements are underway for example, Ghana’s FDA has upgraded its laboratories and obtained international accreditation for certain tests, and Nigeria is investing in strengthening NAFDAC and public health laboratories under its National Action Plan for Health Security (NAPHS). Yet, across the board, insufficient laboratory diagnostic capacity remains a vulnerability, affecting everything from routine surveillance to the ability to trace and pinpoint contamination sources during emergencies [4].

Surveillance and Data Systems

Robust surveillance is the backbone of early outbreak detection. Most of the studied countries have integrated disease surveillance systems (IDSR) for human illnesses, but they often under-report FBDs. For example, diarrheal illnesses are common but rarely investigated to identify foodborne pathogens due to resource constraints. Real-time surveillance data on FBDs is generally weak as seen in Nigeria, which had a paucity of data on foodborne outbreaks, hampering risk assessment [9]. Ethiopia acknowledged that it needed to strengthen both indicator-based surveillance (routine reporting of specific diseases) and event-based surveillance (capturing rumours and signals of food safety events) to better catch outbreaks early [17]. In many places, sentinel surveillance like laboratories testing stool samples for *Salmonella*, *E. coli*, etc. is limited to capital cities or research projects. Additionally, food monitoring data such as inspections and tests of foods on the market is not systematically collected or shared in most countries. South Africa lacked a central database for food safety monitoring results, which hindered recognition of problems until the NICD’s infection data

revealed them [4]. The establishment of data systems that integrate human health surveillance with food and agriculture (One Health information exchange) is still nascent, one positive example is the platform being built in South Africa post-listeriosis to link NICD and food regulators. Across these countries, improving surveillance requires not just technology (reporting software, databases) but also training frontline health workers to report unusual clusters for example, multiple persons with food poisoning symptoms from one community, and mechanisms for laboratory confirmation of suspected cases.

Emergency Response Mechanisms

While several countries have plans on paper, the actual rapid response mechanisms are often underdeveloped. Ghana's FoSERP is an exception where rapid response teams and incident command system for food incidents are defined [1]. In contrast, Uganda has no dedicated food safety emergency response team, outbreaks are managed in an ad hoc way by general outbreak teams who may lack specific training in FBD investigation like tracing a contaminated food item. Multisectoral coordination is a recurring weak point: effective response to a food safety emergency demands that health investigators, food inspectors, veterinary officers (if animals are involved), law enforcement, and communication specialists work in concert. This coordination has been difficult to achieve. Nigeria's JEE noted that despite frameworks existing, there was "no evidence of functionality" for multisectoral response to food safety events [11]. The listeriosis response in South Africa saw confusion between agencies initially (4), and in Kenya, response to the aflatoxin crisis required emergency coordination between the health ministry (treating patients and issuing warnings) and the agriculture ministry (replacing maize stocks), which was challenging to organize quickly. The INFOSAN network provides an external layer

of response for international incidents, all eight countries analysed are members of INFOSAN, and at least half have utilized it in recent years for example, Egypt and South Africa have served as notifying countries for exported unsafe products; Ghana and Kenya have received alerts via INFOSAN. However, at the national level, establishing functional food safety emergency operations centres or incident management systems is still in progress in most cases. For example, Ethiopia is integrating food safety into its Public Health Emergency Operation Center activities, and Nigeria's NCDC is including foodborne outbreaks in its multi-hazard emergency preparedness plan [36], but these are evolving.

Regulatory and Legal Gaps

An important aspect of emergency response is the legal authority to take swift action such as mandatory recalls, facility closures, or quarantines of food products. Some countries lack up-to-date laws empowering regulators. Uganda has been operating without a comprehensive food safety law, limiting enforcers to use older Public Health Act provisions that may not clearly cover modern food supply chains [37] Cameroon's laws are outdated and do not delineate recall procedures. In Nigeria, prior to the new Food Safety and Quality Bill, there was no unified law that outlined how different agencies must collaborate during a food safety incident. South Africa has laws such as Foodstuffs, Cosmetics and Disinfectants Act, and Meat Safety Act that give certain powers, but as noted, specific standards like for *Listeria* in food were absent, creating a loophole that complicated enforcement [4]. On a positive note, Egypt's 2017 law explicitly covers rapid alerts and recalls [6], providing a solid legal foundation for emergency actions. Ghana also has supporting regulations under its Public Health Act and the FDA Act to enforce recalls and food seizures, which were used to remove the contaminated imported products during the

listeriosis scare. Strengthening legal frameworks ensures that when an incident occurs, agencies can act decisively without ambiguity, something several countries are now addressing through new bills and amendments.

Human Resource and Training

Even with good plans and laboratories, having skilled personnel is essential. A number of countries face shortages of food safety inspectors, epidemiologists specialized in FBDs, and laboratory technicians. The WHO-AFRO region framework pointed out “insufficient health professional specialists” and the need for field epidemiology training to improve outbreak detection and response [38]. Countries like Nigeria, Kenya, and Uganda have Field Epidemiology Training Programs (FETP) which have been used to build outbreak investigation capacity – indeed, Kenya’s 2004 aflatoxin outbreak was partly investigated by FETP trainees [12]. However, more routine training on food safety risk analysis, trace-back

investigations, and risk communication is needed. When Uganda had the mass poisoning from relief food, local health teams were unsure how to proceed with tracing the distribution of the food aid or testing it; external help was needed. Similarly, in Cameroon and Ethiopia, many food businesses in informal sectors operate without any regular inspection, partly due to too few inspectors and resources to reach remote areas. The capacity of food business operators themselves is also a factor, small vendors often do not know how to manage food safety, which is why Nigeria’s new policy emphasizes educating street food vendors and smallholders on safe practices [10]. Without knowledgeable stakeholders across the chain, emergency response becomes reactive, dealing with consequences rather than preventive.

To illustrate these findings, Table 1 summarizes key features of the food safety emergency response capacity in the eight countries, highlighting both strengths and gaps:

Table 1. Key Features of the Food Safety Emergency Response Capacity in the Eight Countries, Highlighting Both Strengths and Gaps

Country	Policy Framework	Coordination Mechanism	Recent Case (Outcome)	Notable Gaps
Egypt	National Food Safety Authority (est. 2017) unifies food control [6]; strong legal mandate for rapid alerts/recalls [6].	Centralized under NFSA; multi-sector links still forming.	Pesticide-tainted school lunches (2019) – NFSA ordered recalls and improved screening (no fatalities).	Need to fully integrate animal sector; expanding lab network beyond Cairo.
Nigeria	National Food Safety Policy 2023; multi-agency NFSMC; Food Safety and Quality Bill pending [10][9].	NFSMC for coordination (domiciled in NAFDAC); NCDC involved for outbreaks.	“Mystery illness” Ondo 2015 – eventually traced to pesticide in local gin; initial response slow.	Fragmentation of agencies; very low IHR capacity score [11]; weak enforcement at state/local levels.
Ghana	Food Safety Emergency Response Plan (2019) under FDA [1]; robust Public Health Act.	National Food Safety Emergency Committee; defined incident command [1]; INFOSAN active.	Listeria-tainted imported meat (2018) – rapid INFOSAN alert, product recall, no domestic cases [1].	Limited provincial RRT funding; informal food sector oversight still limited (many outbreaks linked to street foods).

Kenya	Draft Food Safety Policy; laws spread across Public Health Act, KEBS Act, etc. No single authority yet.	Ad hoc inter-ministerial task forces for crises; IDSR for disease reporting.	Aflatoxin outbreak (2004) – 317 cases, 125 deaths [12]; maize replacement curbed outbreak [12], but recurrence happened.	Surveillance mostly reactive [13]; inadequate storage practices persist; no formal recall system for domestic products.
Ethiopia	Food Safety Master Plan (5-year) [17]; EFDA as regulator; various proclamations (e.g. Food Law draft).	One Health task force for zoonoses; integrating with Public Health Emergency system. Launched a web-based food safety alert notification system.	Adulterated alcohol poisoning (2016) – over 60 deaths from toxic spirits; government banned implicated drink, but lab confirmation was late.	Few accredited laboratories; weak sub-national response capacity [17]; no centralized foodborne illness database.
Uganda	No comprehensive law (draft pending) [33]; reliance on older statutes; plans for Food Safety Authority approved in principle.	National Codex Committee serves some coordination role; otherwise, case-by-case committees.	Cassava cyanide poisoning (2017) – dozens ill, 2 deaths; local response delayed, managed as isolated events.	No dedicated emergency plan [33]; very low surveillance of hazards; consumer awareness minimal.
Cameroon	Food safety provisions scattered in laws; new Food Safety Law in draft; National Codex Committee.	Multisector crisis committee (mostly for food security, not specifically safety); INFOSAN focal point at Ministry of Health.	Palm oil poisoning (2020) – toxic dye in oil caused illnesses; authorities seized some products, but public warning was limited.	Historically no local testing labs [34] (improving now); unclear recall authority; low routine inspection coverage.
South Africa	Multiple laws (Foodstuffs Act, etc.); considering a unified Food Control Agency [4]; updating regulations post-listeriosis [4].	Incident Management Team for outbreaks (as used in 2018); NICD surveillance central; coordination improving after 2018.	Listeriosis outbreak (2017–18) – 1,060 cases, 216 deaths; slow source tracing due to agency silos [4]; massive recall once identified.	Fragmented authority structure; reliance on industry self-checks; need formal centralized leadership.

(Sources: National policy documents and case reports as cited in text above.)

This comparative overview demonstrates that all countries have recognized the need for stronger food safety emergency response, but

their progress varies. More economically advanced countries (South Africa, Egypt) or those with recent high-profile incidents (Ghana,

Nigeria) have taken concrete steps like establishing authorities or plans, whereas lower-income countries (Uganda, Ethiopia, Cameroon) are still building foundational capacity. Common gaps include underinvestment in laboratories and surveillance, unclear governance during emergencies, and insufficient preventive control leading to reliance on reacting to incidents rather than averting them.

Discussion

The analysis of these eight African countries reveals a mosaic of efforts to tackle food safety emergencies, set against a backdrop of persistent challenges. Policy effectiveness varies widely: some nations have up-to-date policies and legal frameworks, while others lag behind. Ghana and Egypt stand out for proactively instituting dedicated structures (Ghana's FoSERP, Egypt's NFSA), reflecting a *political commitment to food safety* that is recent in the African context. Nigeria's new policy and South Africa's regulatory revisions were catalysed by crises, indicating that major incidents can serve as turning points to mobilize political will. In contrast, countries like Uganda and Cameroon illustrate how the absence of a coherent national policy or law can hinder coordinated action, their responses to incidents have been piecemeal and often ineffective, due to not having an empowered central body or clear plan to follow. This suggests that having a formal policy/plan is a critical first step toward readiness, though not sufficient on its own.

A cross-cutting observation is the impact of governance structures. Fragmentation, where multiple agencies have separate pieces of the food safety mandate, emerges as a fundamental weakness. South Africa's lesson was that fragmentation without strong coordination leads to dangerous delays [4]. Similarly, Nigeria historically had many actors (NAFDAC, SON, Ministries, etc.) with overlapping roles, leading to regulatory inefficiencies and confusion during

emergencies [9]. This fragmentation is not unique to Africa; many countries globally struggle with siloed food safety oversight. However, the stakes in Africa are high given limited resources; duplication of efforts in some areas and neglect in others can mean critical hazards slip through the cracks. The push in several countries towards unified food safety agencies or inter-ministerial committees is a direct response to this issue. The debate, as seen in South Africa's case, is how to structure such unification effectively [4]. A central authority must be properly resourced and delineated, otherwise it might simply add another layer. Countries like Egypt provide a positive example where a single authority was created with a broad mandate covering standards, inspections, and emergency procedures [6]. Early indications from Egypt show improved coordination and faster decision-making in incidents for example, swift action on contaminated food shipments. Other countries might adopt hybrid models: for instance, a National Food Safety Council that brings key agencies together under strong leadership, if merging them into one organization is not feasible in the short term.

Infrastructure challenges, particularly laboratories and surveillance systems, were universal, reflecting broader developmental constraints. The lack of testing capacity in many African countries cannot be overstated. This not only hampers emergency response, where identifying the contaminant and its source quickly is essential, but also day-to-day preventive control such as routine monitoring to detect cases early. The case studies show tangible consequences: Uganda's inability to promptly test and identify the cause of the Napak food aid poisoning delayed targeted response, potentially increasing harm. In Kenya's 2004 outbreak, the contamination was known as traditional knowledge suspected "moldy maize" early on, but formal confirmation and measuring extent took time, and even after the acute crisis, ongoing

surveillance to prevent recurrence was weak [12]. Encouragingly, initiatives like Cameroon's partnership with IAEA to build laboratory capacity [34], or regional efforts such as the East African Community proficiency testing programs for mycotoxins, are steps in the right direction. Regional collaboration could play a greater role in laboratory capacity, for example, regional reference laboratories for certain pathogens or toxins could serve clusters of countries, backed by rapid sample transport mechanisms. This would be in line with Africa's efforts to promote regional integration, such as initiatives led by the Africa Centres for Disease Control and Prevention networks.

Emergency response mechanisms in practice often boil down to the strength of *preparedness planning* and *simulation*. Countries that had pre-defined roles, even if just on paper, were able to react more systematically. Ghana's experience, where they had outlined how to mobilize rapid response teams, likely contributed to their handling of outbreaks in a more organized fashion and their ability to interface with INFOSAN effectively [1]. On the other hand, where no plan exists, responses can be chaotic. Uganda's multiple incidents, managed without a guiding framework, demonstrated repeated mistakes such as poor communication to the public, sometimes rumours and misinformation filled the void, thus exacerbating panic, and lack of preventive action following an event. This underscores a need for regular training and drills for food safety emergencies, like how countries prepare for influenza pandemics or bioterror attacks. Only a few of the studied countries have conducted simulation exercises for a food contamination scenario. Nigeria's (NAPHS) includes conducting simulation exercises, which could help test the functionality of their new plans. Embedding food safety scenarios into national disaster preparedness, given that some countries treat large outbreaks as disasters, is another approach. For instance,

integrating them into national emergency management agency plans alongside floods or other disasters.

One dimension is the role of international networks and support. INFOSAN's value was clear in cross-border events; all eight countries benefited either directly or indirectly from global alerts. Additionally, technical support from WHO, FAO, and others is visible: WHO supported Ghana in developing its FoSERP [1]; FAO/WHO have been aiding Ethiopia's master plan [17]; IAEA supported Cameroon's laboratories [34]. The World Bank and other donors have projects on food safety in Africa for example, the World Bank's Food Safety Africa initiative in the wake of the listeria outbreak. This influx of support can accelerate capacity building, but it also needs coordination to ensure sustainable impact. There is a risk of fragmented donor-driven activities mirroring the fragmentation of agencies, for instance, one project might train laboratory technicians, another might draft legislation, without a cohesive national strategy to tie them together. Therefore, one recommendation is that countries establish a clear *national food safety improvement plan* (like Ethiopia did) so that partners' contributions align with identified priorities and build lasting systems.

Infrastructure gaps are also closely linked with developmental status, yet there are exceptions where lower-resourced countries have innovated. For instance, leveraging mobile technology for surveillance, some African nations use SMS reporting or mobile apps for disease outbreaks, as seen in Ebola or COVID-19 contexts; similar tools could be adapted for crowdsourced reports of food poisoning or unsafe food in markets. None of the eight countries have fully tapped into such innovations for food safety, though Ethiopia launched a web-based food safety alert notification system, the mobile app option is a potential area to explore to overcome human resource shortages, for example, an app for consumers or health workers to flag suspected

foodborne illness clusters could enhance event-based surveillance.

Emergency response outcomes in the case studies highlight both tragedies and improvements. The Kenyan aflatoxin outbreaks of 2004–2005 were tragedies that led to global attention on mycotoxin risk; since then, Kenya and neighbours have introduced measures like promoting aflatoxin biocontrol products (Aflasafe) and stricter trade standards, though climate and storage practices continue to challenge. South Africa's listeriosis outbreak, while devastating, resulted in unprecedented government focus on food safety and legal action, the affected company faced lawsuits and increased scrutiny on industry. These incidents illustrate that effective emergency response is not just about reaction, but also about learning lessons and preventing future incidents. In this regard, *policy evaluation* is crucial: countries should evaluate post-incident: what worked, what failed, were the policies adequate, how did agencies perform? Only a few have done so formally for example, South Africa convened expert consultations after listeriosis; Ghana reviews outbreak responses via its FDA. Institutionalizing after-action reviews for food safety emergencies would help in refining policies and plans continuously.

Another thread is One Health and intersectoral collaboration. Food safety lies at the intersection of human health, agriculture, and trade. Many of the gaps like usage of unsafe pesticides leading to residues in food, or the interface between livestock and human disease in zoonoses require joint efforts across sectors. The discussion in these countries increasingly references One Health, but operationalizing it is hard. For example, to tackle anthrax outbreaks from eating meat of dead cattle, which is a problem in some rural areas of Ethiopia and Uganda, veterinary services and public health must synchronize surveillance, yet often data is not shared quickly enough. Similarly, to manage chemical hazards like industrial contaminants in food, environmental

authorities may need to be involved. A strong recommendation is for countries to strengthen multisectoral food safety committees that meet regularly (not just during crises) to share information and coordinate risk assessments. Nigeria's NFSMC includes broad stakeholders (environment, education, etc.) [9], which is promising if it functions as intended. South Africa's experience suggests that even an informal network such as scientists at NICD communicating with food regulators, was critical to solving the outbreak [4]. Formalizing such networks could reduce reliance on heroic ad hoc efforts.

From a development perspective, resource allocation to food safety remains low in many African budgets, which is a major discussion point. The economic burden figures (\$110 billion globally for LMICs as per World Bank) highlight that not investing in food safety is costly [1]. Yet, convincing finance ministries to allocate funds for inspectors, laboratories, and training, which is often seen as “preventive” public health measures, can be challenging compared to immediate priorities. Demonstrating the cost-benefit of prevention is key. For instance, the economic impact of the listeriosis outbreak on South Africa's economy, an estimated \$15+ million in productivity losses and trade impacts [39, 40], likely far exceeded what it would have cost to have a more stringent monitoring system in place beforehand. Integrating such economic arguments into policy advocacy can bolster sustained funding for food safety infrastructure.

Finally, it is worth noting consumer awareness and public engagement as part of the discussion. While the focus is on government and systems, empowering consumers can aid emergency response in reporting issues and prevention through demand for safer food. In these countries, consumer food safety awareness is low, though urban populations are increasingly conscious due to media reporting of scandals. Government communication during emergencies is crucial to avoid

misinformation and panic. South Africa's transparent communication during the listeriosis outbreak for example, regular published situation reports, and the Health Minister's public announcement helped inform the public, whereas in Uganda, lack of timely official information on the food aid poisoning led to rumours. As part of improving response, risk communication plans specific to food safety should be developed, some are included in Ghana's and Nigeria's plans. Educating the public on recognizing and reporting foodborne illness could also improve detection, currently many cases go unreported because people may not link their illness to food or see it as a reportable issue.

Conclusion

Food safety emergency response systems in Africa are at a formative stage, with notable progress in some countries and persisting gaps in others. This comparative assessment of eight African nations highlights that policy frameworks are gradually aligning with international best practices, but implementation lags due to infrastructural and coordination challenges. Countries such as Egypt, Ghana, and South Africa have taken important steps by establishing central authorities or response

plans and learning from past emergencies, demonstrating that improvement is achievable. Conversely, the experiences of Nigeria, Kenya, Uganda, Ethiopia, and Cameroon show that fragmented oversight, insufficient laboratory and surveillance capacity, and unclear emergency procedures continue to impede timely and effective responses to foodborne threats.

Conflict of Interest

There is no conflict of interest.

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