5 Food safety and public health implications of growing urban food markets

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Key Messages

1. Currently, Africa suffers from the highest per capita rate of foodborne illnesses in the world.
2. The riskiest foods from a health perspective are animal-source foods, fruits, and fresh vegetables. Consumption of all these is growing rapidly in African cities.
3. Food products sold in formal markets and retail outlets are not necessarily safer than those sold in informal markets.
4. Improvements in urban food safety will require intentioned investments in domestic market infrastructure and improved awareness of the shared responsibility to provide safe food by regulators and value chain actors.

5.1 Introduction

This chapter discusses the food safety and public health implications of urban food markets in low and middle-income countries (LMIC), with an emphasis on Africa. It starts with an overview of urban food markets, and the urban agriculture systems which often supply them, distinguishing between the dominant traditional and informal markets, and the formal system, or modern supply, which is emerging. It discusses food safety and its public health implications in urbanizing cities. The rest of the chapter focuses on food safety as foodborne diseases are a huge concern to consumers, and a primary cause of health burden, with sickness, fatalities and economic impact both at household and national level.

In our discussion on food safety, we first present the evidence on the health burden of foodborne disease, where the best estimates have compared its magnitude to that of malaria, tuberculosis, or HIV/AIDS. We provide evidence on high risk foods and value chains. The subsequent sections focus on risk management, and the shared responsibility between the public and private sectors, and civil society. We provide an overview of responsible agencies and regulatory systems including their enforcement capacity, and draw attention to the important international and regional initiatives such as International Health Regulations (IHR), Africa Food Safety Index (AFSI), and the Partnership for Aflatoxin Control in Africa (PACA); which focus partly

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or completely on food safety. Private sector responses are discussed including private standards and public–private campaigns with an example of a campaign to address fraudulent pesticides. Finally, civil society and consumer responses are discussed. The last section focuses on policy and practical implications. The policy section sets out practical recommendations on how decision-makers can better provide support to improving food safety.

5.2 Health implications of rapidly growing urban food markets in Africa

Growing urban populations need food, and this implies growth in urban food markets, which are extensively described in other chapters of this report. Urban food markets include both the traditional, or informal, (that is, open markets and unregulated businesses) and modern, or the formal, markets (that is, regulated modern distribution and retail). In Africa, overall, the proportion of food sold through modern formal retail (supermarkets and convenience chain stores) is still low, even in cities (Kelly, 2018; Roesel & Grace, 2015). Informal or traditional food markets sell both perishables and dry products, and often both live and slaughtered animals. Many do comply, or try to comply, with government regulations when these are available and known, but most lack effective food safety management systems and are unregistered (hence the term informal). Urban consumers get their products from many different outlets and the food value chains are often complex (Kiambi et al., 2018). Formal retail is relatively more important for less perishable foods (for example, cereals, sugar, oil, and ultra-processed food) and informal markets for fresh, perishable foods (such as animal-source food, fruit and vegetables). Contrary to widespread belief, while the formal sector is characterized by modern infrastructure, often using –at times suboptimally — cold chain, the food in formal markets is not necessarily always safer than that sold in informal markets. In Kenya, for example, milk from both formal and informal outlets is frequently contaminated with aflatoxin M1 (Lindahl et al., 2018) and may have similar hygienic quality (Alonso et al., 2018). Similar findings have been reported in other countries and other products (Eltholth et al., 2018; Fahrion et al., 2013).

Urbanization, and growing incomes and middle classes, drive increased consumption of animal-source foods (Rae, 1998) and fresh vegetables. Growing urban food markets face challenges in providing safe and affordable animal-source food and other perishables to the growing population. This problem is greatly accentuated in LMIC by high rates of population growth and urbanization. This, coupled with a lack of infrastructure and cold chain, poses problems for transportation of perishables from rural areas and is the catalyst for the growing urban and peri-urban agriculture.

Thebo et al. (2014) estimated that there are 67.4 million hectares of urban croplands globally, which comprises 5.9% of all cropped areas and is more common in LMIC. The high value of urban land entails a need to focus urban agriculture on high value products such as vegetables and animal-source foods. There are also advantages to producing these highly perishable foods close to the source of consumption. For example, in Nairobi, milk produced in urban and peri-urban settings is consumed locally, and frequently farmers sell it at farm gate directly to customers (Alarcon et al., 2017). Farm-gate sales are cheap, and customers trust the quality of the milk obtained directly from farmers. However, as urban markets grow the number of sources and intermediary actors' increase, reducing traceability and increasing the risks for adulteration or contamination along the way.

Global estimates show that one out of seven people lived in slum areas in 2011 (Bloom, 2011), and with the growing urbanization, the numbers of urban poor also increases. Poor urban inhabitants often need to produce their own food, including keeping livestock, to ensure food and nutrition security of their families. People in low-income urban settings are more likely to keep livestock. The most comprehensive study on urban livestock keeping found, across 12 LMIC countries, 22–26% of the urban poor kept livestock, and 8–12% of the well-off (Pica-Ciamarra et al., 2011). In Dar es Salaam, Tanzania, Jacobi et al. (2000) reported that urban

agriculture was characterized by vegetable gardens, dairy production, and poultry keeping.

Urban agriculture and livestock keeping have historically been present in cities, and while it is encouraged in some, the trend has generally been towards adding more and more regulatory restrictions to this practice (Grace et al., 2015). While it poses many public health challenges, urban agriculture also offers several benefits including production of nutritious foods which are sold informally in small amounts the poor consumers can afford. Urban agriculture and petty retail allow women to combine remunerative activities with household work and child minding. But the gender implications may vary between countries and food systems (Ishagi et al., 2002; Jacobi et al., 2000).

Urban agriculture presents several other challenges besides public health, including use of public urban space to graze animals illegally; allowing animals to scavenge even at dumpsites which exposes them to the risk of infections with pathogens (Lindahl & Magnusson, 2020); and potential contamination of fresh fruits, vegetables, and urban water sources by bacterial pathogens and pesticide residues from peri-urban farming. In addition, there is an influx of live animals from rural areas for slaughter into the cities where the lucrative markets are. With no or poor traceability in most African countries (Mutua et al., 2018; 2019), there is a grave concern for all kinds of transmissible zoonotic diseases.

Wet markets supply fresh products to millions of customers in tropical and subtropical regions every day. However, when live animals are present there is a risk of zoonotic viruses jumping from vertebrate animals to humans, as has been reported for corona viruses (CoV) and avian influenza viruses (AIV), with outbreaks arising from wet markets (Webster, 2004; Zhou et al., 2016). In 2002–2003, an outbreak of severe acute respiratory syndrome (SARS), caused by the corona virus named SARS-CoV, was linked to a live animal market in China (Webster, 2004), and the COVID-19 pandemic, caused by SARS-CoV-2 (De Wit et al., 2016; Guarner, 2020; Hilgenfeld & Peiris, 2013), is also believed to have started in a market selling live animals in China (Li et al., 2020).

In addition to the spread of zoonotic infections through sale of live animals, there is a risk that the water gathered around wet markets due to poor drainage may facilitate the breeding of mosquitoes, which can transfer disease to humans. Equally, peri-domestic wildlife, such as rodents, pigeons attracted to open markets, can carry diseases. The low hygienic conditions and the presence of live animals and those butchered on site facilitate the survival of several foodborne bacteria like *Campylobacter* spp, *Salmonella* spp, and *Escherichia* spp (Kogan et al., 2019), in addition to parasites like *Giardia* or *Cryptosporidium.* Inadequate knowledge, lack of inspections and biosafety routines in many places (Nyokabi et al., 2018) contribute to a higher presence of health hazards in the food supply chains, and ultimately in the foods sold in these markets.

5.3 Food safety risk assessment: Scope and scale of the problem

Food safety has currently received heightened attention in high-income countries. This is partly because many other major infectious diseases have been controlled, increasing the prominence of foodborne diseases (FBD), which had not been declining in recent years (Grace, 2015). Moreover, better detection capacities that allow FBD outbreaks to be traced back to origin can result in enormous media attention and commercial costs for the private industry. Several industrialized countries have developed methods that allow assessment of the health burden of FBD (that is, number of ill people, number of years lost to death or disability). These studies have found that FBD is common (affecting around one in three to one in eight people a year globally) and results in a high burden of disease in terms of morbidity and mortality (Gkogka et al., 2011; Kirk et al., 2014; Mangen et al., 2015; Scallan et al., 2011; Tam et al., 2014; Thomas et al., 2013). Moreover, the well-known gastrointestinal symptoms of FBD (vomiting and diarrhea) have been found to be responsible for only about half the total health burden. An equally

high, but less obvious burden came from rare but serious effects of FBD such as septicemia, paralysis, stillbirth, and meningitis.

However, historically, FBD has not been a major priority in LMIC or international development. There are several reasons for this: assessing FBD in developing countries is not easy because many infectious diseases never receive a definitive diagnosis, that is, one which identifies the pathogen responsible. Even if a diagnosis is given, it is often difficult to determine if the source of the infection was food, water, other people, animals, or the environment. Partly as a result, few developing countries have official reporting requirements for FBD as a specific category, although certain diseases transmitted through food might be notifiable (for example, salmonellosis, cholera and brucellosis). It is a truism that what is not measured is rarely managed. Thus, the first estimation of the global burden of FBD led to a radical change in understanding the importance of FBD. This was conducted by the Foodborne disease Epidemiology Reference Group (FERG) under the aegis of the World Health Organization (WHO) (Havelaar et al., 2015). Around 98% of this burden falls on LMICs and children under 5 years of age are disproportionately affected.

The FERG study covered 31 foodborne hazards, for which there was sufficient data to develop global estimates. Globally, these 31 foodborne hazards caused an estimated 600 million foodborne illnesses and 420,000 deaths in 2010. The combined burden of death and disability was estimated at 33 million Disability Adjusted Life Years (DALY[7]); children under 5 years old bore 40% of this burden, a disproportionate share as they represent 9% of the global population. The greatest per capita burden fell on African subregions, followed by Asian and Eastern Mediterranean subregions. Table 5.1 shows the number of illnesses, deaths, and DALYs for the African region attributable to these 31 foodborne hazards.The same study more recently presented estimates on the burden of FBD associated with four heavy metals in 2015. This suggested an additional global burden of more than 1 million illnesses, over 56,000 deaths, and more than 9 million DALYs (Gibb et al., 2015). This global burden is comparable to that due to malaria and tuberculosis (estimated at 40 million and 66 million DALYs respectively in 2010) but food safety has received less global attention to combat it, than these two diseases.

The information on attribution, that is, the foods responsible for most FBD, is less solid, although progress is being made. It appears that animal-source food (for example, meat, milk, eggs, and fish) and vegetables are the riskiest products (Grace, 2015). FBD risks from animal-source foods, are mainly food parasites (*Cryptosporidium* species from dairy products, *Toxoplasma gondii* spp. from meats, dairy, and eggs) and bacterial pathogens (*Brucella* species, *Campylobacter* species, non-typhoidal *Salmonella* species, and Shiga-toxin producing *E. coli*). Fresh fruits and vegetables FBD risks are similarly also from food parasites (*Ascarid* spp, *Cryptosporidium spp, Entamoeba histolytica*, *Giardia* spp, and *Toxoplasma gondii*) and bacterial pathogens (*Campylobacter* spp, non-typhoidal *Salmonella* spp, and Shiga toxin producing *E. coli*) (Hoffmann et al., 2017). Especially for animal-source food, consumption tends to be higher in cities than in rural areas. Moreover, urbanization is associated with an increase in consumption of food eaten outside the household, including food sold in the street or from the roadside or in small, informal or formal restaurants (also known as eateries, hotels, or pubs depending on country).

Several studies have found high levels of contamination in these foods (Rane, 2011). A study by the World Bank (Jaffee et al., 2019) predicts that as countries develop and urbanize there will be an increase in FBD (Figure 5.1) and its associated economic burden.

7 DALYs are a summary measure of health developed by the Global Burden of Disease study. One DALY represents a lost year of healthy life.

Table 5.1. Median rates of foodborne illnesses, deaths and disability adjusted life years (DALYs) per 100,000 persons, with 95% uncertainty intervals (UI), 2010, African region

	Illness (95% UI)	Deaths (95% UI)	DALY (95% UI)
Diarrheal diseases	9,830 (3,969–21,567)	9 (3–14)	687 (369–1,106)
Campylobacter species	2,221 (335–8,482)	0.8 (0.4–1)	70 (41–112)
Cryptosporidium species	205 (35–813)	0.2 (0.04–0.4)	13 (3–37)
Entamoeba histolytica	79,698–3,868)	0.05 (0.009–0.4)	5 (0.9–39)
Enteropathogenic E. coli	454 (125–1,215)	2 (0.6–3)	140 (50–282)
Enterotoxigenic E. coli	982 (312–2,480)	1 (0.6–3	109 (46–216
Giardia spp	809 (172–2,574)	0 (0–0)	0.8 (0.2–3)
Norovirus	1,749 (491–5,060)	1 (0.3-3)	81 (24–185)
Non-typhoidal *Salmonella enterica*	896 (175–2,994)	1 (0.5–2)	89 (42–147)
Shigella spp	523 (45–2,265)	0.3 (0.1–2)	43 (8–124)
Shiga toxin producing *E. coli*	5 (2–9)	0 (0–0.002)	0.05 (0.02–0.1)
Vibrio cholera	43 (35–101)	2 (0.5–4)	112 (35–252)
Invasive enteric diseases	425 (156–976)	5 (3–8)	307 (106–508)
Brucella spp	3 (0.4–110)	0.02 (0.002–0.5)	1 (0.1–34)
Hepatitis A virus	232 (60–643)	0.5 (0.1–1)	23 (7–60)
Lysteria monocytogenes	30 (19–42)	0.1 (0–2)	1 (0–21)
Mycobacterium bovis	7 (4–9)	0.5 (0.3–0.7)	30 (19–42)
Invasive non-typhoidal *Salmonella enterica*	25 (12–37)	3 (1–5)	169 (71–306)
Salmonella enterica paratyphi A	25 (5–73)	0.2(0.04–0.5)	12 (3–36)
Salmonella enterica typhi	108 (24–317)	0.7 (0.2–2)	53 (12–155)
Total	10,304 (4,279–322,108)	14 (8–21)	1,001 (562–1,543)

Source: WHO (2015).

In addition to microbiological risks, there are concerns about chemicals, both those naturally derived such as mycotoxins, and substances created by humans, including antibiotics and pesticides. Risks from pesticide residues in urban horticulture is a result of producers applying high levels of pesticides — primarily fungicides and insecticides — to control a wide array of pests. Studies from West Africa indicate that many of the pesticides most commonly applied to horticultural crops are either unregistered or registered for cotton or other non-horticultural crops (Ntow et al., 2006; Tano et al., 2011). Active ingredients most frequently detected in horticultural products vary across study sites, as do exposure and risk levels (Donkor et al., 2016; Ingenbleek et al., 2019; Yao, at al. 2016)

Pesticide residues have also been reported in a range of other popular urban foods, including fish, milk, and cereals. Many of these studies focus on organochlorine pesticide residues remaining in the environment and food system from prior decades of public health campaigns against malaria and concentrated spraying to control pests among major cash crops with highly toxic and now-outlawed classes of persistent organic pollutants (POPs). Indeed, a series of West African studies has detected organochlorines such as DDT and endosulfan in fish, milk, and other dairy products, and even in human breast milk (Kouadio et al., 2014; Maïga et al., 2018; Manda et al., 2017; Traore et al., 2003; 2008). Although most studies detect pesticide levels below international maximum residue limits

(MRLs), the risk of bioaccumulation nonetheless makes them potential long-term health hazards (Kouadio et al., 2014).

Together, these strands of evidence suggest that FBD is likely to be a worsening problem as urban markets grow in Africa and other LMIC.

5.4 Food safety risk management: Public sector response

5.4.1 Responsible agencies

An effective food control system provides assurances to governments and the public that the available food is safe for human consumption and can be sold or traded. It therefore aims to: 1) protect public health by reducing FDB risks; 2) protect consumers from fraudulent practices including mislabeling and adulteration; and 3) support economic development by ensuring quality and safety of products sold and or traded (FAO, 2006). Components of a national food control system include an enabling legislative framework, a food control management system, food inspection, laboratories for monitoring of hazards and surveillance, and information, education, communication and training of value chain operators and consumers. A comprehensive food safety policy should set this out (Jaffee et al., 2019). In many African countries the food safety mandate is spread over many agencies and authorities, with unclear responsibilities leading to inaction and duplication. In most cases countries lack effective national coordination mechanisms (Box 5.1).

Food law encompasses legislations that empower governments to regulate safety in food supply chains. A food law should specify the ministries and agencies to be involved in its implementation. It is also important that the law delineates the boundaries of the actors to enable effective coordination, curing of redundancies, and effective resource utilization. Because of the lack of clarity, the stakeholders at the various nodes of the value chain are unsure of which regulation to comply with, and this may reduce their confidence in the implementing agencies. Food businesses are also exposed to multiple taxation, often without observable benefits, which may discourage compliance (reluctance to pay taxes translates to lost revenue, which negatively affects the economy).

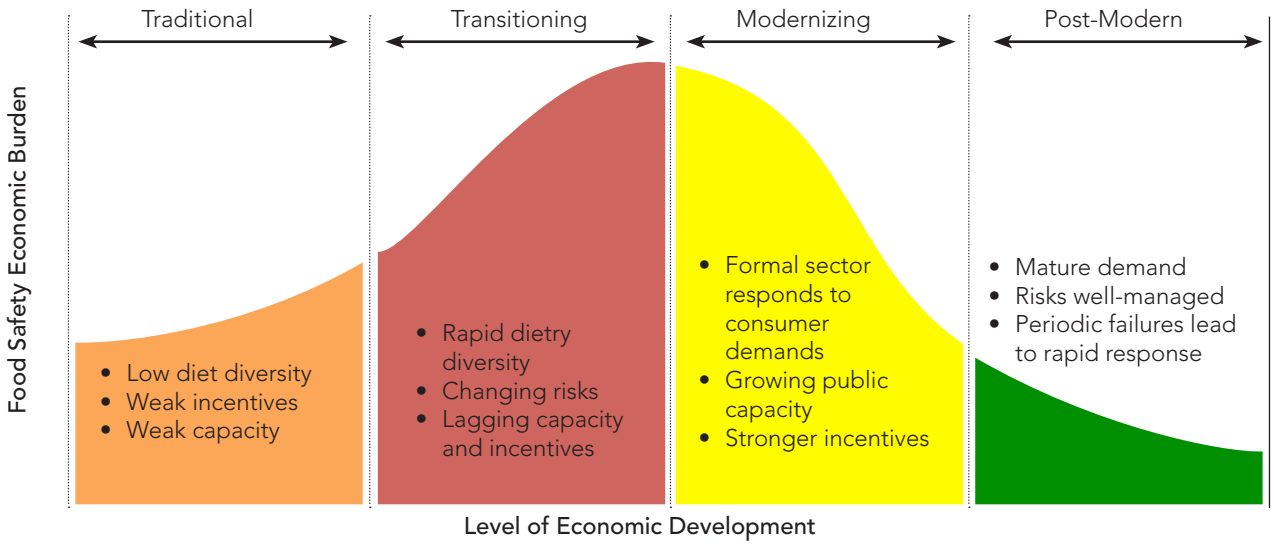

Figure 5.1: Food safety life cycle

Source: Jaffee et al. (2019)

Box 5.1: Examples of food safety regulatory systems in selected countries in Africa

In Kenya, food safety laws are scattered across 23 different agencies. The Ministry of Health leads food safety work in the country. The Ministry of Agriculture, Livestock and Fisheries, the Kenya National Bureau of Standards, the National Cereals and Produce Board, the Kenya Dairy Board, the Kenya Meat Commission, and other agencies and authorities have additional food control roles. The country has no overarching coordinating authority or agency. A Foods and Drugs Authority Bill (2019) is pending in Parliament. When approved, the legislation will allow for establishment of a Kenya Food and Drugs Authority (which is suggested to regulate and monitor the manufacture, processing, distribution, warehousing, wholesale, and importation of food in the country). The National Food and Nutrition Security policy considers food safety a crucial component in attainment of food security and nutrition.

Similarly, Tanzania has several laws on food. Food regulation is now implemented by the Tanzania Bureau of Standards (after a 2019 amendment of the Tanzania Food, Drugs and Cosmetics Act (Cap 219). through the Finance Act, No. 8 of 2019, which saw this role removed from the Tanzania Food and Drugs Authority and the name changed to Tanzania Medicines and Medical Device Authority (https://www.tmda.go.tz). The Tanzania Bureau of Standards is under the Ministry of Industry, Trade and Investment, and several other ministries and agencies have functions on food control.

In Uganda, ministries with food safety control include the ministries of Health, Agriculture, Animal Industry and Fisheries, and Trade and Industry; the Uganda National Bureau of Standards (UNBS) develops and enforces food standards.

In contrast, Mali has a national food safety coordination system, the National Agency for Food Safety (ANSSA), established by Law No. 03-043/PRM of 30 December 2003.

These weaknesses leave consumers less protected and contribute to the persistence of foodborne illnesses. Developing an integrated food control system is key if countries are to deliver on health outcomes associated with safe foods.

Regional bodies have also been instrumental in promoting the food safety agenda in LMIC. The Southern Africa Development Community (SADC) provided guidelines for regulation of food safety, and called for establishment of a multi-sectoral forum which would develop national food safety management policies and strategies (SADC, 2011). The East African Community (EAC) has a Food and Nutrition security strategy and action plan to guide its partner states on how to achieve the elusive food and nutritional security. The 69th Health Ministers Conference of East, Central and Southern Africa Health Community held in February 2020 (ECSA, 2020. p. 7) resolved to embrace "innovative approaches towards achieving food safety and improving quality of life". This is a significant realization that food safety is key to attainment of health outcomes.

5.4.2 Standards

Food may never be completely safe, but standards are set to reduce the risks as much as possible. Standards are meant to protect consumers and support public health. The Codex Alimentarius Commission (CAC) sets standards for food (FAO/WHO, 2003a), to ensure quality and safety and promote fair trade, but countries or regional bodies frequently set stricter standards. A total of 188 countries are members of CAC, about 50 of which are African states. At the country level, specific agencies are mandated to develop food standards and ensure their compliance. Countries and or

regional bodies are encouraged to use Codex guidelines to develop standards that are suitable for their context. They should align well with agreements on Sanitary and Phytosanitary and Technical Barriers to Trade agreements (FAO/WHO, 2003b; Oloo, Lanoi, & Oniang'o, 2018). Unachievable standards are inappropriate when used in local contexts where food systems are more diverse and informal markets dominate (FAO, 2005). They can impact negatively on local livelihoods. Although standards should be based on science, many low-income countries not only lack expertise in risk assessment but also have no data to support its application (Oloo et al., 2018). Regional harmonization of standards is occurring across regional economic communities (RECs) to promote mutual recognition and ensure access to safe food eaten and traded across the continent (Mensah et al., 2012).

5.4.3 Monitoring capacity

Monitoring is an important element of food control systems (Mwamakamba et al., 2012). It can be in the form of training of inspectors, checks to ensure their numbers are adequate, and providing guidelines that are regularly updated to include emerging and re-emerging public health threats. Proper monitoring is hindered by factors such as the low status accorded to food safety officers, inadequate logistical support, and poor governance in the food sector (Oloo et al., 2018). Quantitative risk assessment is an expensive undertaking that many developing countries may not afford to support, however, qualitative participatory risk assessment (Grace et al, 2008) is a simple and cost-effective risk assessment alternative. Although they dominate in Africa, informal markets are not adequately covered in current food regulations (Oloo et al., 2018) and will continue to pose a regulation challenge, perhaps until the need to provide incentives to encourage compliance is realized.

Laboratories are needed for testing of foods, and they need to provide quality analyses. In most cases, public laboratories are poorly equipped (Oloo et al., 2018) and cannot function as expected. In addition, only a few of these are accredited. It is important that national governments provide resources to address these needs (capacity building, purchase of state-of-the-art food testing equipment, surveillance resources, etc.). Surveillance data are needed to assess burden and inform priorities for resource allocation. Surveillance is important for early detection of impending FBD outbreaks, identification of source foods, and through traceability and recall systems, removal of the offending food from the distribution chain. The system should be integrated to allow sharing of data across relevant departments. Many countries in the region lack coordinated surveillance systems (Mensah et al., 2012).

5.4.4 Regional and international food safety initiatives

The Comprehensive Africa Agriculture Development Programme (CAADP) was established in 2003 as a NEPAD program with a focus on agricultural growth, but became an African Union (AU) program in 2014 to monitor progress towards attainment of Africa's Malabo declaration targets (AU, 2014). The Africa Food Safety Index (AFSI) is an indicator, introduced in 2019 in CAADP, developed to monitor progress on food safety. It is the 44th indicator that CAADP tracks every 2 years through the Biennial Review (BR) process (https://au.int/sw/node/36659). The index has three components: Food Safety Systems Index (FSSI); Food Safety Health Index (FSHI); and Food Safety Trade Index (FSTI).

The AFSI scores, based on the data submitted by countries, reflect the food safety status in the country. The scores provide countries with an opportunity to evaluate their performance and plan how to improve it, while promoting collaboration between agencies and authorities on provision of the data used in the index computation.

Other initiatives, not related to human health, that provide indirect information on food safety include:

- World Organisation for Animal Health (OIE) tool for the evaluation of the performance of veterinary services (http://www.oie.int/support-to-oie-members/pvs-evaluations/oie-pvs-tool/)

- The OIE World Animal Health Information System (http://www.oie.int/wahis_2/public/wahid.php/Wahidhome/Home), which reports on animal diseases including those that may be classified as foodborne hazards (for example, trichinellosis and brucellosis)
- The WHO International Health Regulations have one section that covers food safety implementation capacities (https://www.who.int/gho/ihr/monitoring/food_safety/en/)
- The World Bank Enabling the Business of Agriculture tool (http://eba.worldbank.org)
- Information from the Food and Agriculture Organization of the United Nations (FAO) on use of agricultural chemicals (http://www.fao.org/faostat/en/#data/RP)

5.5 Formal sector actions

In high-income countries, risk management has experienced a crucial shift, from being government led to co-regulation, that is, placing the responsibility for the safety of foods on the food operators along the supply chain. In these settings, food safety is largely governed by the private sector, while government enforces the legal framework under which such private sector is expected to operate. In LMIC, most responsibility still falls with the government. However, private industry has a growing role in the monitoring and assurance of food safety. This is particularly evident in urbanizing centers, where food supply chains reliant on modern infrastructure (for example, supermarkets, refrigerated transportation, etc.) are proliferating rapidly to meet the food demand of the growing middle and upper classes. Food safety systems in such formal value chains are adopting the principles and approaches used in industrialized countries (for example, HACCP), albeit with certain challenges related to process and accountability.

Even though there may be regulations, these may not be adhered to. Pesticide residues and use of fraudulent formulations are a great concern for food safety, especially in the fruits and fresh vegetables value chains. Most of the banned pesticides are persistent organophosphates. They are persistent and affect non-target organisms, mainly bees. Because countries have no harmonized list of banned chemical substances, such chemicals are still on the market either fraudulently or introduced into a country through illegal cross-border trade. Haggblade (2019) found that most glycophosphate pesticide on the market had 10% less active ingredient than the approved level, indicating continued use of such would have a great impact on the emergence of pests resistant to pesticides. A multi-agency campaign to minimize fraudulent pesticide by industry stakeholders perceptibly estimated that these efforts have reduced fraudulent pesticides on sale in Côte d'Ivoire, from 40% to 20% (Box 5.2).

Private standards are increasingly common in the formal sector, especially by large multinational companies aiming at meeting the consumer safety demands of the target export markets. They are set by private firms to facilitate supply chain management in international food markets (FAO, 2010) and are benchmarked with Codex Alimentarius. A strong Food Safety Management Control System is put in place to ensure production of safe products with the application of the Hazard Analysis and Critical Control Points (HACCP) and offer various levels of certification (basic, intermediate, and advanced). Besides the fact that ISO 22000:2005 (revised in 2018) is not a mandatory food safety standard in many developing countries, only a few companies manage to get certification (Oloo et al., 2018) because the costs are prohibitive for small-scale operators. The ability of countries to comply with Codex standards and guidelines greatly increases their ability to also comply with private standards (FAO, 2010).

Box 5.2: Industry efforts to combat fraudulent pesticides in West Africa

By Bama Yao

Unregistered and counterfeit pesticides account for roughly one-third of pesticides sold in West Africa, although regulatory enforcement and fraud levels vary significantly across the subregion. In part, the high levels of fraud arise because pesticide markets have grown far faster than regulatory staffing in recent decades. Conflicting registration decisions by national regulators have also contributed to cross-border smuggling of banned and unregistered pesticide products. Ghana's regulators, for example, have authorized both paraquat and atrazine for sale domestically, while the neighboring countries of Côte d'Ivoire and Burkina Faso have banned both active substances. As a result, a lively smuggling trade takes place delivering these banned substances from Ghana into surrounding countries (Figure B5.1).

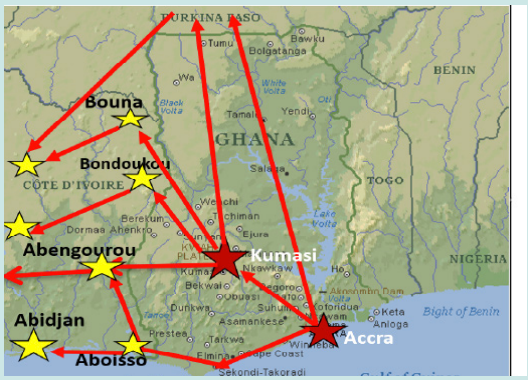

Figure B5.1. Major pesticide smuggling routes in West Africa

Source: Yao (2018)

Trade in fraudulent pesticides poses serious problems for farmers and for legally licensed traders. Farmers complain about adulteration and the difficulties they face in identifying good quality inputs. Independent laboratory testing of the region's most commonly sold pesticide, glyphosate, suggests that fraudulent generic brands contain 10% less active substance than registered brands as well as more variable dosages (Haggblade et al., 2019). Licensed traders who comply with regulatory testing requirements face higher costs than the smugglers. As a result of their lower cost structures, fraudulent pesticides take market share from legally registered brands.

In the face of limited public regulatory resources, private sector stakeholders have begun to spearhead anti-fraud campaigns directly. CropLife Africa Middle East, a trade association of major pesticide producers and distributors, has led a series of media outreach, stakeholder training, and legislative lobbying campaigns to combat fraudulent pesticides in key markets across West Africa. From 2013 to 2015, CropLife and allied industry groups convened a series of cross-border training workshops involving pesticide regulators as well as customs and police officials in Ghana and in Côte d'Ivoire. Many other training workshops target farmers and other end-users with the aim of providing knowledge and tools for identifying, and thus avoiding, the use of fraudulent pesticides.

The private sector has, likewise, worked with national regulators to enact legislative reform in Côte d'Ivoire leading to the formation of district pesticide committees through which local authorities, farmer groups, traders, agriculture ministries, and customs and police officials share information on fraudulent pesticides and target enforcement efforts. Together, industry stakeholders estimate that these efforts have reduced fraudulent pesticides on sale in Côte d'Ivoire perceptibly, from 40% to 20%.

Taken together, these private sector initiatives suggest that, while the private sector can serve as an effective catalyst for improving regulatory enforcement, ultimate success requires working closely with relevant public authorities.

Alongside this, several global and local initiatives aim to support private industry in its journey to providing safer foods. Among these are the standard setting and certifying bodies that ensure products to be placed in the market shelves conform to the standard. Consumer trust in these certificates as a gold standard remains low (Eden et al., 2008). However, the growth and uptake of voluntary certification schemes (for example, GLOBAL GAP) offer a path for private industry to take ownership of food safety processes in the supply chains that serve urbanizing markets. The level of uptake of such voluntary schemes within the formal sector has been high, and is growing annually (Oya et al., 2017). Often, such schemes require investments in local laboratory and testing capacity to ensure these laboratory-based certifications are implemented locally, and at scale. The level of knowledge about such certificates and their value to certify the safety of foods remains low among small and medium enterprises and consumers in LMIC. Engaging consumers and creating demand for such certification is key for private industry to have clear economic incentives to invest in them.

Beside these specific initiatives, several international initiatives seek to promote food safety in LMIC. One of the earliest and most prominent initiatives at African level is the Partnership for Aflatoxin Control in Africa (PACA), launched in 2012. At a global level, initiatives such as the Global Food Safety Partnership (GFSP) of the World Bank and the private Consumer Goods Forum of the Global Food Safety Initiative (GFSI) are essential to catalyze international will and know-how to support transitioning economies and developing countries to continue improving the safety control systems in their agricultural value chains.

5.6 Informal sector responses

While urbanizing African cities are gradually seeing more modern supermarkets and infrastructure-heavy supply chains, a large portion of those living in these cities will continue to be low-income earners who depend on the food sold through informal channels to meet their nutritional demands for the foreseeable future. These channels have an essential role to play in food security and nutrition, local economy, and for livelihoods, especially for poor families (Alonso and Dominguez-Salas 2019). Assuring food safety in such informal chains comes with its own challenges. The lack of formal registration of businesses and absence of traceability processes, among others, mean inspection and certification are difficult to implement. Self-regulation can be implemented by a business which sets out and monitors its own processes and standards. Group regulation can add more accountability and transparency. It is primarily through the establishment of business groups that determine the "standards" and keep members accountable to comply. The horticulture subsector is a good example where best practices of the smallholder farmers are benchmarked with one another for accountability (Ouma, 2010). The dairy sector in Kenya recognizes that the stakeholders' organization is key to providing services, including self-regulation (GoK, 2013). The success of such self-regulation mechanisms is variable, with issues around governance often leading to failures accentuated by creation of cartels that promote protectionism, lack of competitiveness, and of legal floor to enforce the regulations (Kiambi et al., 2020; Swire, 1997).

Assuring the safety of the foods in the informal markets requires a combination of approaches. First, countries need to invest in capacity development efforts to equip food business operators along the supply chains with the know-how about food hygiene, food handling, and food safety. Capacity development must facilitate actors' access to equipment and facilities (credit, water, sanitation, and incentives for change). Capacity building needs to show that a focus on food safety leads to better business (happier customers, greater revenues, and legitimization from government). Governments need to develop the legal framework that allows for the progressive inclusion of businesses operating in informal channels, support their progressive upgrading towards formalization, and continue to provide the livelihood and nutritional security service they now provide. A demand for safer food must be created among consumers, who feel powerless, or helpless, and have little knowledge about how to demand and access safe food.

5.7 Policy implications

The food safety policy environment in Africa's growing urban food markets will be influenced by several factors. First, globalization and reducing trade restrictions have had a large impact on formulation of food safety policies in Africa. The continent exports fresh foods to world markets. To access these markets, African agriculture had to attain pertinent global food standards. This transformation meant that African urban markets benefitted from accessing food of high quality and safety. Globalization and free market policies have the potential to act as catalysts for food safety changes in the rural food value chains that supply urban markets. What is the future of these two global trends amidst the rising return to nationalism and protectionist policies that are now creeping into the global scene? The potential for COVID-induced departure from globalization and free-market policies risks slowing down the impetus for food safety transformation of African rural food systems that serve urban markets.

Second, the African population (1.34 billion; UN, 2020) is growing fast, at the rate of 2.7% (World Bank, 2020), and is expected to double by 2050 (Suzuki, 2019). This large population is expected to bring with it challenges of food security as the urban population grows to about 50% of the African population by 2035 and of the sub-Saharan population by 2050 (World Bank, 2010). This includes challenges to assure the safety of products sold, and often produced, in urban and peri-urban settings. **A rethink of policies and strategies to deliver adequate and safe food to urban markets is imperative.**

Third, the African Union in 2003 (AU, 2003) committed its membership to increase the budget to agriculture to about 10% of the budgetary allocation to stimulate agricultural production to meet the demands of its growing population. In 2014 at Malabo (AU, 2014), the Union decreed to support a tripling of intra Africa trade in foods by 2025. Food safety is one factor that can undermine human health and development, and the competitiveness of African agriculture to attain the AU goals and the UN sustainable development goals (SDG). **To achieve these great milestones, African countries need to prioritize food safety and adopt food safety friendly policies.**

Under CAADP, each country is expected to select five value chains to focus on for the biennial peer review. The CAADP lists about 15 such value chains. In cognizance of the permutations of the value chains across the continent, different hazards that affect these value chains, and cultural food preparation practices, it is clear that there cannot be a "one size fits all" ranking of the most important value chain and hazards when it comes to food safety. **Countries therefore need to prioritize the hazards and value chains that are important to them.** Many countries are prioritizing similar value chains and lessons learned in improving the value chains in terms of food safety in one country could be shared to help other countries benefit and pull together. **For this to happen, greater importance and resources should be placed on the biennial peer review process and evaluation of the performance.**

The prioritization should be based on sound scientific evidence that takes into account the prevalence, route of transmission, the severity of disease (acute, chronic, and disability), population at risk, and cultural practices. This will help calculate risk and identify the risky nodes and actors that can be targeted for surveillance and management. Food-borne diseases caused by failure to adopt food safety measures cost Africa about US$16.7 billion annually (Jaffee et al., 2019). In view of the budgetary constraints experienced by African governments, the focus should be directed to the value chain that results in the greatest loss or burden (productivity and treatment costs). **Bacterial, viral, parasitic, and chemical FBD hazards will continue to top the list of food safety concerns until continental, regional and national attention is shifted to food safety as a matter of priority in a manner akin to National Security, considering its health, economic, and social impacts.**

Prevention of FBD is considered the best practice to avoid outbreaks that are costly to the industry and a country's human health. This can only be achieved

if there exists a surveillance system and a chain of laboratories that are fit for the purpose. Once the surveillance and laboratory results are availed, the management needs to assess the risk and institute appropriate management options that are science evidenced. The COVID-19 pandemic has brought to the fore the lack of preparedness in the surveillance and laboratory capacity of many countries in Africa. **The countries need to commit to invest in human resources, laboratory infrastructure, and personnel capacity that would support the surveillance and laboratory analysis.**

As mentioned above, the burden of food safety compares to that of malaria, tuberculosis, and HIV. The complexity of foods and hazards (WHO, 2019) intertwined in diverse economic, social, and cultural contexts, clearly means **transdisciplinary approaches (for example, One Health)[8] are more amenable to addressing hazards at the human, animal, and environmental interface because prevailing health needs are beyond the skills and competence of any one discipline.**

Consumers of goods in high-income countries play a great role in demand for safer foods. In LMIC, consumer demands (the "pull" from consumers for safer food) are not yet a great force in improving food safety. To increase consumer participation in demanding safe food, the prerequisite is to increase their awareness of food safety. In many countries, this role is left to civil society that is not well resourced or organized. The COVID-19 pandemic has galvanized a sustained campaign by governments to increase population awareness on the risks posed by the coronavirus. Increase in government participation in food safety issues is critical. **Promulgation of policies and regulations that set up a government-funded food safety lobby umbrella with the mandate of creating consumer awareness is pivotal (the "push" from regulations towards food safety).**

Actors along value chains should be able to demonstrate that the food they sell is safe. Food value chains that serve urban markets are mainly informal and applicable food safety standards are non-existent. With the participation of the value chain actors, **food standards bodies should develop codes of practice and checklists that would be adopted as food safety measures by informal market actors. Audits of compliance to these measures would be recognized by regulators and incentives (branding) awarded to promote adherence to good practices.**

If such a multifaceted strategy is adopted, a graded improvement scheme of informal markets could be achieved. This would help change the image of regulators, who are nowadays seen as revenue collectors and out to punish non-compliance, to a body working with actors to facilitate compliance. **This change also requires creating awareness of the regulators, as well as of business operators, on the shared responsibility to provide safe food by the regulators and value chain actors.**

8 One health is the principle that human health, animal health, and environmental health are interlinked and that collaboration between the sectors is necessary. One health addresses food safety issues with an approach of designing and implementing programs, policies, legislation, and research in which multiple stakeholders communicate and collaborate to achieve better public health outcomes.

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