

OVERVIEW

# The Safe Food Imperative

*Accelerating Progress in Low- and Middle-Income Countries*





OVERVIEW

# THE SAFE FOOD IMPERATIVE

## ACCELERATING PROGRESS IN LOW- AND MIDDLE- INCOME COUNTRIES

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## FOREWORD

Every day around the globe, families and friends eat to provide themselves with essential energy and nutrients to lead healthy and productive lives, as well as for pleasure and comfort. Yet every day, on average, unsafe food makes close to two million people sick, keeping them from school and work, and sometimes dramatically degrading or curtailing their lives. Worst of all, foodborne illness disproportionately strikes populations that can least afford to be sick. Low- and middle-income countries in South Asia, Southeast Asia, and Sub-Saharan Africa account for 41 percent of the global population but are afflicted with 53 percent of all foodborne illness, and 75 percent of related deaths.

Whether the consequences of unsafe food are measured in suffering, disability, and loss of life, or foregone income and wages, these personal and social costs are unnecessarily high. According to estimates from the World Health Organization, foodborne diseases made some 600 million people sick and caused 420,000 premature deaths in 2010. Translated into economic terms using 2016 income data, illness, disability, and premature deaths induced by unsafe food lead to productivity losses of about US\$95 billion a year in low- and middle-income countries. Unsafe food undermines food and nutritional security, human development, the broader food economy, and international trade.

*The Safe Food Imperative* argues that much of the burden of unsafe food can be avoided through practical and often low-cost behavior and infrastructure changes at different points along food value chains, including in traditional food production and distribution channels. In many countries, concerted action on domestic food safety has been sporadic and reactive, coming in the

wake of major outbreaks of foodborne disease or food adulteration scandals. Yet what is needed are sustained investments in prevention, including ones that build countries' core competencies to manage food safety risks, and motivate and empower many different actors, from farm to fork, to act responsibly and with consumer health in mind.

Drawing on experiences across the globe, the report highlights examples of effective food safety management. It calls for a higher prioritization of food safety along with more investment in the development of coherent national food safety management systems in low- and middle-income countries. Governments do not and cannot have sole responsibility for ensuring safe food—it is a shared responsibility. Public agencies, farmers, food businesses, and consumers all have constructive roles to play.

Apart from more and smarter public investment in food safety, there is also a critical need for new regulatory approaches that place more emphasis on facilitating compliance and engaging consumers. Countries as diverse as Chile, India, Kenya, Ukraine, Uruguay, and Vietnam have demonstrated that better health and commercial outcomes are possible with the joint involvement of public agencies, businesses, and consumers in food safety.

Individuals across income levels, age groups, and regions all need safe food, but food safety is also a national necessity. Countries need safe food to develop their human capital—to fuel a healthy, educated, and resilient workforce, and to feed a vibrant economy. More and better investments in food safety are needed for countries to unleash their full potential to grow their economy inclusively and sustainably.

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## ABBREVIATIONS

DALY	disability-adjusted life year
FBD	foodborne disease
FERG	Foodborne Disease Burden Epidemiology Reference Group
LMIC	low- and middle-income country
SDG	Sustainable Development Goal

Asia in this report refers to countries and economies in Central Asia, East Asia and Pacific, South Asia, and Southeast Asia.



## OVERVIEW

# The Safe Food Imperative

## INTRODUCTION

Food safety is linked in direct and indirect ways to achieving many of the Sustainable Development Goals, especially those on ending hunger and poverty, and promoting good health and well-being. Food and nutritional security are realized only when the essential elements of a healthy diet are safe to eat, and when consumers recognize this. The safety of food is vital for the growth and transformation of agriculture, which is needed to feed a growing and more prosperous world population; for the modernization of national food systems; and for a country's efficient integration into regional and international markets.

The safety of food is the result of the actions or inactions of many stakeholders, operating under diverse environmental, infrastructure, and socio-political conditions. These stakeholders include farmers, food handlers and distributors, food manufacturers, food service operators, consumers, regulators, scientists, educators, and the media. Their behavior can be shaped by their awareness of food safety hazards; their technical, financial, and other capabilities to apply effective mitigating practices; and prevailing rules, incentives, and other motivators.

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This overview is a summary of a book-length report with the same title. The book provides more detailed empirical analyses, a review of the literature, and an elaboration of recommendations.

Food safety outcomes can be strongly influenced by policies, investments, and other interventions. These alter the awareness, capabilities, and practices of stakeholders, from farm to fork. Well-functioning markets can provide incentives for farmers and food business operators to supply products that match the safety characteristics consumers demand. Even so, there are many circumstances stemming from problems of information and costs where pure market signals fail and additional measures are needed. Problems of information include the actual attributes of food products, and the location and origins of food safety hazards.

For many developing countries, food safety has, until recently, received very little policy attention and only modest investment in capabilities to manage risks. Two main groups of factors contributed to this. The first group includes the weak empirical base for the country-level incidence of foodborne hazards and disease, the economic costs of unsafe food, and the efficacy of food safety interventions. The second group includes institutional factors: the fragmentation of food value chains and public institutional mandates, and the absence of effective consumer representation in most developing countries.

Because of scarce data and thematic leadership, food safety tends to appear on national radar screens only during crises. A typical crisis would be a major outbreak of foodborne disease (FBD) causing death, scandals involving deliberate food adulteration, trade bans, or widespread consignment rejections because of noncompliance with standards. In developing countries, these episodes have tended to spur reactive damage control, resulting in a flurry of regulatory actions or investments. When these are taken in crisis management mode, they often differ in target, content, approach, and lasting efficacy from when food safety measures are developed and adopted in a more deliberative, evidence-based, forward-looking, and consultative manner.

Years of inadequate policy attention and underinvestment have stunted the development of coherent national food safety management systems in many low- and middle-income countries (LMICs). Most of these countries have weak food safety systems in terms of scientific evidence, necessary infrastructure, trained human resources, food safety culture, and enforceable regulations. Governance of national food safety systems in LMICs—whereby stakeholder roles and accountabilities are well defined and understood—is also weak. While many LMICs have islands of strong food safety management capacity, these support only segments of the agri-food system and consumers (often the wealthiest). An especially weak area is the infrastructure and services needed to mitigate the food safety risks faced by the poor. Their FBD burden is often invisible and voiceless.

The dominant discourse on food safety in LMICs has focused on trade, but this needs to change. Complying with food safety regulations and the standards of international trade partners has been a prime objective of investments in food safety by LMIC governments and bilateral and multilateral donors. Trade-related compliance challenges have been highly visible to policy makers, and stakeholders have taken effective action. That said, most LMICs would benefit from widening or redirecting their food safety focus.

Changing demographics and dietary patterns are creating new commercial opportunities in domestic food markets, but these are also increasing the exposure of LMIC populations to food safety hazards. Although statistically invisible, the domestic economic costs of unsafe food are significant and growing in many LMICs.

This report aims to enhance the awareness of policy makers of the socio-economic impacts of foodborne hazards in LMICs, and to strengthen the economic case for devoting more public attention and resources to food safety.<sup>1</sup> Developing countries face many competing demands for limited public investment funds, yet many governments do not fully appreciate the complex and varied impacts of foodborne hazards on public health, trade, the performance of the agri-food system, and the competitiveness of those employed within this system. They also lack quantitative evidence on the economic benefits of improvements in food safety. The report's intended audience are policy makers and policy analysts in LMICs, including those associated with technical ministries—such as agriculture, health, and trade—and those involved in budget and fiscal planning. The report's content and strategic perspectives are also expected to be relevant to development practitioners seeking to devote greater attention to food safety in their support for public health, trade, and agricultural and food system transformation in LMICs.

## **FOOD SAFETY AND THE SUSTAINABLE DEVELOPMENT GOALS**

Food safety is vital for achieving food and nutritional security. Unsafe food contains microbiological, chemical, or physical hazards that can make people sick, causing acute or chronic illness that, in extreme cases, can lead to death or permanent disability.<sup>2</sup> The presence of foodborne hazards can also reduce the

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<sup>1</sup> In recent years, major international initiatives have increased attention and resources to mitigate risks from unsafe food in LMICs. Examples of these initiatives include the work of the World Health Organization's Foodborne Disease Burden Epidemiology Reference Group and CGIAR's food safety research under its Agriculture for Nutrition and Health Program; the technical assistance programs of the Food and Agriculture Organization of the United Nations and the Standards and Trade Development Facility; programs supported by the Global Food Safety Partnership and the Global Food Safety Initiative; support provided by the U.K. Department for International Development, USAID, and the Bill & Melinda Gates Foundation for research on FBDs and their control in developing countries; and various regional initiatives.

<sup>2</sup> Hazards that have been addressed by public policies include microbial pathogens (for example, *Salmonella* spp.); zoonotic disease agents (for example, highly pathogenic avian influenza); parasites (for example, intestinal worms); adulterants (for example, melamine); naturally occurring toxins (for example, aflatoxin); antibiotic drug residues; pesticide residues; and heavy metals (for example, cadmium).

bioavailability of nutrients in food and lead to food being thrown away, putting already food-insecure populations at greater risk of malnutrition.<sup>3</sup>

Food safety hazards affect not only public health in LMICs but also the growth and modernization of their domestic food markets. These hazards also affect income and employment opportunities that domestic food markets provide through production, processing, and distribution. Unsafe food can be a liability for economic growth and shared prosperity, especially where demographic and other changes result in rising but unmet consumer demand for safe food (Ortega et al. 2012; Lagerkvist et al. 2013; Ortega and Tschirley 2017). A country's food safety profile may even affect domestic and international tourism (Croes and Rivera 2015).

Unsafe food and investments in food safety capacity can have profound effects on the success of efforts to alleviate poverty and promote shared prosperity. Because people with low incomes are both consumers of food and agents in agri-food value chains, food safety intersects with poverty in two critical ways. In the first, a growing body of literature identifies the extent of food safety hazards in informal food markets, which are the predominant source of food for poor people, especially in urban areas (Choudhury et al. 2011; Fellows and Hilmi 2011; Feglo and Sakyi 2012; Jarquin, Alvaraz, and Morales 2015). In the second, food safety can affect the livelihoods of poor people employed in agri-food value chains, whether as small-scale producers, as operators of micro and small enterprises in food processing and distribution, or as employees in commercial food enterprises. And as already noted, enhancing food safety capacity can make important contributions to achieving several of the Sustainable Development Goals (box O.1).

### **BOX O.1 Importance of Food Safety for Attaining the Sustainable Development Goals**

Food safety will be vital for achieving many of the Sustainable Development Goals (SDGs), and particularly the following:

- *SDG 1: End poverty.* Foodborne disease (FBD) is a major cause of ill-health among the poor and is associated with a range of costs affecting them, including lost workdays, out-of-pocket expenses, and reduced value of livestock and other assets.
- *SDG 2: End hunger.* FBD has multiple complex interactions with nutrition. For example, toxins may directly lead to malnutrition, some of the most nutritious foods are the most implicated in FBD, and concerns over food safety may lead consumers to shift consumption away from nutritious foods.

*(Continued)*

<sup>3</sup>Food safety is closely linked to other agri-food system public health issues that offer potential for synergies in risk management. For example, the inappropriate use of antimicrobials in livestock and aquaculture production is contributing to the emergence of antimicrobial resistant pathogens. There are also potential synergies in the surveillance and management of FBD and antimicrobial resistance.

## **BOX O.1 Importance of Food Safety for Attaining the Sustainable Development Goals (Continued)**

- *SDG 3: Good health and well-being.* The global health burden of FBD is comparable to that of malaria, HIV/AIDS, and tuberculosis, and the people most vulnerable to FBD are infants, pregnant women, the elderly, and those with compromised immunity.
- *SDG 5: Gender equality.* Women are the gatekeepers of household food safety, play important roles in traditional food chains, and often derive their livelihoods from agri-food value chains.
- *SDG 6: Clean water and sanitation.* Lack of clean water increases the risk of food being unsafe, injudicious use of chemicals in food production can pollute water sources, and infectious FBDs can be transmitted via water.
- *SDG 8: Decent work and economic growth.* Inclusive food markets provide livelihoods and are a way out of poverty for many poor people.
- *SDG 11: Sustainable cities and communities.* Hundreds of millions of poor people work in urban agriculture and food-related services, and vibrant traditional food markets and street food make important contributions to culture, tourism, and livable cities.

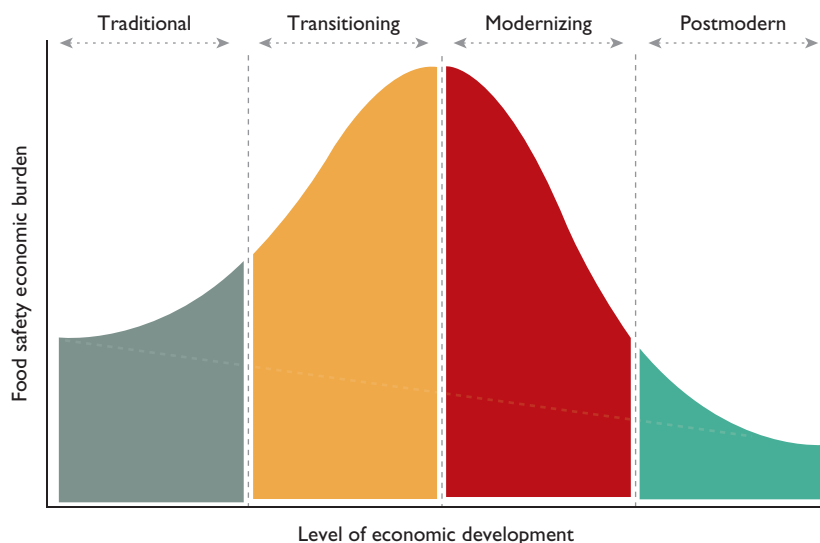
Food safety is an important determinant of the trade performance of some LMICs. This is especially true for those competing in markets for high-value foods, including fresh fruit and vegetables, fish and fishery products, meat, spices, and nuts. Countries, and sectors and firms within countries, with limited food safety capacity will find themselves at a competitive disadvantage when trying to serve potentially lucrative export markets if they face periodic yet costly rejections of product consignments and uncertainty about sustained market access.

## **CONCEPTUALIZING A FOOD SAFETY LIFE CYCLE**

The burden of unsafe food generally evolves in a systematic manner, in line with processes of economic development; this can be called the food safety life cycle (figure O.1). The economic costs of unsafe food, in both absolute and relative terms, vary across countries according to their level of economic development. This variation is linked to the complex interplay of a wide range of economic, demographic, dietary, and environmental health factors. These affect the incidence and potential exposure of populations to food safety hazards, the strength of incentives for actors in agri-food value chains to prevent or manage these hazards, and the costs of food safety missteps.<sup>4</sup> Although all LMICs are

<sup>4</sup> Incentives can be market-based (that is, derived from the demand of consumers or other value chain actors) or generated through political processes, such as pressure from citizens, advocacy groups, and signatories to international agreements.

**FIGURE O.1 The Food Safety Life Cycle and Levels of Economic Development**



Source: World Bank.

experiencing changes in diet and agri-food value chains, their position in this process of food system transformation varies considerably. The food safety life cycle across countries and over time reflects evolving food safety challenges, and the degree of mismatch with food safety management capacity across the public and private sectors.

While low-income countries face a significant burden of food-related illness, the supply of and demand for safe food remain underdeveloped at this traditional stage, as shown in figure O.1. Here, diets tend to be dominated by starchy staples and policy attention is focused on the availability and affordability of these foods and on other public health issues (for example, malaria and waterborne diseases). Much food is produced close to the point of consumption and undergoes limited transformation. Traditional ways of processing food dominate, and are often fairly effective at reducing risk. The predominant FBDs come from microbiological pathogens and parasites linked to poor hygiene, close contact with animals, and low access to clean water and improved sanitation. Domestic market drivers or incentives for safer food are often weak. Food safety capacity tends to be rudimentary, with more developed systems tending to be geographically concentrated and focused; for example, in capital cities for higher-income consumers and in niche exports to high-income countries.

Countries reaching lower-middle-income status—the transitioning stage in figure O.1—face a broader range of food safety hazards, straining if not overwhelming food safety systems. These countries are generally experiencing rapid shifts in diet, agricultural production practices, and urbanization, which affect the exposure of consumers to food safety hazards. In these countries,



most of the distribution of potentially hazardous fresh food products continues to occur through informal channels with multiple points of intermediation. For farms, the intensification of production often involves the greater use of agrochemicals and veterinary drugs. Animal source foods are an important cause of FBD, and, as animal production intensifies, epidemiological changes occur that can lead to the emergence of new diseases. More opportunities and incentives for food fraud also arise. Food imports, including perishable foods, often increase. As a result, domestic consumers are exposed to new foodborne microbiological, chemical, and physical hazards. A common situation is one in which the prevailing official regulatory apparatus is overtaken by the breadth and depth of emerging issues, while emerging private sector food safety governance measures still reach only a modest share of the overall food market. In these countries, consumer food safety concerns are rising faster than the use of available tools to fix food safety problems. Empirical evidence points to the underdevelopment of regulatory oversight capabilities in lower-middle-income countries, especially for relatively high-risk animal products. Commonly, national and subnational governments are playing catch-up and are sometimes being overwhelmed by the emerging challenges. Yet, the politics of unsafe food is pressing governments to act, in real or symbolic ways.

For upper-middle-income countries in the modernizing stage (figure O.1), the gap between need and capacity begins to close. This results in a reduction in the absolute or relative public health and economic burdens of unsafe food. The modernizing stage is characterized by profound and often rapid restructuring of agri-food value chains. Formal sector enterprises come to dominate in both urban and rural areas, and the modern retail sector expands and extends into smaller urban centers and rural areas. As businesses become better organized, both as individual enterprises and collectively across sectors, they are able to exert greater pressure on government to enhance public food safety management systems. Because of administrative change and public investment, regulatory systems become more effective at establishing and enforcing minimum food safety standards, and at promoting and facilitating food safety management system upgrades in the private sector. More effective surveillance systems also highlight the burden of FBD, helping the problem gain recognition and making the benefits of upgrading food safety management systems more apparent. Simultaneously, the public administration of food safety becomes more efficient and able to respond to the needs and demands of stakeholders. All these changes foster greater trust within the population in the ability of the agri-food system to deliver safe food.

The burden of FBD eventually declines to much lower and relatively stable levels in the postmodern stage (figure O.1), at which point any further improvements in food safety happen in smaller increments.<sup>5</sup> While differences persist in the prevalence of specific FBDs in high-income countries, in the aggregate

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<sup>5</sup> Perversely, concern over FBD may increase, accompanied by a blurring of borders between food safety and other issues; for example, organic food, animal welfare, biotechnology, and industrial production.

and for particular hazards, improvements are slow, especially compared with those observed among the rising number of middle-income countries. This new equilibrium reflects the fact that both market-based and political incentives for improved food safety management capacity remain high, but that agri-food value chains are complex and easy wins in terms of improved capacity are few. Paradoxically, concern over FBD and novel food technologies is highest at this stage.

## THE PUBLIC HEALTH BURDEN OF FOODBORNE DISEASE

Research is shedding new light on the global burden of FBD. Until recently, data on the incidence of FBD and its associated costs were limited to high-income countries and regions, including the United States, Canada, and parts of Europe (Scallan et al. 2011; Thomas et al. 2013; Painter et al. 2013; Tam et al. 2012; Havelaar et al. 2015). To address this gap, the World Health Organization's Foodborne Disease Burden Epidemiology Reference Group (FERG) has been working on global estimates of the incidence of FBD since 2006. This work covers 31 of the most important foodborne hazards in 14 regions. The estimates are expressed in terms of disability-adjusted life years (DALYs) associated with ill-health and premature death.<sup>6</sup>

For 2010, the base year, the global burden of FBD is estimated at 600 million illnesses and 420,000 premature deaths. This aggregates to the equivalent of 33 million DALYs (Havelaar et al. 2015). For comparison, the estimated 2015 global burden of tuberculosis was 40 million DALYs, and 66 million for malaria.<sup>7</sup> These FBD estimates are considered to be highly conservative. For example, the incidence of illness associated with chemical hazards was substantially underestimated in FERG's earlier work because of data limitations, as will be confirmed by updated estimates to be published in late 2018.

The global burden of FBD is unequally distributed. Asia and Sub-Saharan Africa have the highest incidence of FBD, as well as the highest rate of deaths due to FBDs and the greatest loss of DALYs. LMICs in South Asia, Southeast Asia, and Sub-Saharan Africa, which make up 41 percent of the global population, are estimated to account for 53 percent of all foodborne illnesses, 75 percent of FBD-related deaths, and 72 percent of FBD-related DALYs. A disproportionate share of the burden falls on children under the age of five, who account for 9 percent of the global population but 38 percent of all cases of illness and

<sup>6</sup> One DALY can be thought of as one lost year of "healthy" life. The sum of DALYs across a population is a measure of the burden of disease and can be thought of as a measure of the gap between current health status and an ideal health situation in which the entire population lives to an advanced age, free of disease and disability. Estimates of DALYs encompass losses due to premature death and the loss of health status due to illness.

<sup>7</sup> According to the Institute for Health Metrics and Evaluation, the global incidence of tuberculosis and malaria fell by 35 percent and 31 percent, respectively, from 2006 to 2016. No statistical trend data are available for FBD as a whole, although some FBDs associated with poverty and lack of infrastructure appear to be declining.

40 percent of the DALYs. An estimated 30 percent of premature deaths due to FBD are of children under the age of five. Geographically, children are most likely to die from FBD in Sub-Saharan Africa, followed by South Asia.<sup>8</sup>

## THE ECONOMIC COSTS OF UNSAFE FOOD

The economic costs of unsafe food take multiple forms and have both short- and long-term dimensions. Examples include the public health costs and loss of productivity associated with FBD, disruptions to food markets when outbreaks of illness occur as consumers avoid implicated foods or shift to alternatives perceived to be safer, impediments to agri-food exports because of real or expected food safety problems, and the costs of complying with food safety regulations and standards in foreign markets. More indirect and harder-to-measure costs include the costs of prevention and those associated with wary consumers shifting from high-nutrient fresh produce to processed foods.

Valuing the costs associated with FBD is challenging because of data and methodological limitations. Few studies capture national data, and those that do often depend on broad assumptions and extrapolations. This report estimates the cost of FBD on the basis of “productivity losses,” as measured by gross national income per capita and associated with disability or premature death captured in DALYs. The report uses FERG’s DALYs by country or subregion for 2010 and the gross national income per capita estimates for 2016 from the World Bank’s World Development Indicators Database.

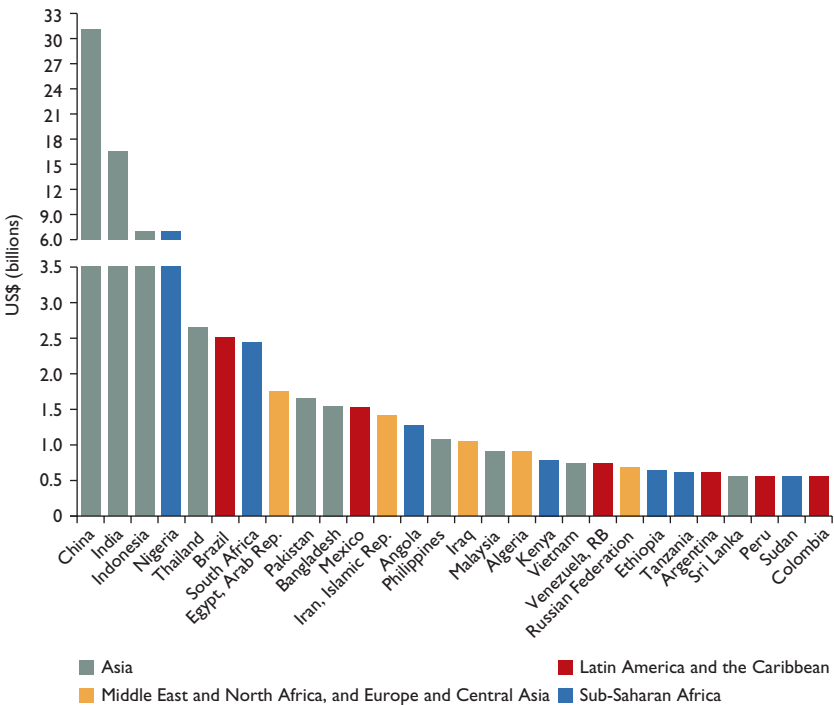
The total productivity loss associated with FBD in LMICs is estimated at US\$95.2 billion a year. Of this, upper-middle-income countries account for US\$50.8 billion, or 53 percent of the total. Lower-middle-income countries account for US\$40.6 billion (43 percent), and low-income countries for US\$3.8 billion (4 percent).<sup>9</sup> By region, LMICs in Asia account for US\$63.1 billion and those in Sub-Saharan Africa for US\$16.7 billion. By country, China alone accounts for over US\$30 billion of the total global burden of FBD in LMICs, and India for US\$15 billion. Fifteen LMICs are estimated to

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<sup>8</sup> For risk management purposes, it is important to have detailed information on which foods are involved in the transmission of FBD. Unfortunately, little information exists on these relationships for most countries, but Hoffmann et al. (2017) provide estimates. In some high-income countries, animal products have been found to account for half or more of the FBD burden. The pattern for this, however, is likely to vary greatly among countries because of differences in diets, industry structures, and environmental conditions, among other things. Indeed, parallel analysis supported by this research found the share of FBD attributable to animal products to range from 15 to 85 percent across a sample of 93 countries. For most LMICs, a combination of animal products and fruit and vegetables likely accounts for the bulk of FBD. Estimates attribute very little of the global burden of FBD to cereals, although the serious long-term public health consequences of aflatoxin exposure from cereals, especially in Africa and South Asia, have been widely reported.

<sup>9</sup> This small share of low-income countries is partly attributable to changes in the World Bank’s country categorization. In 2016, only 31 countries were classified as low income, compared with 63 countries in 2000. The share of the world’s population living in countries classified as low income fell from 40 percent in 2000 to just below 9 percent in 2016.

**FIGURE 0.2 Productivity Loss from Foodborne Disease by Country, 2016**



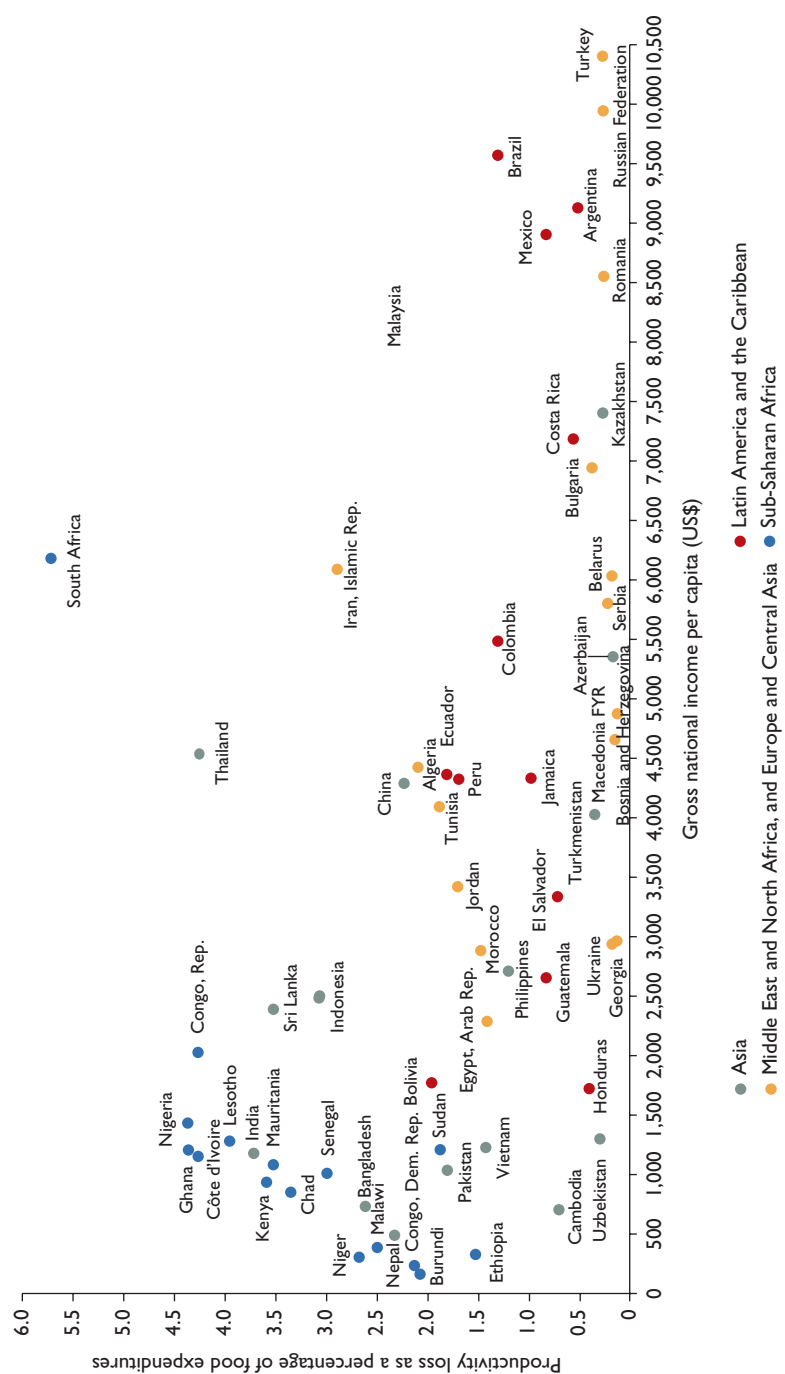
Source: World Bank calculations.

Note: Calculated by multiplying unpublished 2010 Foodborne Disease Burden Epidemiology Reference Group country estimates for foodborne disease disability-adjusted life years by 2016 gross national income per capita estimates from the World Bank’s World Development Indicators Database.

have an economic burden of FBD that exceeds US\$1 billion a year, seven of which are in Asia and three each in Sub-Saharan Africa and the Middle East (figure 0.2). While these economies are generally large (for example, China, India, Indonesia, and Nigeria), some are smaller ones, including South Africa, Angola, and Iraq. All countries with an FBD burden exceeding US\$1 billion a year are lower- or upper-middle-income countries. A further 13 countries have a burden of between US\$500 million and US\$1 billion, with a diverse mix of regional representation.

To illustrate the relative economic burden of FBD in LMICs by level of economic development, figure 0.3 plots the loss of productivity as a proportion of food expenditures to income per capita. This ratio also makes it possible to compare the economic burden of FBD across countries with different population sizes. The ratio was computed using data for 2010 since data on national food expenditures were not readily available for later years for many

**FIGURE 0.3** Relative Economic Burden of Foodborne Disease, 2010



Source: World Bank calculations.

low-income countries. Although the countries in figure O.3 are quite widely scattered, it is possible to discern a broad pattern in which the relative economic burden of FBD is highest in middle-income countries, where processes of market transformation and diet transition are in full swing, and lower in countries with higher levels of income per capita. This is broadly in line with the food safety life cycle described earlier.<sup>10</sup>

Another source of evidence on the economic burden of FBD comes from a small number of cost-of-illness studies. These aim to document the actual costs incurred for medical treatment and similar outlays in the wake of disease outbreaks. Kristkova, Grace, and Kuiper (2017), in an analysis of FBD in India, estimate these costs at about US\$20 per case, implying a total cost of US\$2 billion. Other cost-of-illness estimates include diarrhea attributable to food in Nigeria (US\$10 per case) (ILRI 2011) and Ethiopia (US\$40 per case) (Grace et al. 2018), and for *shigellosis* in China (US\$28 per case) (Guh et al. 2008). Although these studies use different methods and arrive at different estimates, cost estimates converge at about US\$27 per case. Multiplying this figure by FERG's estimated 558 million cases of FBD in LMICs aggregates to a cost of illness of approximately US\$15.1 billion in 2010. Adding this figure to the human productivity loss estimate brings the public health cost of FBD for LMICs to an estimated US\$110.3 billion.

In addition to the costs attributable to adverse health impacts, unsafe food can impose significant costs on businesses (table O.1). These include the loss of sales as consumers cut out foods perceived to be risky and substitute alternatives, erosion of firm equity, and even a total loss of business at the enterprise and industry levels. Businesses can also face the risk and costs of legal action brought by regulators or private litigation by victims and their families. And the costs of food scares can evolve in unpredictable ways as facts surface and organizational and consumer responses play out.

While cases of food safety failure are relatively common in LMICs, their costs and broader ramifications are much less well understood than comparable crises in high-income countries. The best-documented cases tend to involve multinational food businesses; examples include the sales of outdated Yum Brand meat in China (2012) and alleged high levels of lead in Maggi noodles in India (2015). The Chinese melamine milk scandal of 2008 is well documented (Wang and Saghaian 2013; Xiu and Klein 2010; Pei et al. 2011), reflecting, at least in part, the entry of milk products contaminated with melamine in international trade.<sup>11</sup>

<sup>10</sup> Not shown in figure O.2 is the relative burden of FBD for high-income countries. This tends to be at 1.0 percent or below. For example, the estimated ratio is 0.96 percent for the United States, 0.88 percent for Canada, and 0.48 percent for Japan.

<sup>11</sup> Indeed, some of the better-documented cases of more generalized food safety failures in LMICs involved agri-food exports; for example, the scandal of Sudan red dye in chili powder from India that erupted in 2005 and lasted for several years, and Brazil's tainted meat scandal in 2017. Impacts of food safety failures at the sector and economy levels are less well documented, even in high-income countries. But the limited evidence that exists suggests there are often long-term structural outcomes from persistent food safety failures.

**TABLE O.1 Potential Market and Economy Costs of Food Safety Problems**

<b>Economic unit affected</b>	<b>Types of costs incurred when food safety failures occur</b>	<b>Distribution of costs</b>	<b>Market incentives or regulatory enforcement for food safety</b>	<b>Variations by development level</b>
Consumer	Consumers seek substitutes, limit consumption. May pay higher food prices or incur avoidance costs. May influence dietary patterns, with negative nutritional consequences.	Foodborne illness is a greater burden on poor people and children. Both acute and chronic illnesses will reduce labor productivity and incomes.	Consumers may not always identify source of hazard and may not, as a result, be able to avoid them. Consumers will look to certification, media reports, and the public sector for guidance.	Consumer awareness and access to good information about hazard avoidance will be limited in low-income countries. Information improves with urbanization, but this may not always be reliable. Good evidence for public health burden; mixed evidence on willingness to pay.
Firm	Lower price for products, loss of both domestic and export markets, loss of firm equity and brand reputation, firm failure. Mitigation may require new investments and recurring costs, including certification.	Small firms may evade detection, and the impact is more likely for larger firms. Per-unit costs of mitigation are likely higher for small firms.	Consumers shun firm or accept product only with lower price. Export markets may be closed. Formal sector buyers require certification. Regulators impose fines or recall products. Equity prices decline.	Unlikely to be detected at low-income levels except in a limited way in informal markets. Buyer incentives are more likely as markets urbanize. Export market failures can occur at any income level. Firm equity impacts occur only in high-income countries with larger firms.
Industry	Loss of product reputation is a cost to all firms, even good actors. Lower price or loss of market share relative to substitute products or import suppliers. Loss of export markets or diversion to lower-price markets. Limited market expansion.	Firm failure for those unable to comply leads to change in industry structure as smallholders more likely to have higher costs of compliance.	Consumers shun domestic product, make substitutions, or accept only at lower price. Export markets may require special certification or approval. Regulators may impose new requirements for entire industry with additional costs. Formal sector may impose certification requirements.	More likely as markets develop and regulators discover problems, which are then reported in the media. More likely if product is also exported, as problems in meeting high-income standards become known.

*(Continued)*

**TABLE O.1 Potential Market and Economy Costs of Food Safety Problems (Continued)**

Economic unit affected	Types of costs incurred when food safety failures occur	Distribution of costs	Market incentives or regulatory enforcement for food safety	Variations by development level
Food sector	Limited expansion of supply for products associated with failures, with resulting losses for producers.	May bias sector development toward processed or imported products. May bias food safety investments toward high-value exports, with little spillover for domestic quality.	Incentives are subtler at this level, and these effects only appear over time.	More likely to be experienced as countries pass through the middle-income stage of market development.
Economy	Limited food sector development, especially processing and high-value exports. Burden of foodborne illness reduces labor productivity and output across all sectors. Increased food imports and/or reduce exports reduce government revenues.	May limit opportunity for smallholders and women in food processing. May skew direction of structural transformation in agriculture and food, with possible negative consequences for income distribution.	Incentives subtler, and shifts toward fewer high-risk commodities in production and consumption occur over a long time. Food trade balance impacts also likely to accrue slowly over time. Burden of foodborne illness often hidden and impacts of better health on productivity are hard to measure.	Public health burden hidden but likely more significant at low-income levels. Consequences for structural transformation emerge as countries pass through the middle-income stage.

Source: World Bank.

Food safety performance and compliance costs affect the agri-food trade in LMICs, but the size of these costs is much smaller than the impacts on domestic public health and market development. Effectively competing in the international agri-food trade may entail considerable compliance costs for the public and private sectors, particularly to meet food safety requirements in high-income markets. Factors affecting the level of these costs include firm and industry size, the gap between food safety management capacity and the capacity required for compliance, and levels of collective action among exporting firms (World Bank 2005). The evidence suggests that the fixed costs of meeting stricter food safety requirements in export markets tend to favor established exporters (Jaffee and Henson 2004; Anders and Caswell 2009).

The best-measured aspect of the trade-related costs of unsafe food and noncompliance with administrative and labeling requirements are border rejections in Organisation for Economic Co-operation and Development countries.



Among LMICs, border rejections are concentrated among the more successful actors in international trade, suggesting that this is little more than a bump in the road of expanded trade. Analysis of data from the European Union, Japan, and the United States find that border rejections are dominated by the 10–15 LMIC countries that export the largest shares of food-safety-sensitive, high-value foods, such as fish, animal products, fruit and vegetables, nuts, and spices. In 2016, two-thirds of LMIC exports of high-value foods came from 10 countries, nine of which were also the top exporters in 2000. Levels of market concentration are even higher in certain product categories. For these leading LMIC countries and industries, border rejections are a modest cost of doing business—and rejection rates, relative to the value of trade, are generally falling. These countries have driven a process in which LMIC exports of high-value foods increased from US\$78 billion in 2001 to US\$228 billion in 2016, led by fish, and fruit and vegetables.

The costs of compliance with food safety regulations and standards are more challenging in smaller LMIC countries, and less-established sectors and firms in these countries. These costs can potentially be a make-or-break trade issue. Economies of scale in food safety management arise from high initial fixed investments in upgraded facilities and in establishing new procedures and systems for value chain coordination and governance. Yet, the challenges of compliance typically accompany and can magnify broader weaknesses in competitiveness. Food safety is rarely the whole or even most of the story.<sup>12</sup>

With a common pattern of declining rejection rates for the largest exporting countries, the proportion of exports directly affected is likely to be between 0.5 percent and 1 percent of the value of LMIC trade (which in 2016 totaled US\$ 475 billion for food overall, and US\$ 228 billion specifically for higher value food safety-sensitive commodities). The annual value of trade directly affected by consignment interceptions is therefore likely to be in the range of US\$ 1.5 and US\$ 2 billion. If we add to this an estimate for trade, which isn't initiated because of the deterrent effects of food safety standards and expected compliance costs, and an annualized estimate of the fixed costs of upfront investments dedicated to trade standards compliance, then the total trade-related losses and costs for LMICs would be in the order of US\$ 5 to US\$ 7 billion. This is equivalent to between one-fifteen and one-twentieth of the estimated domestic costs of unsafe food, counting productivity losses and the costs of treatment, yet not counting compliance costs for the domestic market.

The rapid expansion of food trade among LMICs is expected to change the political economy and practical concerns related to food safety and LMIC trade. High-value food imports by LMICs have been growing at double-digit rates since 2000, reaching nearly US\$150 billion in 2016. For low-income countries, about two-thirds of their high-value food exports and imports involve trade with other

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<sup>12</sup> Food safety challenges may accentuate the broader set of competitive strengths and weaknesses of industries and firms. In some cases, trade losses attributed to noncompliance with more stringent standards are more accurately attributable to more entrenched and longer-term competitiveness issues within businesses and sectors. See Diaz Rios and Jaffee (2008) on Sub-Saharan Africa and compliance with European Union aflatoxin standards.

developing countries. High-income countries remain important buyers and sellers of high-value foods, yet these shares are declining. For lower-middle-income countries, imports from and exports to other LMICs are growing faster than this. Trade among developing countries will account for most future growth in high-value food trade because of higher income elasticities and demand for dietary diversity, especially in middle-income countries. Exporting to other developing countries poses challenges that differ from those in high-income markets. For high-income markets, standards are generally stringent, yet the rules are typically clear and consistently applied, though there are of course exceptions. In contrast to these markets, cross-border or longer-distance South-South trade is often characterized by a lack of transparency in rules and procedures, the limited use of science-based evidence in applying technical barriers to trade and sanitary and phytosanitary measures, high border transaction costs, and rapidly changing consumer demands for quality and safety (APEC Business Advisory Council 2016). Exporter country compliance often seems to be as much a political as a technical issue. This brings considerable uncertainties, especially for small and medium enterprises lacking the connections or resources to maneuver through the steps needed to gain and maintain market access.

## THE STATUS OF FOOD SAFETY CAPACITY

No representative and comprehensive benchmarking program exists for food safety management capacities in LMICs. This contrasts with the situation in Organisation for Economic Co-operation and Development countries, where several detailed comparative assessments of food safety performance have been carried out. For many LMICs, detailed assessments have been completed on the status of public food control systems; for example, the World Organisation for Animal Health's framework for the performance of veterinary services. Yet the findings are generally not conducive to quantification—and thus, comparison—and many of these studies are not in the public domain. Various other studies and databases offer partial indications, while those providing greater breadth tend to reflect actions on paper (the presence of a law or agency, for example) more than institutional performance or functionality in practice. Food safety metrics and targets are generally not covered in development planning and monitoring initiatives.

A review of often non-publicly disclosed assessments points to common shortcomings in the national food safety systems of LMICs. These include:

- The absence of a comprehensive national food safety policy, translating into a lack of prioritization of investments;
- A focus on hazard rather than risk, often leading to the misallocation of resources;
- The presence of many regulations and standards, yet a lack of clarity on the extent to which they are voluntary or mandatory;

- The fragmentation of institutional responsibilities, especially for market surveillance and inspecting food production, processing, and handling facilities;
- Fragmented systems for laboratory testing that do not function as a system and fail to reveal comprehensive inferences on the causes of FBD;
- The lack of effective food safety engagement with consumers, whether in relation to education, risk communication, and other matters;
- The failure to empower and incentivize the private sector to deliver food safety; and
- The lack of consistent and transparent border measures to address growing food imports.

Data and information gathered for this report are consistent with this picture of underdeveloped food safety management systems, especially in the public sector. For example, animal source foods account for a high proportion of FBD in many LMICs, yet underlying capacities to manage food safety hazards from animal sources are generally weak. This is especially true for functions that are considered critical public goods. Among the 34 Sub-Saharan African countries for which assessment data are available, only four are deemed to have adequate capacity for identifying and tracing animals and animal products, and only a similar number can adequately inspect abattoirs. Capacities for quarantine and border security are somewhat better, yet these are deemed adequate in only 21 percent of the 34 countries. Among the 35 lower-middle-income countries worldwide assessed by the World Organisation for Animal Health, only 6 percent were found to have adequate capacities for animal product identification and traceability, and 11–17 percent were deemed to have adequate capacities for inspecting abattoirs or meat distribution facilities, had effective regulations for veterinary drugs, or were able to ensure the quality of laboratory testing of animal products. The situation is different among upper-middle-income countries, where 30–45 percent of 29 rated countries had adequate capacities in these areas.<sup>13</sup> Strong negative correlations were found among these capacities and the burden of FBD attributable to animal products.

<sup>13</sup> In this report, the ratings for the various capacities given in the World Organisation for Animal Health's performance of veterinary services assessments are brought together to develop a simple unweighted Animal Products-Related Food Safety Capacity Index. This capacity is then assessed against need. Livestock and animal products are of vital significance to the agricultural economies of some countries, yet not to others. The importance of animal products in the diet also varies widely. Some countries are prominent or at least minor exporters of livestock and animal products, while others are not. Countries which export tend to have a relatively high food safety performance, but this may not spill over to benefit domestic consumers. Demographic factors, such as level of urbanization, might be expected to influence the need for effective food safety management, given the impact on the length of animal product distribution channels or the greater possibility of disease transmission among densely populated areas. Taking these factors into consideration, a Food Safety Management Capacity Need Index was constructed. For 93 countries, these two indexes are mapped against one another to illustrate the different size of capacity gaps among countries. Most countries with especially large capacity gaps are lower-middle-income countries.

For the private sector, the situation is more varied in low- and lower-middle-income countries and, again, substantially more advanced in countries in later stages of economic development. What can be seen here are lead firms (major food manufacturers and supermarkets) requiring their suppliers to adopt good agricultural or manufacturing practices. However, in domestic markets, these do not affect most of the population because informal distribution channels and traditional community markets continue to play a predominant role, at least in Africa and Asia.

Within the private sector, more stringent primary production standards are being applied over a broader area. For example, the LMIC coverage area for certified GLOBALG.A.P. fruit and vegetable production, most of which is destined for export, increased from 700,000 hectares in 2010 to 1.87 million hectares in 2017, yet most of this expansion occurred in upper-middle-income countries. In 2017, these countries accounted for 80 percent of the total (versus 18 percent for lower-middle-income countries and 2 percent for low-income countries). Upgrades are also being made at the level of food manufacturing. In January 2018, some 118,000 food companies from outside the United States were registered with the U.S. Food and Drug Administration. Of these, 59 percent were from high-income countries. Of the over 48,000 LMIC-registered companies, 72 percent were from upper-middle-income countries, while 2 percent were from low-income ones.

The widest gaps between needed and actual food safety management capacity are found in lower-middle-income countries. Especially the larger ones are important food safety “hot spots,” where the exposure of populations to food hazards is increasing and consumer confidence in food safety is waning. In these countries, neither decentralized food safety regulatory capacity nor the governance arrangements of the formal private sector food industry are able to match the emerging challenges. Comprehensive measures to strengthen food safety management capacity are needed in these countries to curb a likely rise in the health and economic costs of FBD in the coming years.

Field research suggests that growing attention to domestic food safety has probably had little positive impact on the poor, although clear empirical evidence on this is lacking. The consumption of unsafe food by low-income populations stems from a combination of factors, including low access to potable water, the cohabitation of humans and animals, high exposure to environmental contaminants, the suboptimal use of inputs and other practices of semi-subsistence farmers, poor rural infrastructure, poor hygienic conditions in urban community markets, and the widespread presence of food safety hazards in street food. Improving access to potable water has probably been greater than advances in other domestic food safety areas. A particularly high investment deficit relates to the physical condition of traditional community markets and small shops, where most poor people shop for fresh produce. Some market-based standards initiatives may be having the unintended consequence of securing safe produce for targeted distribution channels, but leaving the more contaminated, test-failing produce for the markets of lower-income consumers.

For many countries, capacities to manage food safety risks for exports appear to be considerably stronger than capacities to protect domestic consumers. Trade-related compliance with food safety regulations and standards has undoubtedly been the catalyst for the significant upgrading of food safety management capacity in many low- and middle-income countries, especially the latter. Thus, efforts to meet some of the toughest regulations and standards in high-income countries have driven many early and sustained upgrades in laws, control systems, and systems of private value chain governance for food safety. Unfortunately, evidence of substantive spillovers between trade-related capacity development and domestic systems is limited. And as noted earlier, many LMICs are not applying risk-based approaches to managing food imports. Inconsistent or burdensome border measures do not ensure safer food, but preventive and science-based measures can.

## THE WAY FORWARD

A significant share of food safety problems and associated costs can be avoidable if a concerted set of preventive measures are put in place. While various indicators support the notion of a food safety life cycle that tracks economic development, the typical rapid upward trajectory of public health costs and trade disruptions is not inevitable. Indeed, a significant share of food safety problems and associated costs is avoidable. Food safety issues and challenges evolve not only with the level of economic development and food system transformation, but also in relation to measures that are taken to ensure that food safety management capacity keeps up with emerging hazards. It is noteworthy that some countries do considerably better than others in terms of the burden of FBD, despite having similar constraints. With a proactive strategy and a proper prioritization of problems and measures, countries can avoid losses from the burden of FBD amounting to hundreds of millions of dollars a year (and these losses can run up to several billion dollars for larger countries). In doing so, countries can minimize disruptions to markets and livelihoods that come from periodic food safety scares and prevent these episodes from dominating consumer perceptions about the underlying quality and safety of local foods (and the integrity of the food governance arrangements in place).

While the safety of food is a “public good,” governments do not and cannot have the primary responsibility for safe food. Rather, food safety needs to become a *shared responsibility*. Operationalizing this concept effectively is a significant challenge in many LMICs. Governments need to play effective vision-setting and convening roles; provide reliable information to other stakeholders; and effectively deploy a wide set of policy instruments, both carrots and sticks, to involve, incentivize, and leverage the actions of farmers, food business operators, and consumers. While practitioners once emphasized effective “official food control” systems, the most critical roles for government are now recognized to be facilitative ones that induce investments and behavior changes by actors that share with government the goal of and responsibility for safer food.

This inclusive concept of food safety management may require a paradigm shift in how emerging countries approach food safety regulation. The traditional model centers on enforcement through inspections of food facilities and product testing, and systems of legal and financial penalties for infractions. This strict authoritative model is seemingly appealing to the public, media, and therefore political decision makers, yet it is not altogether an effective model and it can be highly misplaced in contexts in which smallholder farmers, micro and small enterprises, and informal food channels predominate, and both surveillance and inspectorate capacities are limited. A shared management model implies a move from a regulator-regulated relationship toward efforts by governments to better incentivize and facilitate the safe production, processing, and distribution of food. The role of regulation then becomes one in which the absolute minimum food safety standard is applied, thereby leaving food business operators with some degree of flexibility in how they attain that standard, and for government to offer information and other resources and support to motivate and assist compliance. Thus, the results of regulation are measured in terms of compliant enterprises and food safety outcomes rather than the number of fines or business closures.

Governments in LMICs not only need to invest more in food safety but also to invest more smartly. This means investing with a clear purpose and tracking the impacts of interventions; investing in the foundational knowledge, human resources, and infrastructure for food safety systems; balancing attention to hardware and software; realizing synergies among investments and in the pursuit of goals (One Health initiatives); ensuring the sustainability of investments and outcomes; and using public investment to leverage private investment.

Not all investments that can reduce the burden of FBD are ones typically regarded as “food safety” investments. Critical investments may be ones that address environmental health issues, such as those that increase access to potable water and improve sanitation or lessen environmental contaminants in soil, water, and air. Measures like these reduce the propensity for cross contamination in food supply chains. Also important are investments in public health systems, including those that improve the quality of and access to medical treatment, which can reduce morbidity and mortality related to FBD. Indeed, many countries with high estimated DALYs for FBD are also the ones where rates of access to potable water, improved sanitation, and local health services are relatively low.

This report offers two sets of recommendations to national governments. The first is for more effective policy frameworks to govern food safety; the second is for better implementation. The first set of recommendations emphasizes the adoption of both systemic and inclusive concepts of food safety management, shifting the focus from hazards to risks, addressing risks from farm to fork, changing from a reactive to a proactive orientation on food safety, and adopting a consistent approach to prioritized decision making. To improve implementation, this report offers guidance for reforming food safety regulatory practices, investing more smartly in essential public goods, institutionalizing a structured

approach to food safety risk management, and leveraging consumer concerns over food safety.

This report makes tailored recommendations for different stakeholders, and general priorities are highlighted for countries at different stages in the food safety life cycle. The recommendations for different stakeholders are summarized in box O.2 and are discussed more fully in the report. Table O.2 highlights priorities for countries at different stages in the food safety life cycle. These emphasize core principles and reflect the study team's perspective on what is most important and feasible for countries at different levels of economic development and food system modernization. More specific priorities and action plans will need to be determined and created by stakeholders at country or regional levels.

Building food safety capacity needs to be seen as a continuous process of development, upgrading, learning, adjustment, and refinement. It needs to be linked to the broader processes and evolving goals of economic development, and to be addressed in tandem with other interventions. These include measures to improve access to quality public health services, clean water, and sanitation, and to improve agricultural productivity and sustainability. A subset of investments and institutions will need to be dedicated to food safety, although this challenge cannot be addressed through professional silos.

### **BOX O.2 Recommendations for Different Stakeholders**

For ministries of finance or other coordinating economic ministries in low- and middle-income countries (LMICs):

- Calibrate public expenditures for food safety to the economic costs of unsafe food and the benefits of investing in its prevention and management.
- Emphasize forward-looking preventive measures to minimize future costs (avoidable losses) for, among other things, public health and market development.
- Balance public expenditures and investment between “hardware” (laboratories, market places) and “software” (management systems, human capital, awareness-raising for behavioral change).
- Ensure that proposals for significant public investments or programs are justified using cost-benefit or cost-effectiveness analysis, and that alternative approaches, including regulatory measures and facilitating private investment, have been considered.
- Use public investment and programs to leverage and incentivize private investment and other activities to build food safety capacity and improve outcomes.
- Strategically focus resource allocations by linking them to coherent, system-wide strategies for food safety investment and management.

*(Continued)*



## **BOX 0.2 Recommendations for Different Stakeholders (Continued)**

For lead food safety agencies or other coordinating bodies in LMICs:

- Develop a unified food safety strategy that defines priorities and responsibilities, guides the coordination of measures by government and private entities, and establishes funding needs.
- Using a structured approach, define evidence-based priorities using risk analysis and regularly update them to make more strategic use of resources.
- Redefine institutional roles to be less about finding and penalizing noncompliance and more about facilitating compliance by providing information, advice, incentives, and interventions to motivate and leverage investments and actions by value chain actors.
- Provide consumers with the tools to become partners in food safety through their own actions and through incentivizing and motivating food suppliers.
- Incorporate the science of behavior change by redesigning training programs, information campaigns, and other interventions.

For technical ministries—agriculture, health, trade, environment—in LMICs:

- Change key performance indicators to be less about noncompliant outcomes (infringements, value of fines collected, number of businesses closed) and more about food safety outcomes (magnitude of food safety risks, incidence of food-borne disease, standards-compliant trade).
- Take measures to minimize hazard entry into the food supply from farms, especially measures that offer co-benefits for public health and environmental protection.
- Direct attention to small and informal actors in the food system, with an emphasis on awareness-raising, adopting safer food handling practices, and improving physical operating conditions (that is, access to clean water and waste management facilities).
- Develop technical standards that help to correct the asymmetry of information that divides buyers and sellers of food from farm to fork.
- Remove policy, regulatory, or other barriers to private investments and services for food safety.
- Apply risk-based approaches to govern food trade, together with improved trade facilitation capabilities.

For chambers of commerce and food industry associations in LMICs:

- Participate in national processes for food safety policy development and prioritization.
- Play active advocacy roles by ensuring that small-actor constraints are factored into policy making and advocating for the least burdensome means and realistic time frames for regulatory compliance.
- Organize collective action to build food operator awareness; facilitate the adoption of good agricultural, manufacturing, and industry code practices; and

*(Continued)*



## **BOX 0.2 Recommendations for Different Stakeholders (Continued)**

strengthen food quality and the safety management of industry leaders, small and medium enterprises, and organized primary producers.

- Support programs to improve food and pathogen traceability and transparency by establishing industry-wide norms and standards for record-keeping and sharing information along the value chain.

For research institutes and academia:

- Build capacity in the basic disciplines to address food hazards and use this capacity to conduct research on the epidemiology of foodborne disease, carry out risk assessments, and evaluate feasible alternatives for risk management.
- Develop, adapt, and pilot food safety technologies and approaches in partnership with industry and civil society organizations; evaluate the efficacy and cost-effectiveness of these technologies and approaches.
- Develop and contribute to professional training and accreditation programs for food safety professionals to create a cadre of trained personnel for industry and the public sector.

For bilateral development and trade partners:

- Strengthen incentives for preventive actions by LMIC trading partners by instituting more streamlined trade consignment inspection protocols, and act through memorandums of understanding and twinning arrangements to achieve mutual recognition of sanitary and phytosanitary management systems.
- Give increased priority to food safety interventions focused on promoting domestic public health in LMICs to make a significant contribution to achieving the Sustainable Development Goals.
- Improve the quality of bilateral food safety capacity support programs by applying more rigorous economic analysis and monitoring and evaluation, placing greater emphasis on capacity sustainability, and taking advantage of potential synergies, such as One Health initiatives.
- Promote low-cost, high-impact investments in food safety management capacity through the experimentation, demonstration, and facilitation of technology transfer and practice adoption.

For multilateral organizations and partnerships:

- Develop and apply a “food safety commitment index” as a global or regional benchmarking tool to monitor the level of commitment that LMIC governments are making to food safety, and to motivate them to take additional measures to improve underlying capacities and performance.
- Promote active experience sharing among LMICs, and document and promote good practices in food safety management upgrading policies and programs.
- Promote the application of formal processes of prioritization as part of the development of national strategies for enhancing food safety management capacity.
- Promote multidisciplinary research to better inform strategies, policies, and programs.

**TABLE 0.2 Priorities for Countries at Different Stages in the Food Safety Life Cycle**

Priority area	Traditional	Transitioning	Modernizing
Policy, strategy, and regulation	<p>Integrate food safety concerns in national food and nutritional security strategies to mobilize attention.</p> <p>Establish a basic legislative framework for food safety (roles and responsibilities, legal authority).</p> <p>Update regulations for the use and marketing of agricultural chemicals and veterinary drugs.</p>	<p>Integrate food safety concerns into national strategies for agricultural transformation and trade diversification to mobilize attention.</p> <p>Align sanitary and phytosanitary standards with the potential for trade in relevant commodities.</p> <p>Develop a national multisector food safety strategy that sets priorities, addresses institutional strengthening and coordination, and lays out approaches for private sector collaboration and consumer engagement.</p> <p>In line with available enforcement and compliance capacity, strengthen the legal framework and align it with the Codex Alimentarius.</p> <p>Participate in regional harmonization efforts.</p>	<p>Integrate food safety concerns in national strategies for managing public health costs.</p> <p>Strengthen regulatory convergence with trading partners and international standards.</p> <p>Negotiate equivalence agreements to facilitate trade with important partners.</p> <p>Conduct cost-benefit analysis on proposed regulatory measures and incorporate regulatory impact assessments into policy making.</p>
Risk assessment	<p>Undertake qualitative assessments and quantitative risk ranking, where feasible, to identify the most significant risks to public health.</p> <p>Incorporate information from other health reporting systems.</p> <p>Pay particular attention to issues associated with neglected zoonoses and staple foods.</p> <p>Undertake value chain assessments to determine the locus and nature of risks in relation to food-safety-sensitive exports.</p>	<p>Set up programs for monitoring food consumption and purchasing patterns, and for estimating total dietary exposure to hazards.</p> <p>Develop a foodborne disease (FBD) surveillance and reporting system.</p> <p>Pay particular attention to microbial hazards, and hazards related to the adulteration and use of agricultural inputs.</p>	<p>Draw up a national research plan to address food safety, with input from industry.</p> <p>Set goals of continuous reduction in FBD (as reported by surveillance system).</p> <p>Pay particular attention to emerging FBD and novel technologies.</p>

(Continued)

**TABLE O.2** Priorities for Countries at Different Stages in the Food Safety Life Cycle (Continued)

Priority area	Traditional	Transitioning	Modernizing
	Develop basic laboratory testing capacities while using regional and international labs for specialized or low-volume testing.	Establish programs to monitor food safety hazards of public health concern and supplement them with studies to generate additional surveillance data to prioritize risks.  Invest and facilitate investment in more extensive and professional quality assurance laboratory testing capacities	Apply mechanisms for the systematic collection, evaluation, and use of FBD surveillance data.  Ensure that laboratory systems are internationally accredited, effectively networked, and financially sustainable.
Risk management	Ensure that synergies between water and sanitation upgrade initiatives and community-level food hygiene programs.  Improve basic hygiene conditions in markets by investing in infrastructure, especially targeting markets where poor populations buy high-nutrient and perishable foods.  Improve access to basic health services to minimize serious complications from untreated FBD.  Support community-based and peer-to-peer mechanisms for improving food safety in smallholder agriculture and the informal food sector linked with development initiatives.  Establish border controls with a focus on likely high-risk products.	Develop a registry of food businesses in the formal sector and undertake risk profiling. Implement programs for the hygiene grading of food premises.  Professionalize food inspectors and implement risk-based inspection plans.  Introduce local good agricultural and animal husbandry practice programs targeting specific commodities in emerging formal sectors.  Leverage consumer awareness and demand for safer food.  Invest in (through public-private partnerships, if possible) improved food market infrastructure for perishable foods.  Mainstream the adoption of good agricultural and animal husbandry practices through technical and market support programs, and ensure multisector synergies (through One Health, for example).	Build attitudes and incentives to mix robust enforcement and constructive compliance support for businesses.  Incentivize the adoption of food safety management systems by small and medium enterprises (SMEs) and internationally benchmarked standards by larger enterprises.  Remediate important environmental hazards.  Strengthen fully documented national food recall and traceability systems.  Strengthen decentralized capacities for regulatory oversight and advice.  Use emerging information, biological, and other technologies in regulatory delivery and supply chain management.  Ensure that border controls for food imports are consistent and effective.

(Continued)

**TABLE O.2 Priorities for Countries at Different Stages in the Food Safety Life Cycle (Continued)**

Priority area	Traditional	Transitioning	Modernizing
	<p>Target important single-source hazards for feasible control measures.</p> <p>Undertake public-private initiatives to develop compliance with external requirements for sectors with significant export growth potential.</p>	<p>Introduce procedures for investigating and responding to food safety incidents and emergencies, and for early warning systems.</p> <p>Strengthen border controls on a risk basis, and ensure that controls follow good trade facilitation practices.</p> <p>Develop an early warning system and contingency plan for food emergencies.</p>	<p>Ensure that procedures for recalls and food emergencies are well established.</p>
Information, education, and communication	<p>Educate consumers on basic food hygiene and avoidance of specific hazards.</p> <p>Develop targeted training for SMEs, informal food retailers, and street food vendors.</p> <p>Raise awareness of synergies and trade-offs between food safety, nutrition, and equity; and food safety and Sustainable Development Goals.</p>	<p>Implement national food safety awareness programs, targeting all stakeholders and age groups.</p> <p>Work with industry and universities to develop training and advanced education programs in food safety management.</p> <p>Develop and implement various elements of a risk communications program, including guidelines for different stakeholders and use of electronic platforms.</p>	<p>Establish a mechanism to systematically monitor public perceptions to inform food safety communications and education programs.</p> <p>Develop communication strategies to correct public misperceptions.</p> <p>Use behavioral science principles and empirical testing methodologies to design programs that influence consumer and food handler behavior.</p> <p>Support private efforts to label and certify products to promote consumer trust and reduce information asymmetry.</p>

Source: World Bank.

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