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Cornerstone for an Effective Regional Risk-Based Food  
Safety System**

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## Food Safety Risk Analysis in East African Community: A Cornerstone for an Effective Regional Risk-Based Food Safety System

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### Abstract

**Purpose:** Food risk analysis remains a major cornerstone that provides a framework for the risk-based food safety system. This paper aimed at evaluating the effectiveness of the food safety system, and the foundational role and opportunities of the risk analysis concept in the East Africa Community (EAC).

**Methodology:** The study was done through the explorative review of the literature as the best approach to getting broad information on the concept of risk analysis in global food safety and its impact on food safety systems. Through analysis of the relevant literature and previous studies related to global food safety and food safety systems, the approach helped to draw on challenges and opportunities and to reformulate the potential key role of the risk analysis concept in the EAC food safety system. Challenges were identified through the evaluation of the effectiveness of the EAC food safety system with reference to the US- effective food safety model. The role and opportunities of the risk analysis in the EAC food safety system were evaluated against identified challenges, and its

implementation feasibility and assets in the EAC food safety system.

**Findings:** As results, the EAC food safety system showed many gaps and challenges, and was ineffective. While the risk analysis concept was found a key factor in attributes of the effective food safety system, it could help the EAC food safety system to become effective, and to respond to the current and future food safety needs of both the African continent and the Globe. With many opportunities and potentials in EAC, the risk analysis concept can be integrated into the EAC food safety system.

**Unique Contribution to Theory, Practice and Policy:** Therefore, a useful and strategic approach as a model of the integration of the risk analysis concept was designed for EAC. It is the establishment of an EAC- Regional Centre of Expertise in Food Risk Analysis (EAC-CREFRA). In addition, the EAC food safety system needs to anchor One Health and multi-factorial food safety management approaches to food safety.

**Keywords:** *Food Safety, Food Safety System, EAC, Risk Analysis Concept.*

## INTRODUCTION

The global population is expected to reach 9.7 billion by 2050, and the particular growth is taking place in sub-Saharan Africa, and Central and Southern Asia while demographic changes (such as urbanization, population growth, and aging) are impacting food systems (World Health Organization, 2021a), which, in turn, are globally threatened by food safety (Thompson, 2021). Food safety is a public health and socioeconomic priority. It is an integral part of sustainable development Goals (SDGs) (Grace et al., 2018; World Health Organization, 2021a), which pertain to ending hunger and poverty, promoting good health and well-being, gender equity, water and sanitation, economic growth, sustainable cities, responsible consumption and production and global partnership (Jaffee et al., 2019; World Health Organization, 2021a). While food safety is an enabler and not an inhibitor of global food security (King *et al.*, 2017), it is also a prerequisite for market access and commercial success in today's global food system (Boto, 2018). Without food safety, the world cannot have food security and achieve some Sustainable Development Goals (Jaffee *et al.*, 2019; King *et al.*, 2017).

On a global scale, there is acceleration of drivers causing unsafe food, and evidence of the health and economic burden of foodborne diseases (FBD) (Kang'ethe *et al.*, 2021). Almost 1 in 10 people in the world fall ill after eating contaminated food. Contaminated foods contribute to the global annual burden of 33 million disability-adjusted life years (DALYs) and 420 000 premature deaths (World Health Organization, 2015). FBDs impede socioeconomic development and harm national economies, tourism, and trade (World Health Organization, 2022). Therefore, there is a need to minimize exacerbating factors of food safety through national food control systems to protect the health of consumers, ensure fair practices in the food trade (Kang'ethe *et al.*, 2021; World Health Organization, 2021a), and cover economic costs associated with of unsafe food (Jaffee *et al.*, 2020).

Considerable progress to strengthen the food safety systems in many countries has been recorded so far (FAO, 2005). However, ensuring food safety to protect public health and promote economic development remains a significant challenge in the world (FAO, 2005). Complying with food safety requirements is still an issue, especially in sub-Saharan Africa, Central and Southern Asia. Globally, the important food safety challenge is to address food safety drivers, which among others include interests and demands for safe food, food safety threats, climate change, demographic changes, and urbanization (World Health Organization, 2021a).

In sub-Saharan Africa, food safety improvement has been recorded, but the food safety challenge is still due to many hampering contextual aspects in Africa, similar to low and middle-income countries (Alarcon *et al.*, 2021; AUC-DREA, 2020; Boto, 2018; Dudeja *et al.*, 2017; Grace, 2015; Jaffee *et al.*, 2020; Molnar & Godefroy, 2020; Roesel & Grace, 2015; Whitworth, 2021). In the East African Community (EAC), a regional economic community in sub-Saharan Africa, a food safety system seems to be organized (Kang'ethe *et al.*, 2021; Mutua, Grace, *et al.*, 2021). However, it is not effective due to reported gaps by different authors (Boto, 2018; Grace *et al.*, 2010; Humphrey, 2017; Kang'ethe *et al.*, 2021; Land O'Lakes Venture37, 2021a, 2021b; Molnar & Godefroy, 2020; Mutua, Grace, *et al.*, 2021; Roesel & Grace, 2015). Therefore, it is critical, for EAC, to prioritize and guarantee the safety of foods sold through informal markets, and consequently minimize the FBD burden associated with unsafe food (Kang'ethe *et al.*, 2021; Mutua, Grace, *et al.*, 2021).



To sort food safety challenges out nationally, regionally, and globally, there is a need for legislation and extensive actions through a systemic transformation that responds to public health and development issues, while ensuring consumer trust and confidence in food safety authorities, and the safe food supply, respectively (Boto, 2018; Fouladkhah, 2017; Gross, 2020). Moreover, a food safety system requires policy-makers (food safety authorities) to inform their decisions and mobilize resources based on reliable estimates of the burden of foodborne diseases, and founded science, which is the risk analysis (Boto, 2018; Institute of Medicine/National Research Council, 1998).

### **Problem Statement**

The food risk analysis concept is the cornerstone of a country's food safety system, providing a framework for food safety risk assessment, risk management, and communication of risk and mitigation decisions (FAO, 2017). The risk analysis is the main focus of the new WHO Global food safety strategy 2022 - 2030 for the new food safety management system that envisions promoting, supporting, and protecting the population's health by reducing the burden of FBDs (World Health Organization, 2021a). Unfortunately, this concept sounds new with scarce information about it in the EAC. Moreover, it is not yet implemented into the EAC food safety system (Kang'ethe *et al.*, 2021; Molnar & Godefroy, 2020; Mutua, Grace, *et al.*, 2021). The exploratory review of the literature, on food safety risk analysis, could provide broader information on the topic (Frederiksen *et al.*, n.d.) to bring out its integral role in the global food safety and food safety systems while bringing out challenges and opportunities, and the foundational role of food safety risk analysis in the EAC food safety system. Therefore, the present paper explored the literature review of the concept of food safety risk analysis along with global food safety and food safety systems to evaluate the effectiveness of the EAC food safety system, and elaborate the potential and foundational role of food safety risk analysis concept into the food safety system in the EAC. Furthermore, this paper will elaborate a model for the EAC food safety system effective-based on food safety risk analysis concept.

### **Food Safety System in the East African Community**

#### **Brief Description of the East African Community**

The East African Community (EAC) is one of the fastest-growing regional economies, and agriculture contributes significantly to this. Approximately 80% of the EAC population lives in rural areas and depends on agriculture for their livelihoods (Commonwealth Agricultural Bureaux International, 2020). However, significant progress has been made in the EAC economic integration process. Among other progress indicators, the establishment of the EAC Act 2006 on Standards, Quality Assurance, Metrology and Testing (EAC-SQMT), which aimed at harmonizing standards and technical regulations (about 6000 national standards) to facilitate trade in the region. Further, in 2010, the EAC Common Market (EACCM) was established whose aim was to create the free movement of goods in the region (Rasanga, 2013). Improving the access and utilization of nutritious, diverse, and safe food by 2022 is a common objective in the EAC food and nutrition security strategy of 2018-2022 (EAC, 2018).

#### **Organizational and Implementation Framework of the EAC Food Safety System**

Generally, the EAC member states have a similar food safety organizational framework that is vested in a few ministries (agriculture, health and trade) (Kang'ethe *et al.*, 2021). For the agricultural products trade, a Sanitary and Phytosanitary (SPS) measures is a pre-requisite to the

world trade organization (WTO) members to conduct science-based risk assessments for international trade facilitation (Mahmoud, 2019). The EAC Partner States are guided by the recently established common and harmonized SPS standards known as EAC SPS Legal Framework (ESLF) (Commonwealth Agricultural Bureaux International, 2020). So far, the report shows that Uganda, Rwanda, Kenya, and Burundi have ratified their SPS Protocol (Molnar & Godefroy, 2020). Moreover, food standards are established with the active standards harmonization for member states (Mutua, Grace, *et al.*, 2021). In the EAC, food safety systems mainly from animal source foods (ASF) and fruits and vegetables (FV) value chains are essential for nutrition despite their implication in foodborne diseases (Kang'ethe *et al.*, 2021).

The food safety management framework is composed of food safety policies or legislations and implementation activities (inspection, surveillance, etc.) along with certification programs (HACCP, ISO 22000, Global G.A.P) (Mutua, Grace, *et al.*, 2021). Both public and private stakeholders, through collaboration, play a major role in executing food safety, and ensuring the safety of food products (Kang'ethe *et al.*, 2021). The public stakeholders are ministries of agriculture, health and trade. Their tasks are the formulation, implementation and enforcement of policies, legislation and regulations regarding food safety. The private stakeholders, along the farm-to-fork continuum (from primary producers to consumers), include farmer organizations, private manufacturing entities, and consumer lobby groups (Kang'ethe *et al.*, 2021).

### **Overview of an Effective Food Safety System Model**

Based on the USA food safety system, an effective food safety system is a science-based system with a strong emphasis on risk analysis, and the use of data. It is a dynamic and aligned system with a central role in maintaining and improving the public's health and well-being. The mission of an effective food safety system is to protect and improve public health by ensuring that foods meet science-based safety standards through the integrated activities of the public and private sectors. Its stakeholders in the interdependence relationship are government agencies at all levels, businesses and other private organizations, consumers, and supporting players (universities and colleges, the news media, and focused special interest organizations, among others), which are critical to the integration of the attributes of research, education, and information (Institute of Medicine/National Research Council, 1998).

The structural organization of an effective food safety system shows that it is built on five (which can be split into six) major attributes. First, it should be science-based with a strong emphasis on risk analysis and prevention thus allowing the greatest priority in terms of resources and activity to be placed on the risks deemed to have the greatest potential impact. Second, it is based on a national food law that is clear, rational, and scientifically based on risk. Third, it includes comprehensive surveillance and monitoring activities, which serve as a basis for risk analysis. Fourth, it has one central voice at the federal level (compared to national/regional in this paper), which is responsible for food safety and has the authority and resources to implement science-based policy national/ regional) activities related to food safety. Fifth, it recognizes the responsibilities and central role played by the non-federal (public) partners (state, local, industry, consumers) in the food safety system; and sixth, it receives adequate funding to carry out major functions required (Institute of Medicine/National Research Council, 1998).

### **Challenges and Gaps in the EAC Food Safety System**

Food safety is the development of actions to reduce the likelihood of food contamination and prevent illness and death (Auler *et al.*, 2017). An effective food safety system focuses on public health, and its main actions are aligned to achieve a safer food supply, improve public health, and instill consumers' confidence in both the system and their role in improving it (Institute of Medicine/National Research Council, 1998). Moreover, a modern and effective food safety system is essentially based on science-based approaches and is crucially created through the risk analysis framework (Dudeja *et al.*, 2017). Among many reported challenges in the EAC food safety system, the main challenges are systematically reported with reference made to six attributes of the USA's effective food safety system model (Institute of Medicine/National Research Council, 1998).

Challenges reported in Table 1 are common in developing countries, they could hamper the effectiveness of the EAC food safety system with the concern of the risk analysis concept. Lack of proper strategic and coherent food safety programs, ineffective use of existing evidence, and weak communication and collaboration among different ministries and relevant stakeholders (FAO, 2017) are the key challenges. Moreover, in most African countries, there is a challenge of placing citizens' health at the heart of national food safety systems by establishing health-based goals, priorities, metrics and implementing strategies, and helping to generate the missing evidence needed for rational planning (Boto, 2018). There are inadequate policy and legislation; inadequate investment; multiple organizations with overlapping mandates; outdated and fragmented or missing legislation; fragmented food quality control systems; inappropriate standards; lack of harmonization and alignment of standards; lack of information, incentives for compliance and resources; failure to cover the informal sector; weak or non-existent of traceability and foodborne disease surveillance mechanisms; and limited enforcement and civil society involvement (Alarcon *et al.*, 2021; AUC-DREA, 2020; Grace, 2015).

**Table 1: Challenges and Gaps in the Effectiveness of the EAC Food Safety System**

No.	Attributes of Effective Food Safety system	Challenges/Gaps in the EAC Food Safety System	References
1	Science-based evidence with a strong emphasis on risk analysis and prevention	<ul style="list-style-type: none"> <li>- Poor guide for food safety risk management</li> <li>- Quantitative risk assessment not prioritized</li> <li>- Hazards prioritization and management are not a risk-based</li> <li>- No data evidence-based to the food safety status</li> <li>- Poor standards implementation with unintended consequences</li> <li>- Insufficient resources to conduct a risk assessment</li> <li>- Incapacity to prevent foodborne disease burden.</li> <li>- Poor food safety communication</li> </ul>	Roesel & Grace, 2015 Kang'ethe <i>et al.</i> , 2021 Mutua, Masanja, <i>et al.</i> , 2021 Kang'ethe <i>et al.</i> , 2021 Mutua, Grace, <i>et al.</i> , 2021 Mahmoud, 2019 Mutua, Grace, <i>et al.</i> , 2021 Land O'Lakes Venture37, 2021a
2	Clear national (regional) food law and scientifically risk-based	<ul style="list-style-type: none"> <li>- Trade facilitation rather than public health-based standards</li> </ul>	Land O'Lakes Venture37, 2021a Molnar & Godefroy, 2020
3	Risk Analysis-based comprehensive surveillance and monitoring activities	<ul style="list-style-type: none"> <li>- Confusion in some standards review</li> <li>- Overlapping inspections and conflicts between agencies</li> <li>- No formal food safety surveillance system</li> <li>- Conformity assessments and inspections are not risk-based</li> <li>- Lack of enforcement and coordination in food inspection</li> </ul>	Kang'ethe <i>et al.</i> , 2021 Kang'ethe <i>et al.</i> , 2021 Land O'Lakes Venture37, 2021b Roesel & Grace, 2015
4	One central authority with resources to implement science-based food safety activities	<ul style="list-style-type: none"> <li>- Duplication of tasks and redundancies, and lack of coordination prudent financial management</li> <li>- Inadequate capacities and ineffective regulations in their food control systems</li> <li>- Unharmonized implementation of standards procedures</li> <li>- Lack of the reference EAC office to coordinate and support food safety standards</li> </ul>	Kang'ethe <i>et al.</i> , 2021; Land O'Lakes Venture37, 2021b Land O'Lakes Venture37, 2021a CABI, 2020 Molnar & Godefroy, 2020
5	Recognition of the central role and responsibilities of other players	<ul style="list-style-type: none"> <li>- Established standards with barriers to trade for small players</li> <li>- Low attention to food safety in the dominant informal food value chains</li> </ul>	Humphrey, 2017 Kang'ethe <i>et al.</i> , 2021; Mutua, Grace, <i>et al.</i> , 2021
6	Adequate funding to carry out major functions required	<ul style="list-style-type: none"> <li>- Funding constraints in EAC regulatory agencies</li> <li>- Poor resources in EAC states' food safety system agencies</li> </ul>	Mutua, Grace, <i>et al.</i> , 2021 Kang'ethe <i>et al.</i> , 2021

In addition, regarding food safety risk communication, the information on food safety updates is a common major food safety challenge in developing countries (King *et al.*, 2017; Nguyen-Viet *et al.*, 2017). While all the information on foodborne hazards across foods is unavailable (Jaffee *et al.*, 2020), hazards associated with certain foods are not directly linked to food-borne disease epidemiological data (FAO, 2005). Then, all foodborne diseases cases are underreported and the complete estimation of the foodborne disease burden is affected (Boto, 2018). As a consequence, obvious but wrong decisions are made along with an inaccurate estimation of controlled risks (microbial hazards versus chemical hazards in food) (Grace *et al.*, 2010). A key challenge is how to channel relevant and factual information to consumers, particularly when managing serious food safety incidents (World Health Organization, 2021a). Furthermore, globalization has not only resulted in the ability of foodborne hazards to be transmitted, and spread quickly, but the globalization of news (e.g., TV, Internet) has also resulted in the ability for news to spread quickly and cause unfavorable economic consequences for producers (King *et al.*, 2017).

The social media or individuals influencers, often with no background in food safety or food science, amplify and misrepresent the risk posed by food incidents, and diminish trust in the food supply (King *et al.*, 2017), resulting in even more frightened consumers (Nguyen-Viet *et al.*, 2017). The lack of evidence-based guidelines advising officials on how to most effectively incorporate social media may exacerbate the dissemination of false information about food risk in public (Rutsaert *et al.*, 2014), and is likely to happen to food safety professionals within the food industry (King *et al.*, 2017).

## **Risk Analysis and Food Safety Regulatory Framework**

### **The Concept of Risk Analysis in Food Safety**

In 2003, the Codex Alimentarius Commission initiated the work on the development of food safety risk analysis principles for use by national authorities (FAO & WHO, 2005). Thereafter, food safety risk analysis principles have been globally implemented by many countries, until now. It represents a structured decision-making process with three distinct but essential, complementary and closely connected components, namely risk assessment, risk management, and risk communication, which are highly integrated, and they are implemented in a procedural way of different steps as seen in Figure 1 (WHO & FAO, 2005). Each of these components plays an essential and complementary role in the risk analysis process, which can only be effective if all three components are successfully integrated (FAO, 2005).



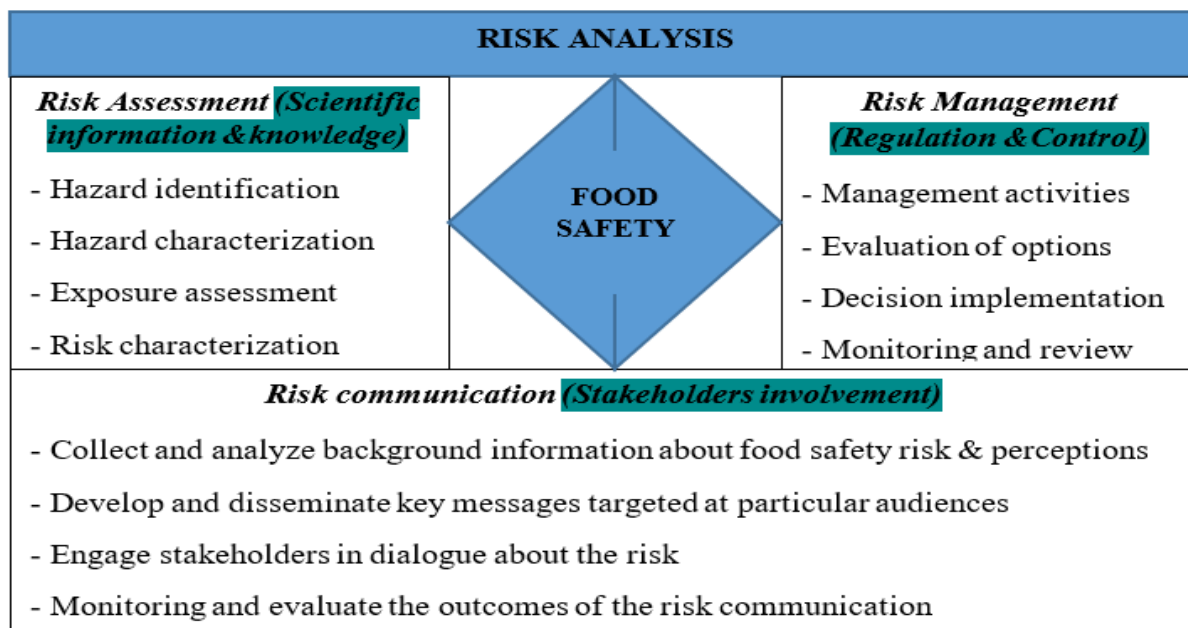


Figure 1: Main Steps of Food Safety Risk Analysis

Source: (FAO & WHO, 2005)

The food safety risk analysis framework is characterized by iterative and ongoing, and highly interactive aspects, which provides a process to systematically and transparently collect, analyze and evaluate relevant scientific and non-scientific information about a possible food hazard (chemical, biological or physical) to select the best option to manage that risk, based on various alternatives identified (FAO & WHO, 2005). The effective implementation of food safety risk analysis requires three main factors: the existing operational food safety system, knowledge about risk analysis, and support and participation of key stakeholders (government, industry, academic institutions and consumers) (FAO & WHO, 2005).

### **Roles of Risk Analysis in Food Safety Regulatory Framework**

The risk analysis concept plays many roles in the effectiveness of the food safety regulatory framework. Although the existence of both advantages and disadvantages of the risk-based food safety approach, the list of advantages is much longer than the list of disadvantages (Barlow *et al.*, 2015).

- Enforcement of food supply chains controls with appropriate data on contaminants, hazards and risk management strategies (Dudeja *et al.*, 2017).
- Governing food decision-making through a scientifically-based process (Godefroy *et al.*, 2019)
- Enhancing the quality of decision-making with the involvement of diverse stakeholders (FAO, 2005, 2020).
- A pre-requisite for the harmonization of food safety measures (Molnar & Godefroy, 2020).

- A tool that national food safety authorities can use to make significant gains in food safety (FAO & WHO, 2011).
- It helps to estimate and control risks, and communicate risks and applied control measures (FAO & WHO, 2011; Henson & Caswell, 1999; WHO & FAO, 2006).
- A new and effective approach for managing food safety risks bridging to livelihood concerns (Roesel & Grace, 2015).
- It accommodates the ever-changing food supply, recent technologies to detect new and changing public health hazards, and the evolution of regulatory approaches to provide effective and efficient food safety solutions (Institute of Medicine (U.S.), 2001).
- It helps to appropriately allocate resources in the short and long term and to estimate and analyze the costs and benefits of policy alternatives (Institute of Medicine/National Research Council, 1998).

### **Roles of Food Safety Risk Analysis for the Effective and Sustainable EAC Food Safety System**

Although food safety decision-making continues to evolve in a multifactorial approach (FAO, 2017), and risk analysis just being one part of an effective food safety system (FAO, 2005), the risk analysis paradigm remains, however, the cornerstone providing a framework for assessing, managing, and communicating both the risks and decisions taken to mitigate them (FAO, 2017). Those fundamental needs, with an impact of protecting and improving public health (Institute of Medicine/National Research Council, 1998), are central elements for an effective food safety system.

There are several reasons for the need for a risk analysis concept in the EAC food safety system. The main reasons are grouped into three aspects: (1) addressing earlier identified challenges for the EAC effective food Safety system; (2) integrating requirements or agreements of the African Union, whose EAC partner States are signatory members; and (3) integrating requirements of global food safety strategy 2022-2030 established by the World Health Organization (Figure 2).

Therefore, the concept of food safety risk analysis will stand as a foundational cornerstone to address the current needs, and proactively anticipate the future needs for sustainability of the EAC food safety system.

### **Addressing Challenges of the EAC Food Safety System**

The risk analysis concept, in a properly understood food safety management, helps to assess, manage, and communicate risks for proper implementation of food safety policies, food laws, and standards in a country (Dudeja *et al.*, 2017; WHO & FAO, 2006), while national governments should endorse principles of science- and risk-based prevention, adapted to local conditions (Boto, 2018). The application of the risk analysis framework as a basis of food regulatory decision-making, including the use of evidence and science-based risk assessment, is a guarantor for alignment, predictability of food safety decisions and incremental regional integration of food safety measures (Molnar & Godefroy, 2020) along with food safety decisions in alignment with international partners (Godefroy *et al.*, 2019).



Figure 2: The Foundational Role of Food Safety Risk Analysis for the EAC Food Safety System

The implementation of a risk analysis framework in the EAC food safety system will help to establish minimum standards and risk-based systems at all levels (international, national and business). That is the first step to ensure cost-effectiveness with available resources to uniformly lift compliance, and improve food safety outcomes in the region (Kang’ethe et al., 2021; Oloo et al., 2018; Thompson, 2021). That will be reached by prioritizing the riskiest food safety hazards since not all food safety hazards pose the same risks (FAO & WHO, 2005; Mahmoud, 2019). It will then lead to the establishment of detailed country- and region-specific useful data for risk and FBD burden assessment along with determining public health priorities (Mutua, Masanja, *et al.*, 2021), and food safety research priorities (Godefroy *et al.*, 2019). As result, critical risks will be efficiently eliminated with finite resources while allowing farmers to produce, without prejudice, acceptably safe products that enter the market at prices consumers can afford, thus boosting public health and protecting trade (FAO, 2019; Godefroy *et al.*, 2019; Humphrey, 2017; Thompson, 2021).

The (scientific) evidence-based food safety decision-making, aligned with international standards and best practices, is a pre-requisite for the harmonization of food safety measures (Molnar & Godefroy, 2020), the goal that EAC targets to achieve in its food safety system agenda to facilitate the agri-food trade. The food safety risk analysis concept will facilitate the harmonization of SPS measures in EAC, provided that the SPS Agreements stipulate provisions of the concept, as enacted in Article 5 of the SPS Agreement (WTO, 2021). For example, the risk assessment comes in to determine whether a food safety measure complies with countries' WTO obligations

(Godefroy *et al.*, 2019; Jackson & Jansen, 2009). Moreover, the risk science-based approach helps to enhance coordination, collaboration, and communication capacity among food safety stakeholders (FAO, 2017; WHO & FAO, 2006), and fosters the participation of stakeholders (García-Cela *et al.*, 2012). That may support the removal of SPS constraints and improvement of coordinated and harmonious food safety standards, therefore supporting the economic regional integration of the EAC (Godefroy *et al.*, 2019). In addition, risk-based approaches, with continued adaptation, testing and dissemination, may be a useful way of addressing food safety problems in informal markets (Grace *et al.*, 2010), which dominate the EAC agri-food trade (Kang'ethe *et al.*, 2021; Mutua, Grace, *et al.*, 2021), by removal of market restrictions thanks to the risk-based decision making (Barlow *et al.*, 2015).

The evidence-based food safety decision-making approach will contribute to enhancing the performance of the existing food control systems in Africa (Gross, 2020), including EAC, since the risk-based approach must be the foundation for food control policy and consumer protection (FAO & WHO, 2003, 2005). The (science) risk-based approach is essential to develop and improve components of food safety systems, including food safety policies, food legislation (encompassing food law, regulations and standards), food inspection, laboratory analysis, epidemiological surveillance of FBDs, monitoring systems for chemical and microbiological contamination in foods, and information, education, and communication (Dudeja *et al.*, 2017; FAO & WHO, 2005). That will enable governments to develop and implement a range of general improvements and interventions tailored to specific high-risk areas, which will ultimately improve food safety, and reduce the burden of FBDs (Dudeja *et al.*, 2017; FAO & WHO, 2005).

As the overall results, the EAC food safety system will be lifted from a traditional to a modern food safety system, because of the risk analysis approach, which would be the leverage of existing instruments of coordination created through the development of scientific and risk-based food safety decisions adopted at the (EAC) regional level (Molnar & Godefroy, 2020). Moreover, risk analysis strengthens the modern food safety system with effect of the improved risk reduction compared to the traditional food safety system, which is not always satisfactory (FAO & WHO, 2005). In addition, (science-based) modern food safety systems effectively cope with and respond to a wide range of food safety challenges presently confronting countries (Dudeja *et al.*, 2017) as there were shown earlier in the EAC food safety system. Therefore, the risk analysis, of the EAC food safety system, will ensure, as reported by FAO& WHO, the effectiveness of the food safety system, its cost-effectiveness, and the increase in confidence (FAO & WHO, 2002).

### **Integrating African Food Safety Needs into the EAC food Safety System**

Very recently, there have been significant demands, to most AU member states, to enhance SPS capacity to improve agricultural productivity, strengthen health protection and/or boost regional and international trade (African Union Commission, 2019). Then, African decision-makers have recently prioritized actions concerning food safety and SPS matters that resulted in a new institutional framework for continental SPS governance at the African Union Commission (AUC) level (Molnar & Godefroy, 2020). Moreover, the African continent recently set three new requirements as food safety-related indicators (indices): (1) Food Safety System Index (FSSI) to measure a country's performance for international best practices and the Codex Alimentarius international food safety standards. (2) Food Safety Health Index (FSHI) to measure a country's performance in reducing cases of foodborne illnesses. (3) Food Safety Trade Index (FSTI) to



measure the percentage reduction in rejected food commodities export due to food safety violations (AUC-DREA, 2020).

In addition, in the context of the ratified African Continental Free Trade Area (AfCFTA) along with the African Union (AU) Malabo Declaration by 2025 (Kang'ethe *et al.*, 2021) the above food safety initiatives and needs are very important because food and agri-food products constitute an important set of commodities expected to benefit from enhanced intra- African trade (Molnar & Godefroy, 2020). Therefore, integrating and benefiting from those needs, in the existing food safety system of EAC, would require working systematically on food safety improvement to ensure effectively the performance of the food safety system.

Implementing food safety risk analysis, through a risk assessment component, in the EAC food safety system, will be appropriate scientific guidance for the effective SPS coordination mechanism to support Africa for international (and intra-African trade) food trade, and coping with the rapid technological change in the area of agriculture and food supply (Jackson & Jansen, 2009; Oloo *et al.*, 2018). Moreover, building up capacities for risk analysis and risk communications, in EAC, would be the way forward for elements that constitute the comprehensive approach to improving food safety awareness, practices, and governance in the African continent (Jaffee *et al.*, 2020).

The risk analysis, through food safety risk assessment, will help to respond to the African Union Agenda 2063. Food safety risk assessment will contribute to the accurate and reliable quantification of contaminants in locally produced and imported food, thereby enabling better monitoring and enforcement of food safety standards, resulting in safer foods for consumers along with decreasing mortality and morbidity from foodborne illness (African Union Commission, 2019); thus complying with new African food safety indexes requirements (Gross, 2020). Moreover, the risk analysis concept will help the EAC to integrate the African Union Commission (AUC) long-term objective, which is the establishment and operationalization of a food safety coordination mechanism for Africa. For the EAC, to achieve the objective requires the creation of an evidence-informed decision-making process, that engages all the relevant public and private sector stakeholders to promote dialogue on the priorities for SPS investments and interventions, and enhance the efficiency of resource allocation decisions (African Union Commission, 2019).

In addition, reliance upon food safety standards anchored in a scientific assessment is paramount, for EAC, to ensure their acceptability by domestic and international stakeholders, as well as to satisfy obligations of the SPS agreement regarding predictability, consistency and fairness as they relate to food safety regulatory provisions (Godefroy *et al.*, 2019). A food safety risk-based approach, by risk assessment to generate data on probable risks along the food value chain, will improve food safety surveillance. A food safety surveillance system, that provides data on the possible breaches and where they could occur, is one of the infrastructure that would help position the EAC partner states to meet the goals of the Malabo Declaration (by 2025) and participate effectively along with reaping the economic benefits in the African Continental Free Trade Area (AfCFTA) (Kang'ethe *et al.*, 2021).

Furthermore, developing food safety coordination capacity at the level of the RECs, for example by establishing the food safety risk analysis concept in EAC, will act as a driver towards the adoption of optimum and harmonized food safety decisions across the African continent (Molnar & Godefroy, 2020). The reason is that food safety risk analysis is the foundation of food regulatory

decisions and strives towards the harmonization of food safety measures at the regional and international levels (Godefroy *et al.*, 2019). And the concept has also proven to be compatible with the development objectives of African countries by their recognition of food safety importance and their need to build capacity in risk analysis approach at national levels (Grace *et al.*, 2010).

### **Integrating Global Food Safety Needs into the EAC Food Safety System**

The EAC food safety system will need to implement the risk analysis concept to integrate new global food safety strategies because the concept of food safety risk analysis is the foundation for the evolving food safety system (FAO, 2017); and strategies to strengthen the country's food control system should use a risk-based approach to determine priorities for action (FAO & WHO, 2003). Moreover, globally, the risk analysis paradigm in food safety will help to upgrade the global food safety system, and to respond to the new food safety requirements of the WHO' Global Food Safety Strategy 2022-2030 adopted in the WHO' resolution WHA73.5 "Strengthening efforts on food safety" (World Health Organization, 2021a).

In the WHO Global Food Safety Strategy 2022-2030, it was recognized that governments must act at the global, regional, and national levels to strengthen food safety. It will be done by developing food safety policies that take into consideration all stages of the supply chain, the best available scientific evidence and advice, as well as innovation; providing adequate resources to improve national food safety systems; recognizing consumer interests; and integrating food safety into national and regional policies on health, agriculture, trade, environment, and development (World Health Organization, 2021a).

Among five food safety strategic priorities of the new WHO' Global Food Safety Strategy, four strategic priorities are directly or indirectly founded on the risk analysis paradigm. The first strategic priority- Strengthening national food controls - strategic objective 1: establishment of a modern, harmonized and risk-based framework of food legislation, and strategic objective 3: development and implementation of fit-for-purpose standards and guidelines. The second strategic priority - Identifying and responding to food safety challenges resulting from global changes and transformations in food systems - strategic objective 1: identification and evaluation of food safety impacts arising from global changes and transformations in food systems and movement of food; and strategic objective 2: adaptation of risk management options to emerging foodborne risks brought about by transformation and changes in global food systems and movement of food. The third strategic priority - Increasing the use of food chain information, scientific evidence, and risk assessment in making risk management decisions. The fourth strategic priority - Strengthening stakeholder engagement and risk communication. (World Health Organization, 2021b, 2021c, 2021a).

In addition, the risk analysis concept could contribute to the multi-factorial evidence and informed food safety policy and decision-making, which is the emerging and updated food safety management approach to help policymakers and risk managers to consider other factors in the food system (trade, economics, food security, tourism, social well-being) (FAO, 2017). Furthermore, if the EAC wants to go with future trends in food safety, it shall ultimately integrate risk analysis into its food safety system. That is because the food safety science-based approach, through risk analysis concept or paradigm, will be the only future approach capable to cope with and respond to the burden of emerging food safety risks associated with trending climate change effects on the future global food safety system, particularly in developing countries (FAO, 2020).

## **Opportunities and Potentials of EAC for Food Safety Risk Analysis Framework**

The East Africa Community has around six opportunities and potentials as motivational reasons, from which, can benefit and strengthen its capacity in science-based food standards by integrating the risk analysis concept into its food safety system.

The recent agreements or signatories within the African continent: the ratified African Continental Free Trade Agreement (AfCFTA); the African Union (AU) adoption in October 2019 of a sanitary and phytosanitary (SPS) policy framework for Africa to harmonize and strengthen the SPS measures within the AfCFTA; and the 2014 Malabo Declaration by African leaders (Gross, 2020). They all represent an enormous opportunity for Africa's development in agriculture trade for its envisioned tripling value, whereby the African countries' work is to harmonize their SPS regulations in line with international science-based standards to enhance agricultural trade opportunities both regionally and with countries internationally such as United Nations (Gross, 2020).

The African Union plans to establish an African Food Safety Agency (AFSA), African Food Safety Network (AFoSaN), African reference food safety laboratory (ARFSL), African Rapid Alert System for Food and Feed (RASFF), and African Union Food Safety Management Mechanism (AU-FSMCM), through support by regional and international institutions (Molnar & Godefroy, 2020). The creation of those food safety infrastructures at the African Union level is a motivational fact as an umbrella and opportunity for strengthening food safety capacity across the continent, particularly the implementation of food safety risk analysis framework with expanding them at EAC and other RECs levels, to support the continent in providing with science-based data from regions.

The existing EAC committee was created by the Codex Alimentarius Commission under the FAO/WHO Coordinating Committee on Africa (CCAFRICA) and the Joint FAO/WHO Food Standards Program. The committee is dedicated to coordinating the international food standards program in Africa (Molnar & Godefroy, 2020). Moreover, the joint FAO/WHO Food Standards Program is committed to helping countries' food safety authorities and regulators to develop capacity in risk-based food safety approaches. Their objectives, among others, are: (i) ensuring the risk analysis approach is used appropriately to address the specific food safety challenges and agreed on priorities to ensure consumer protection and development of the agro-processing/ food trade sectors; and (ii) facilitating harmonization of regulatory measures and standards among countries and across regions (FAO, 2022).

The United States Department of Agriculture (USDA) and USAID-funded programs, implemented by Land'0 Lakes-Venture37 in EAC, put food safety and quality at the core of the project by supporting the adoption of risk-based procedures and putting the consumer first along with strengthening food safety management system by certification programs for food producers (Thompson, 2021).

In the WHO' Global Food Safety Strategy 2022-2030, WHO is committed to reducing the health, economic and social burden derived from foodborne disease by advising and assisting Member States to reduce exposure to and monitoring unacceptable levels of chemical, microbiological and physical hazards. Regarding the related food safety risk analysis framework, WHO specifically helps to (i) synthesize evidence and generate normative guidance; (ii) enhance technical cooperation and build stronger capacity; and (iii) build partnership and foster global collaboration

strategically by striving to harmonize the efforts and shape the future agenda for food. WHO will provide multilateral fora for dialogue, enabling Member States to share knowledge and experiences related to food safety risk assessment, risk management, risk communication, and capacity-building (World Health Organization, 2021a)

The EAC region has at least some personnel who got knowledge and skills through several related food safety training programs. They can support risk and evidence-based food safety legislation. There is a recent initiative of the capacity-building program in food safety laboratory training on food contaminants, in EAC member states, through the partnership between the Food and Agriculture Organization of the United Nations (FAO) and University Laval (UL) - Food Risk Analysis and Regulatory Excellence Platform (PARERA). PARERA is setting up a trust fund to support multi-stakeholder funding that could enable the design and implementation of regional centers of expertise in food safety risk assessment (Godefroy et al., 2019). Moreover, a group of trainees was trained on food safety risk assessment and food control systems by the International Livestock Research Institute (ILRI) (Kang'ethe et al., 2021). In addition, a quite good number of trainees, from EAC member states, have been acquiring knowledge and skills in food risk analysis at Ghent University (University of Ghent, 2019).

The existence of multi-channels (TV, radio, and ICT tools like telephone and internet represented by social media platforms) to diffuse information in the aspect of food safety risk communication. The EAC, since 2015, has witnessed the rapid growth of the use of mobile and digital technologies, whereby Information Communication and Technology (ICT) has played a role, mostly in supply chain management and is increasingly being included in farm management and even food development (EAC, 2019). Clearly, opportunities exist for food safety communicators to use online communication channels to effectively engage, inform and educate consumers on food safety issues (King *et al.*, 2017). Social media platforms provide new opportunities for risk communication and education regarding food safety (World Health Organization, 2021a), when there is the best use of social media to communicate to the public about food risks and benefits (King *et al.*, 2017). Moreover, social media, through accurate and transparent communication, could also help to win over public opinion and aid the implementation of (good) agriculture practices and food processing technologies (King *et al.*, 2017), in the aspect of implementing food safety risk management options.

### **The Way Forward and Prospects**

Considering the identified potentials and opportunities to integrate food safety risk analysis, the strategic approach for the EAC is to establish the model Centre of Expertise in Food Risk Analysis (EAC-CREFRA). That Centre would be a platform for cost-effective food safety regulation, implementation and capacity building among EAC partner states. Creating the Centre may be the starting point of regions' capacity building in improved food safety systems across Africa. Such an undertaking, in the EAC region, will help countries to avoid duplication of efforts, reduce unnecessary spending on infrastructure, and enhance better collaboration on matters of risk analysis data among neighboring countries (Oloo *et al.*, 2018) through the mutualization of resources and collective development of data, tools and competencies (Godefroy et al., 2019). The creation of a regional Centre of expertise in food safety risk analysis could be considered as a vehicle to achieve the coordination, if not, the integration of food regulatory policies as an enabler to a convergent and more harmonious food safety standard setting framework to boost the agri-food trade in targeted regions (Godefroy *et al.*, 2019).



The proposed center model (**Figure 3**) could be envisaged in the form of the collaboration of different partners (academia or research institutions, national food regulators, food industries, farmer cooperatives, consumer organizations) as a source of input data and as a data destination in the interdependence process. The data source at national levels can support generating inputs data for risk assessment, risk management and risk communication; national cost-benefits on food safety standards or measures implementation along the agri-food chain; consumptions patterns of food commodities; and the burden of the foodborne disease. Moreover, data source recipients, for the evidence and risk-based food safety regulation and implementation in the EAC region, will use the output data generated from input data by the Centre. In addition, the Centre will be providing needed information in supporting the envisaged continental -African Food Safety Laboratory for harmonized food safety legislation framework (AUC, 2019). The Centre will be also the hub of research and training in food safety and risk analysis. Such a kind of model could be recommended to other regional economic communities in Africa and around the world, where food safety systems are not effective.

Furthermore, apart from the establishment of the EAC-CREFRA, the EAC food safety system will also need to adopt a One Health approach to food safety to anchor the emerging approaches of the evolutionary food system. The multi-factorial food safety management approach would be also anchored to make the best use of finite resources and ensure that decisions on food safety do not negatively impact other dimensions essential for development, e.g. trade, economics, food security, tourism, and social well-being (FAO, 2017).

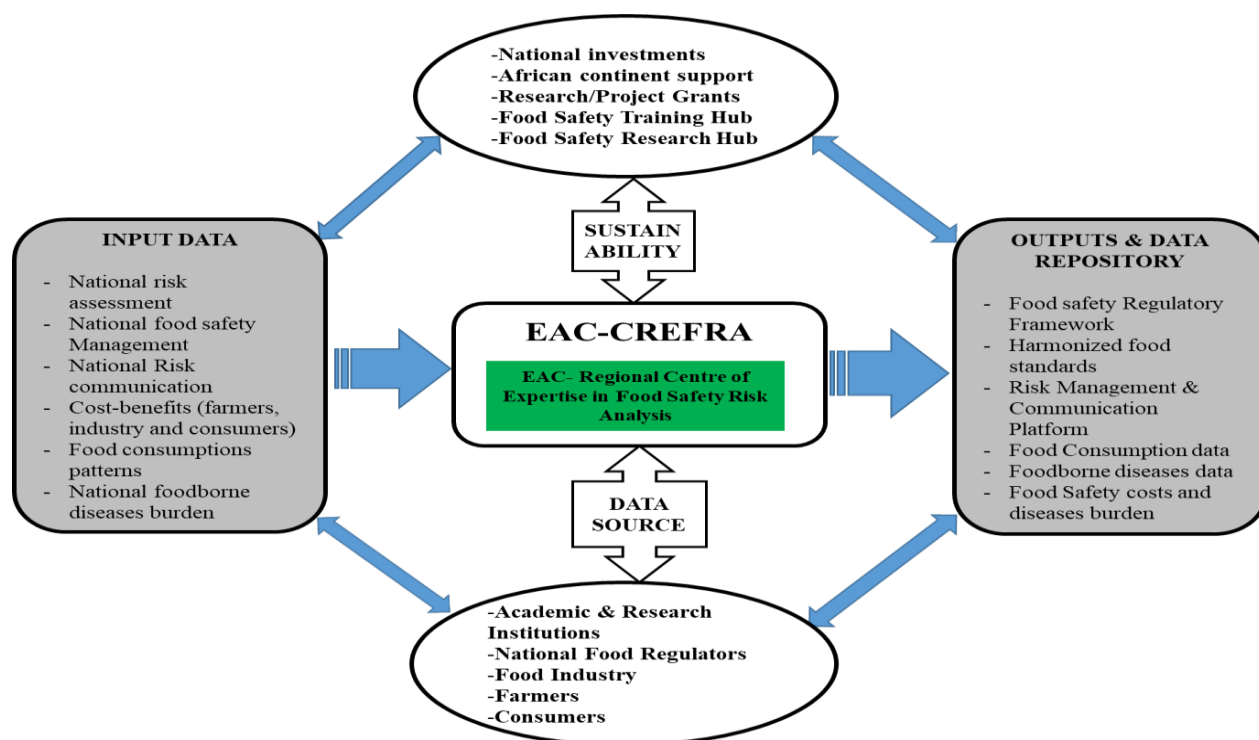


Figure 3: Proposed Model of an EAC-Regional Centre of Expertise in Food Safety Risk Analysis

## **CONCLUSION AND RECOMMENDATIONS**

### **Conclusion**

The EAC food safety system was inadequately effective due to many gaps and challenges in terms of implementation and outcomes. The evaluated food safety system was not founded on a food safety risk-based approach that is based on the risk analysis concept. Therefore, the integration of food safety risk analysis, into the EAC food safety system, is required to stand as the foundational cornerstone to address the current food safety needs and to proactively anticipate the future needs at regional, continental and global levels.

### **Recommendations**

In the optic of global trends in food safety, it is highly useful for the EAC food safety system to implement the risk analysis concept to integrate new global food safety strategies. The EAC Partner countries need to adopt and implement the concept as a national strategy to strengthen the food control system by prioritizing actions through a risk-based approach. Furthermore, the EAC food safety system needs to adopt a One Health approach to food safety to anchor the emerging approaches of the evolutionary food system.

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