



NEW DIRECTIONS

for tackling food safety risks
in the informal sector
of developing countries

Spencer Henson, Steven Jaffee and Shuo Wang

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A pork vendor sells meat at the wet market in Hung Yen Province, Vietnam - ILRI/Nguyen Ngoc Huyen ▲

NEW DIRECTIONS for tackling food safety risks in the informal sector of developing countries

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A milk vendor decants a delivery of fresh milk from a farm in her village in Mosombor, Kapsaret, outside of Eldoret, Kenya - ILRI/Kabir Dhanji ▲

4. New directions for tackling food safety risks

CONTENTS

FOREWORD	7
ACKNOWLEDGEMENTS	8
EXECUTIVE SUMMARY	9
1. Introduction	15
2. Is there a case for not taking concerted action to improve food safety in the informal sector?	18
2.1. The consolidation and formalization hypothesis	19
2.2. The ‘food control’ hypothesis	22
2.3. The trade compliance spill-over hypothesis	24
2.4. Can bottom-up solutions fill the void?	25
3. Unsafe food is a serious and widespread issue in the informal sector	27
3.1. Limited awareness of food safety by food operators	28
3.2. Hazardous operating conditions of informal food enterprises	28
3.3. Problematic food safety practices	29
3.4. Consumer behaviour	30
3.5. The safety of food in informal markets	31
3.6. The informal sector and the incidence of foodborne disease	32
4. Recasting the problem, players and settings	35
4.1. Reframing the fundamental constraints	36
4.1.1. <i>Incentives</i>	36
4.1.2. <i>Capacity</i>	38
4.1.3. <i>Interplay between incentives and capacity</i>	38
4.2. Reframing the players	40
4.3. Reframing the setting	44
5. Status of domestic ‘food control’ systems	49
5.1. Central or national level capacities	50
5.2. Food safety action at the sub-national level: a regional illustration	55
6. Broad strategies for addressing food safety in the informal sector	59
6.1. Exclusion—washing away the problem through punitive actions	60
6.2. Incremental formalization	61
7. Tackling capacity and incentive-related deficits	64
7.1. Enhancing the internal capacity of informal sector enterprises	65
7.2. Enhancing informal enterprise capacity through collective action	69
7.3. Enhancing external infrastructure	70
7.4. Enhancing external market-based incentives	74
8. Ways forward	78
REFERENCES	85



Food for sale at Makara Market in Phnom Penh, Cambodia - ILRI/Hardisman Dasman ▲

600

MILLION PEOPLE
WORLDWIDE
suffer from
foodborne disease

480,000

DEATHS
each year result from
foodborne diseases

**USD
115 BILLION**

Cost of food hazards
and foodborne diseases
in low- and middle-income
countries each year

Chickens for sale in Maputo's Xipamanine traditional market - ILRI/Stevie Mann ▼



FOREWORD

Nutritious, safe food is paramount to people and to social development. But every day, billions of people eat without knowing if their food is safe and every year hundreds of millions of people fall sick, and hundreds of thousands of people die from unsafe food.

It is estimated that around 600 million people worldwide suffer from foodborne disease, resulting in 480,000 deaths each year, with most cases occurring in low- and middle-income countries. Food hazards and foodborne diseases cost these countries a combined total of USD 115 billion each year.

The International Livestock Research Institute (ILRI) – a CGIAR centre – has been at the forefront of studying the complex landscape of unsafe food practices in low- and middle-income countries; and with governments and other partners, developing solutions to ensure healthy, safe and nutritious food for all.

Most of the meat, milk, eggs and fish produced in developing countries is sold in traditional, domestic markets lacking modern infrastructure and escaping effective food safety regulation and inspection. But these informal markets also provide livelihoods for hundreds of millions of people generating jobs and income.

In recent decades, ILRI and partners have had substantial success in developing new approaches to improve food safety in these informal markets. These approaches involve working with national and local authorities to create an enabling environment, providing training and appropriate technologies to value chain actors, and most importantly, assuring incentives are in place for better practice by food producers, handlers and consumers. The challenge now is to invest in further experimentation of intervention models and sharing of experiences on what works and what does not in the different settings of low- and middle-income countries. This work is being tackled by the new CGIAR Initiative on One Health and the current portfolio of food safety research at ILRI.

This report, commissioned by ILRI and the CGIAR Initiative on One Health, builds on the work done in the CGIAR Research Program on Agriculture for Nutrition and Health and other bilateral programs of food safety at ILRI to understand food safety issues in domestic, largely informal and traditional, markets. The report proposes a radical reframing of how we look at food safety in low- and middle-income countries as well as who needs to be involved. It also recommends a change in direction and the recognition of the informal sector if we are to tackle the enormous food safety health and economic burden in developing countries.

We are very pleased to share this groundbreaking report with the wider food safety research community. ◆

Appolinaire Djikeng, director general, ILRI



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The views, opinions and conclusions expressed in this paper are those of the authors and do not necessarily reflect the views of ILRI or any of the individuals or institutions that were consulted during its preparation. ◆

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EXECUTIVE SUMMARY

For many low- and middle-income countries, the topic of food safety first emerged on their development agendas as a trade and market access issue. Considerable resources have been deployed to align country regulations with international standards and build management systems to comply with trade partner requirements, especially those of high-income countries. The track record on these interventions is relatively good and many low- and middle-income countries have achieved a margin of success in exporting higher value, food safety-sensitive products, including fish, meat, and fruit and vegetables.

In recent decades, incrementally greater attention has been given to concerns about food safety in the domestic markets of low- and middle-income countries, including the potential repercussions for public health, consumer trust and food market development, and the wider connections between food safety and the achievement of many of the Sustainable Development Goals (SDGs). Most of the emphasis of recent food safety interventions has focused on central government regulatory and surveillance capacity; that is, developing a functional 'food control' system built around a modern food law, inspection and enforcement of regulatory requirements, accredited laboratories for product testing, and the application of both national and international standards.

Progress in building up the capacities and outreach of such domestic 'food control' systems has varied greatly. While most upper middle-income countries appear to be on a trajectory towards effectively managing emerging food safety risks, this is much less evident among low and lower middle-income countries. Assessments of food control systems in low and lower middle-income countries generally point to many common weaknesses, including the absence of a comprehensive national policy related to food safety, the fragmentation of institutional responsibilities among leading agencies, and major deficiencies in systems for generating and interpreting data related to food safety hazards and food borne disease (FBD).

With limited budgets and suitably qualified and experienced personnel, food control agencies have typically had to be very selective in many of their regulatory or advisory efforts, concentrating, for example, on medium or larger food manufacturers, elements of the so-called 'modern retail', and rural areas dominated by commercial farms or better organized smallholder farms. Most of the development assistance support and most initiatives sponsored by the private sector in the domestic food safety space have focused on these players and on upgrading central government regulatory capacities.



◀ **Selling pork in a traditional Vietnamese market - ILRI/HUPH/ Ngan Tran**

While this growing attention to domestic food safety is a welcome development, most existing initiatives have a significant policy blind spot and/or implementation gap. They lack adequate attention to, and a coherent strategy for, effectively tackling food safety challenges in the informal sector. This paper demonstrates that:

- **THIS IS A FUNDAMENTAL (AND NOT A MINOR) ISSUE.** While low- and middle-income countries have a hybrid food system structure, combining different types of actors and channels, most of these food systems feature very low levels of concentration, widespread informality, and a preponderance of micro and small players. Fragmentation and informality are especially common in relation to the domestic market distribution systems for nutrient-rich fresh foods (including fish, meat, and fruits and vegetables) which are estimated to be the leading sources of FBD in most countries. For many, if not most, low- and lower middle-income countries, unsafe food in informal channels probably accounts for a large majority of the FBD attributed to marketed foods.

For many, if not most, low- and lower middle-income countries, unsafe food in informal channels probably accounts for a large majority of the FBD attributed to marketed foods

- **THIS IS A LONG-TERM (AND NOT A TRANSITIONAL) ISSUE.** Over time, as food systems evolve, we will see increased levels of formalization and consolidation and likely reduced numbers of very small-scale food business operators. Yet, a future state in which the formal components of the food system are dominant is at least

a decade or two away for many low- and middle-income countries. Across many countries in sub-Saharan Africa and emerging Asia, small traditional shops still account for 70–90% of grocery retail sales, while community markets and other informal channels account for similar proportions of fresh produce retail sales. The so-called ‘supermarket revolution’ has not materialized or has stalled in many countries.

- **THIS INVOLVES A BROAD SET OF (WIDELY OBSERVED) PROBLEMS AND CONSTRAINTS.** Large numbers of empirical studies highlight common weaknesses in the food safety knowledge of informal sector operators, the relatively poor environmental conditions under which many of them operate, the limited or non-sustained application of good hygienic and safe food preparation practices, and the resulting high incidence of microbiological, chemical and/or contaminants in the foods they sell. In most cases, these informal food business operators lack both the capacity and the incentive to make pertinent investments or changes to their practices. Further, some of the pertinent risks are largely outside of their own control, related to environmental health conditions and/or developments in primary agricultural production.
- **MOST CURRENT APPROACHES ARE MAKING LITTLE HEADWAY IN TACKLING THESE PROBLEMS.** Governments in low- and middle-income countries can be characterized as ‘weak regulatory states’ in general. Furthermore, centralized ‘food control’ agencies tend to have little contact with the informal sector. In the absence of effective and regularized outreach, the typical approach has involved periodic harassment of informal sector vendors and applying punishments against food processors who do not comply with regulations. This approach sends a signal to the general public that the government is ‘doing something’ to protect them. Yet, in practical terms, this rarely results in safer food. More promising have been interventions to raise awareness of informal food operators about safer practices and to equip them with low-cost technologies. However, most such programs have proven difficult to scale and near-term gains have not been sustained without re-enforcing measures and complementary investments. Very few low- and middle-income countries are applying a more holistic approach. Overall, practitioners in this field are at a cross-roads. There is growing recognition of the problem, yet a lack of understanding or consensus on ‘what works’, even ‘what might work better’.

This paper provides a synthesis of the empirical evidence regarding food safety in the informal sector and regarding ongoing initiatives to address (at least aspects of) the problem. However, its main contributions may be more in terms of the perspectives it provides, both conceptually and in outlining a revised approach for moving forward.



A milk vendor pours fresh milk through a sieve for a customer at her shop just outside of Eldoret Town, Kenya - ILRI/Kabir Dhanji ▲

There is an evident **need to reframe the problem statement** when it comes to food safety in low- and middle-income countries. Why is unsafe food such a pervasive problem in the informal sector? Why do informal food operators not employ better food safety practices? There are two standard responses to these questions. One is that the players lack the requisite awareness about food safety hazards and the basic knowledge about approaches and practices to prevent these hazards from entering their businesses and the overall food supply. We can call this *the awareness and knowledge deficit*. The other explanation relates to alleged gaps in regulatory and other official oversight systems, on paper and/or on the ground. This we call the *regulatory or food control deficit*. Both factors are relevant, yet a broader perspective seems warranted.

The paper contends that the status of food safety measures among informal food business operators can be seen to reflect the interplay of two core sets of factors. First, the *incentives* for enterprises, and food handlers therein, to implement and maintain improved food safety practices. These incentives alter the balance between the costs and benefits for the enterprise of implementing or not implementing these practices. Incentives may be shaped by markets, regulations, social pressures, ethical norms etc. Second, the *capacity* of food enterprises, and food handlers therein, to implement improved food safety practices. Here, factors both internal (for example,

the condition of the enterprise's physical establishment and level of human capital) and external (for example, the physical environment in which the enterprise operates, access to potable water and availability of training resources) to the enterprise are relevant. The paper's conceptual framework emphasizes the need to address both the incentive and capacity deficits in tandem in order to get tangible and sustainable improvements. In many cases, one may need to look well beyond dedicated 'food safety interventions' to firm up incentives and capacities.

RECASTING THE PLAYERS: Part of the problem in addressing the issue of unsafe food in low- and middle-income countries stems from a failure to recognize the specificity of enterprises engaged in the informal sector. Seeing the informal sector as a homogenous cluster of players leaves little room for differentiated policies or strategies that recognize the different circumstances surrounding distinct types of operators. Certainly, many enterprises share core economic characteristics, including ongoing commercial vulnerability, and operate with the harsh realities of not being registered. At the same time, however, distinctive types of enterprises face quite different situations when it comes to the incentives to enhance their food safety controls and/or their capacity to do so; in turn, they will likely be more (or less) amenable to influences from regulatory agencies, food consumers and/or formal sector enterprises.

The paper makes distinctions between three types of informal food enterprises: (i) traditional retail vendors (including community market vendors and small store/kiosk operators); (ii) traditional food processors (including small animal slaughter units and micro food processors); and (iii) informal food service operators (including street vendors of prepared foods and alleyway restaurants). Contrasts are made among these in terms of their typical numbers, registration status, rate of enterprise turnover, mobility, operating environment, foods handled, clientele and engagement with regulatory authorities. Based on these considerations, we find potentially considerable differences in both the food safety risk profiles of these players and the likely scope for interventions. This kind of exercise is useful for thinking about priorities and the feasibility of different solutions.

RECASTING THE SETTING: The setting for possible interventions is not some homogeneous rendition of a 'developing country'. There are vast differences among countries in terms of their size, per capita income, administrative capacities, conditions of physical infrastructure, food consumption patterns etc., as well as the current prominence of the informal sector. The paper re-introduces the concept of a 'food safety life cycle' and contrasts the main dynamics in food safety management and the relationship (or gap between) food safety management needs and actual capacities among

low, lower-middle and upper-middle income countries. We surmise that the gravity of the informal food sector food safety problem differs significantly across the food safety life cycle, as does the likely feasibility of various strategies, policy instruments and programs.

For example, upper middle-income countries will tend to have much greater financial and administrative resources and much better physical market conditions to address food safety concerns among informal enterprises. Furthermore, the scope of the problem might be much smaller there because of the more advanced formalization of the food system and, likely, the greater opportunities for people to exit/transition away from informal food vending or processing and enter the wider labour market. The incremental or even accelerated formalization of food enterprises could well be feasible in these settings with transitional costs (and social tensions) being relatively manageable.

The situation is entirely different for countries transitioning from low to lower-middle income status and among the countries traversing the lower middle-income phase of economic development.

Here, changing demographics and diets and other factors are potentially adding to the food safety risk problems they face. While informal sectors remain dominant, formalization is only incipient and central government, let

▼ **Pre-bought fresh milk in a fridge in a milk shop in Roadblock, Eldoret, Kenya - ILRI/Kabir Dhanji**



alone sub-national, capacities for food safety management remain highly underdeveloped. This would seem to be the hotspot where the nexus of problems and constraints trumps prevailing capacity as well as prevailing ideas on what to do. For these countries, a passive approach or simply pursuing 'business as usual' comes at a great cost.

RECASTING THE IMPLEMENTATION AGENDA: The current model, if one can refer to it as such, is not working and cannot be expected to work. A very different approach is called for here.

Centrally guided local action: The top-down focus of efforts to build food safety capacity in low- and middle-income countries has largely failed when it comes to the informal sector. The most appropriate locus of action for efforts to enhance food safety controls in the informal sector of low- and middle-income countries is at the municipal level, where most of the potential interfaces between government and informal food operators (of all kinds) occur. While recognizing that national legislation may be needed to empower municipalities to implement food safety controls within their jurisdiction and to unlock the needed resources, the predominant focus of efforts to build food safety capacity specifically needs to be at the local level. That being said, technical guidelines and backstopping from central government agencies will likely be necessary for many cities to move on this agenda more effectively.

Multisectoral action: Many significant actions needed to improve the safety of food in informal markets lie outside the typical purview of food safety controls and related capacity-building efforts per se. These include access to potable water and sanitation, business registration, urban planning and the infrastructure of public markets. For this reason, efforts to enhance food safety controls in the informal sector of low- and middle-income countries need to be integrated with complimentary areas of action by municipalities, including those targeting food insecurity. In many cases, the most effective and sustainable interventions will not be dedicated to 'food safety' but rather multisectoral strategies pursuing multiple goals; for example, the interfaces between food safety and nutritional security, environmental health, the water, sanitation and hygiene (WASH) agenda and urban upgrading. At the municipal level, this calls for firmly mainstreaming food safety into urban planning and into approaches to deliver improved municipal services.

Strategy mainstreaming: India is one of the few low- and middle-income countries which have incorporated informal food enterprises into their national vision for a healthy and safe food system. For countries not expecting to follow this example, it is difficult to see how the informal sector will be effectively incorporated into national food safety strategies. An alternative, and perhaps more

realistic approach, is to focus on strengthening the food safety dimensions within the emerging visions being articulated for 'healthy and sustainable cities' to ensure that food safety is mainstreamed within approaches and structures for urban food governance. This may be a way to maximize synergies across multiple public policy objectives and their implementing institutions through urban food policies, programs and investments.

Differentiated solutions: Ubiquitous solutions to the food safety problems of informal food markets are unlikely to be effective. Rather, there is a need to recognize the distinct challenges and opportunities that distinct sub-sectors of the informal sector present, design food safety interventions accordingly, as well as recognize the prevailing challenges and weaknesses of particular low- and middle-income countries. It is necessary to address incentives and capacity deficits in tandem (this often requires more complex or synergistic interventions) and to calibrate actions with what is likely to be feasible given prevailing financial and administrative resources and other factors. The paper presents different sets of interventions likely to be appropriate and feasible vis-à-vis the three sub-categories of informal food business operators in different socio-economic settings, distinguishing interventions seeking to strengthen incentives for improved practices and those aiming to improve internal or external capacities.

Emphasizing collective action: Concentrating interventions on individuals is neither likely to be feasible at any reasonable scale nor especially effective in bringing about sustainable changes. Whether the issue is inducing behavioural changes amongst informal market players, attempting to enforce regulatory provisions and/or implementing a process of incremental formalization, it may be essential to mobilize and utilize collective action among groups, associations or clusters of (informal) food market actors. While researchers and practitioners have drawn attention to the merits of collective action in circumstances of potential conflict between informal players and governments, it is essential to better engage formal or informal groups of actors in the design and implementation of multi-sectoral programs as a means of applying social pressures on players, and to compensate for both market failures and the limited reach of governments. Practitioners will need to develop strategies for effectively operationalizing, in the context of informal food markets/distribution channels, the World Health Organization's notable principle that food safety is a 'shared responsibility' (among consumers, businesses and governments).

Rebalancing carrots and sticks: Strict enforcement of regulatory provisions is unlikely to be effective vis-à-vis informal sector food operators. Rather, gradual and continuous enhancements in food hygiene and other

Practitioners will need to develop strategies for effectively operationalizing, in the context of informal food markets/distribution channels, the World Health Organization's notable principle that food safety is a 'shared responsibility' (among consumers, businesses and governments)

practices are more likely to help secure the ongoing viability of informal operators. Municipalities must see financial penalties as a last resort, rather than a source of much-needed revenue. While shutting down businesses and harassing street vendors might convey a message of 'seriousness' about food safety to the public, these measures tend not to result in sustained safer food in the marketplace. What may be needed instead is a wholesale change in the official mindset vis-à-vis the informal sector and in the mix or balance of regulatory versus facilitative municipal functions. Food officer bonuses could be tied to the numbers of food safety-compliant vendors or food processing enterprises, rather than to the number of fines issued. And, as many officials need to be positioned as food safety advisory officers as those designated as inspectors or regulatory agents. Food safety must become an area of attention not only for the few individuals who happen to have the occupational designation of 'food safety officer', but also for planners and officers working on matters related to logistics, land use zoning, commerce, water and sanitation, and overall public health.

The applied research and operational agenda: With respect to the research agenda moving forward, attention needs to focus on piloting and evaluating integrated interventions directed at specific sub-sectors of the informal sector. Experimentation of individual parts of the jigsaw puzzle, for example training, raising consumer awareness and/or assessment of willingness to pay or receptivity to certification schemes, do little to test the practicability and/or impact of such interventions. This requires that researchers engage with municipal governments and that real on-the-ground interventions across multiple facets of the food (safety) problem are implemented and evaluated. In undertaking such investigations, attention must be given to the ways in which both the incentives and capacity of informal food enterprises are enhanced and likely to be maintained beyond the timeframe of the intervention itself.

Where the approach we propose above is already being tested (for example, as with elements of the 'Eat Right India' program), it is important to closely monitor how these developments are playing out. Such innovations present critical 'testing grounds' of the decentralized, multisectoral and/or facilitative actions that are needed in low- and middle-income countries. Thus, it is important to identify the challenges these approaches face in their implementation and/or in achieving sustained changes in behaviour across distinct contexts. While care needs to be taken in generalizing these experiences, lessons need to be drawn for low- and middle-income countries more generally.

To more broadly operationalize the agenda outlined above, it would be beneficial to develop guidelines for how national governments/agencies can best facilitate effective municipal actions with respect to food safety, especially in the context of the informal sector in its various forms, as well as the legal and resourcing frameworks needed to facilitate and operationalize more effective municipal food safety controls. Important here is how municipalities can integrate efforts to promote enhanced food safety with other public health and environmental health interventions and/or policies and program relating to urban planning. Here, it could be beneficial to work through national and international networks of cities, especially those which are already endeavouring to mainstream food system matters into their urban planning, governance and development strategies. It will be important to strengthen the involvement of food safety practitioners and those with experience working with informal food system operators in such networks. ◆



1. Introduction

During the past decade, there has been increasing recognition of the importance of food safety in low- and middle-income countries. Among other things, this has been spurred by improved estimates of the global public health burden of foodborne disease (FBD) (Havelaar et al. 2015), better understanding of the economic costs of unsafe food in rapidly changing food systems (Kristkova et al. 2017; Jaffee et al. 2019), and the devastating public health and/or commercial consequences of major instances of food contamination or fraud (see for example, Pei et al. 2011; Tarantelli 2017; Freitas et al. 2017). This recognition has led to more attention on how the promotion of safer food could contribute to the realization of the Sustainable Development Goals (SDGs), including those pertaining to poverty reduction, alleviation of hunger, ensuring good health, promoting decent work, and building sustainable communities and cities (Grace, 2017).

For many years, food safety has been on the development agenda primarily as a trade and market access issue.

Considerable resources have been deployed to align country regulations with international standards and build management systems to comply with trade partner requirements, especially those of high-income importing countries. For most developing countries, far less attention has been given to mitigating food safety risks in domestic markets—and this is illustrated by the underdevelopment of many technical capacities and services. While efforts to tackle emerging domestic market challenges have increased in recent years, many countries are finding that their incremental development of food safety controls is lagging the growing need for effective food safety measures which is accompanying important dietary and demographic changes (Jaffee et al. 2019; Randolph 2021; Unnevehr 2022).

Low- and middle-income countries have a hybrid food system structure combining actors or sub-systems which have been named or characterized as ‘modern’, ‘traditional’ and ‘informal’, with the latter two often clustered together as constituting the ‘informal sector’.

The situation varies somewhat from country to country, although most low- and lower middle-income countries tend to feature low levels of concentration, widespread informality and a preponderance of very small players in their food systems. Fragmentation and informality are especially common in relation to the domestic distribution systems for high-nutrient fresh foods (including fish, meat, fruits and vegetables), which are leading sources of foodborne disease (FBD) in most countries. The logic follows, and it will be estimated below, that a large proportion of the burden of unsafe food in the developing world is connected to deficiencies in capacities and incentives for managing food safety risks within the informal sector.

Most of the emphasis of recent food safety interventions has focused on central government regulatory and surveillance capacity

If this contextualization is true, then we have a serious conundrum. Most of the emphasis of recent food safety interventions has focused on central government regulatory and surveillance capacity; that is, developing a functional 'food control' system built around inspectorate teams, laboratories, and the application of both national and international standards. In the domestic setting, the primary targets of such efforts have been medium and larger food manufacturers, elements of so-called 'modern retail', and areas dominated by commercial farming. Yet, what about the vast numbers of small and micro enterprises and individual vendors who are preparing and distributing a major proportion of the food bought and consumed by urban residents? Are we expecting the emergent food safety controls to trickle down to impact or incentivize changes among informal sector players? Alternatively, are we simply expecting the informal sector to downsize and eventually disappear as countries advance through and eventually graduate from low- or middle-income status?

Both propositions are of doubtful validity. It is questionable that a regulatory solution can be at the forefront of efforts to tackle food safety risks in the informal sector. Central government agencies lack the tools and outreach to address the problem; most of the on-the-ground interfaces between informal sector players and government agencies occur at the local or municipal level. And, for most low- and middle-income countries, the informal sector will not disappear anytime soon. This sector is a manifestation of many converging factors in these countries related to living standards, job opportunities, urban geography, regulatory systems, agrarian structures etc. And, for many urban consumers, there remains a strong preference for sourcing their food from informal sector players, based upon considerations of affordability, accessibility, variety, flexibility and personal trust.

Development and food safety practitioners have contended that the issue of food safety in the informal sector of developing countries has been largely neglected (Roesel and Grace 2014; GFSP 2019). In terms of both directed policy attention and resource mobilization, this is probably true. Still, during the past decade there have been an array of bottom-up interventions targeting informal sector players, typically aiming to increase their food safety awareness and knowledge. While including some innovative design features, overall, the results from these efforts have been modest and generally neither scalable nor sustained (Grace et al. 2019). They also do not seem to have had a lot of influence on broader public policies or public spending in relation to food safety (Randolph 2021).

The policy and practitioner communities are at a crossroads in relation to food safety management in the informal sector, yet even the alternative directions are not especially clear. There is an evident need to reframe the problem set and the menu of potential solutions. That is the aim of this paper. *The paper argues that the broad lexicon of 'informal sector' and 'developing countries' is not helpful in tackling the problem as it combines quite different types of players (and risk profiles), operating in a variety of very different settings. Distinctions are needed better to discern what is and is not possible to do, and what actions should be prioritized and are most feasible in different contexts.* The paper goes on to argue that the most significant impacts on food safety in the informal sector can be achieved through actions not at the national level but more at the level of local/municipal governments. It is at this level of government that institutions for collective action among food operators can be most effectively mobilized and leveraged, improvements can be made in prevailing incentives and capacities to manage food safety along value chains, and synergies can be realized with other critical development objectives, including

those related to nutrition and improved access to water and sanitation.

The paper is structured as follows. Section 2 explains why the challenge of unsafe food in the informal sector is not going away despite structural changes within food systems and interventions which have been addressing unsafe food in other segments of such food systems. Then Section 3 summarizes the current evidence on the nature and scale of the food safety problem within informal food distribution channels of developing countries and poses an estimate of the magnitude of the FBD burden associated with this. We then attempt to reframe the food safety challenge conceptually in Section 4 by defining the problem as a dual deficit of capacities and incentives, by

drawing distinctions among different types of informal food sector players and by re-iterating that the 'developing country' playing field for potential interventions is highly diverse (rather than homogeneous). Section 5 then provides a summary of the limited food control capacities of some national governments and provides insights into the state of municipal-level food safety engagement in one major region—Asia. Section 6 contrasts two broad strategies for addressing informal food actors, namely exclusion and incremental formalization. Then, Section 7 examines a range of approaches which have been applied to tackle the food safety capacity and incentive deficits found in informal distribution channels and what is known about their efficacy. The final section draws conclusions and lays out an agenda for action. ◆

▼ **At the market in the town of Zebilla, in Bawku West District of the Upper East Region, northern Ghana**
ILRI/Georgina Smith





2. Is there a case for not taking concerted action to improve food safety in the informal sector?

One way of approaching the informal sector food safety conundrum is to see it as essentially a transitional issue, not warranting dedicated policy attention or targeted programs. This would stem from a perception that the problems could be minimized or resolved because of the formalization and consolidation of developing country agri-food systems, the increased outreach and effectiveness of national food control systems, and/or the capacity and ‘good practice’ spill-overs gained from interventions focused on export competitiveness and compliance with trade partner requirements. In other words, the informal sector will inevitably shrink in size and importance and the higher-level capacities being built at national or industry levels will readily manage the residual food safety problems which might endure. Below we consider the grounds for this optimistic (or passive) case.

2.1. The consolidation and formalization hypothesis

Economic development brings about changes to food systems, including to their patterns of organization. There has been speculation (and even expectation) that changes in the structure and organization of domestic markets in low- and middle-income countries will quickly and substantially shrink the size and importance of the informal sector and at the same time give rise to enhanced food safety management capacities. The implication here is that food safety systems will naturally evolve over time within the private sector; it is just a matter of patiently waiting for these to emerge.

Part of this expectation came from the growing importance of supermarkets in countries which had already seen mass urbanization (such as Latin America) and/or that had reached upper middle-income status. This so-called ‘supermarket revolution’ (Reardon et al. 2003; Reardon and Hopkins 2006; Humphrey 2007) implied the inevitable consolidation of retail markets and the formalization of value chains via the procurement systems and standards applied by the dominant retail businesses (Reardon et al. 2008). This process was expected to occur in waves, spreading from region to region and involving a sequenced progression of product lines (Reardon and Minten 2019). Growing supermarket dominance was projected first for processed foods, then staple commodities which could be bought in bulk and ultimately for fresh produce. The supermarkets’ cost

advantages and greater capability to manage quality and food safety problems in their supply chains, paired with the better shopping experience they offered to consumers, were expected to marginalize traditional retailers (Reardon et al. 2007).

The ‘supermarket revolution’ was expected to bring more than the formalization and consolidation of food retail. In parallel, some countries were seeing increased foreign direct investment (FDI) by multinational businesses in their food manufacturing and food service sectors (Reardon 2015; Barrett et al. 2022). The expectation was that such companies would apply the food safety management systems they had already perfected in their home countries. Thus, deep and accelerated patterns of structural change in domestic food markets could accelerate the enhancement of food safety controls in middle-income countries. In turn, this transformation would reduce the number of food business operators that would need to be inspected by regulatory authorities, diminish capacity gaps between businesses within the food sector, and promote the wider use of company brands and private standards to signal and govern food safety.

The penetration of supermarkets and the globalization of food manufacturing and food service has not, however, progressed with the rapidity that was widely predicted, for example in Africa and significant parts of emerging Asia

The penetration of supermarkets and the globalization of food manufacturing and food service has not, however, progressed with the rapidity that was widely predicted, for example in Africa and significant parts of emerging Asia (see, for example, Nickanor et al. 2021). Even where supermarkets have gained more traction, their sales tend to be dominated by processed foods. As will be illustrated below, market fragmentation and informality remain the norm in relation to fresh foods that are important nutritionally for many countries and often the leading sources of FBD in low- and middle-income countries.

In many low- and middle-income countries, the informal sector continues to predominate in the handling, processing, and marketing of many foods

The emergence of supermarkets in many regions is not tending to marginalize traditional food distribution and service channels (Yuan et al. 2021). Rather, there are numerous examples where supermarkets and traditional food retailers co-exist and co-evolve in a complementary manner. Also, it is not entirely clear how much the food safety practices in the 'modern' sector are spilling over to the informal sector. Even where supermarkets have gotten a foothold in markets for fresh produce, their procurement systems have not necessarily deviated much from the systems employed by traditional market vendors. Thus, a major part of their supply continues to come from primary or secondary wholesalers rather than being directly sourced from farmers. For example, see Yuan et al. (2021) for China.

Figure 1 provides an illustration of the hybrid food system which continues to prevail in most low- and middle-income countries. The relative size of the 'modern', 'traditional'

and 'informal' sub-systems varies from country to country, although the 'modern' segment still represents a minority share of the domestic food systems in most, if not all, low- and lower-middle income countries. The 'modern' segment's share is larger for most upper middle-income countries, although not necessarily for high-nutrient, food safety-sensitive fresh foods.

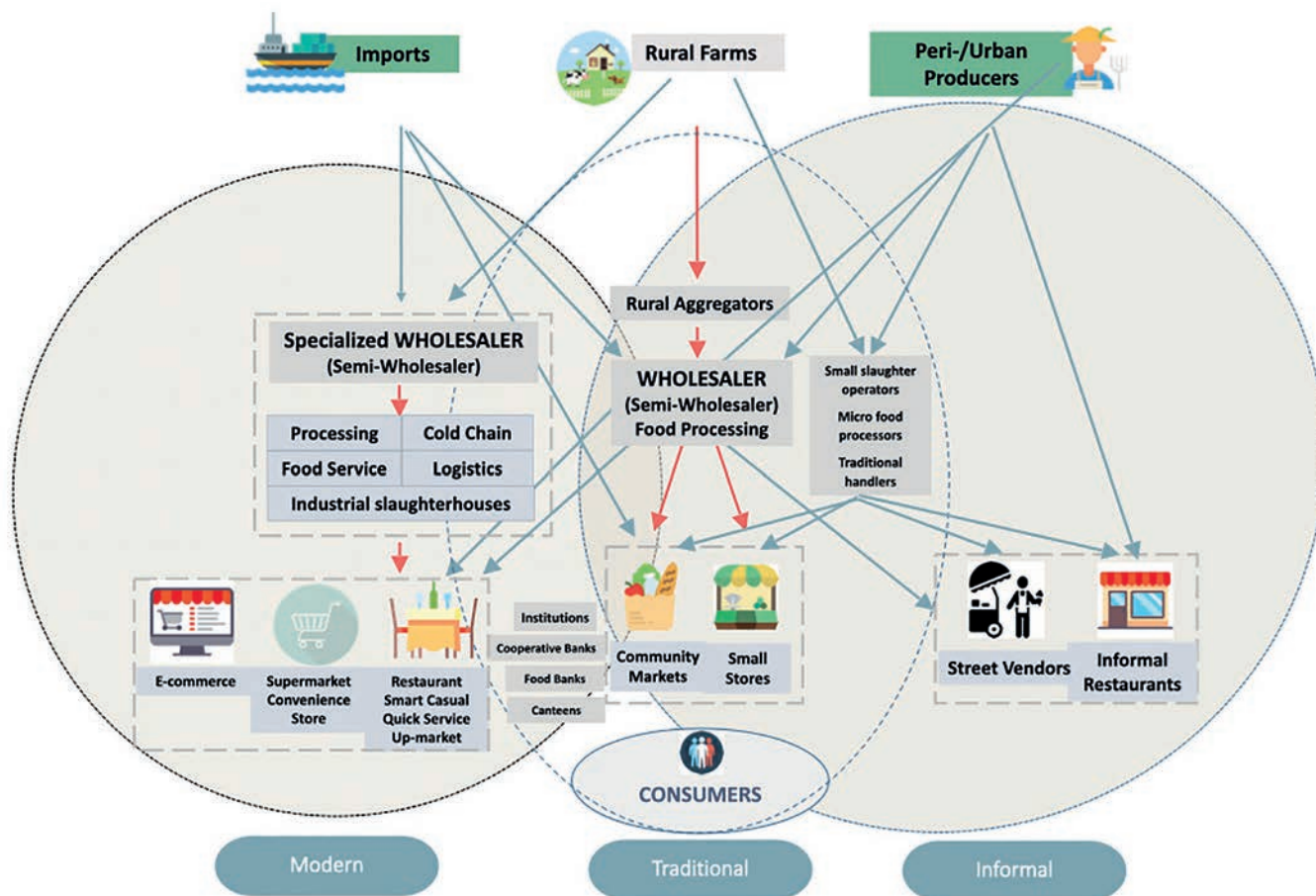
In many low- and middle-income countries, the informal sector continues to predominate in the handling, processing, and marketing of many foods. In sub-Saharan Africa, for example, 85–95% of the market demand for food was serviced by informal markets at the beginning of last decade (Tschirley et al. 2010), with this proportion expected only to decline to 50–70% by 2040. Surveys across southern African conducted by the African Food Security Urban Network found that some 70% of lower-income households normally source foods from informal outlets (Crush and Frayne 2011; Battersby and Watson 2018). Hannah et al. (2022) found that, in the secondary cities of Kenya and Zambia, open-air markets continue to be the dominant source of consumer fruit and vegetable purchases, with most meat purchases either occurring in these markets (Zambia) or in small traditional shops (Kenya). Wanyama et al. (2019) found supermarkets to be of no importance in servicing the poor in Nairobi and Kampala. In many African cities, street foods also account for a very significant proportion of daily food intake, both among adults and children (Steyn et al. 2013).¹

The persistence of traditional markets is also found throughout emerging Asia. In Indonesia, a large survey of households in secondary cities found that, despite a relatively rapid expansion of supermarkets, traditional small grocers and community markets continue to account for most food expenditure and an especially large proportion of vegetables, meat and fish purchases. At the same time, semi-permanent stands remain relatively important sources of fruit and vegetables meals consumed outside of the home (Minot 2014; Minot et al. 2015). In 2020, supermarkets and hypermarkets accounted for only 7% of retail grocery sales in Indonesia, with traditional grocers accounting for 78% and convenience stores 15%.² While the share of supermarkets in food expenditures has been growing in Vietnam's largest cities, this remains relatively small and is primarily accounted for by purchases of processed foods. Nationwide, traditional outlets still accounted for 92% of grocery retail sales in 2019 (based on data from Euromonitor International), while only in Vietnam's richest city do modern retail outlets account for more than 15%

1) Among low- and middle-income countries globally, it has been estimated that some 2.5 billion people eat street food daily (Fellows and Hilmi 2011).

2) Based on data from Euromonitor International and reported in USDA (2022).

Figure 1: Hybrid food system in low- and middle-income countries.



Source: Adapted and modified from Tefft et al. (2017)

of grocery sales. The predominance of traditional outlets is even greater for fresh perishable foods. In Hanoi, for example, more than 90% of consumer spending on fruits, vegetables, meats and eggs still occurs in traditional outlets, with community markets being, by far, the most important locale. Hanoi has 454 such markets, located in nearly every residential neighbourhood (Umberger et al. 2017)³. In recent years, there has been a major exodus of European food retail chains from parts of developing Asia as they have had difficulty competing with local players, both formal and informal⁴.

In low- and middle-income contexts where supermarket penetration is greater, evidence suggests that this has been complementary to rather than serving to displace community markets and other traditional vendors. For example, even in China where supermarket penetration is relatively high in major urban centres, community markets continue to be the most significant source of fresh foods (Si et al. 2019). In many situations, consumers continue to give preference to traditional markets when purchasing fresh produce due to wider product variety, greater freshness, flexible pricing, proximity to place of

3) Traditional shops and outlets still account for 85% of India's retail (packaged) grocery sales, although a recent study projects that this might decline to 70% within the next five years due to the emergence of e-commerce and other alternative channels (McKinsey and Company 2022).

4) For example, Auchan, Tesco, Ahold, Metro and Carrefour have either wholly or mostly wound down their supermarket operations in Asia, especially outside of China. In Africa, there has also been some international chain retreat from major markets. For example, South Africa's Shoprite has withdrawn from Nigeria and Kenya.

work or home and the social interactions that take place⁵. This is despite the relative neglect and dilapidated state of many traditional markets. At the same time, in many urban settings, the competition faced by traditional market vendors is arguably less from supermarkets than from itinerant street vendors.

2.2. The ‘food control’ hypothesis

The consolidation hypothesis envisions large companies and other so-called ‘lead firms’ applying proper food safety measures and pressuring, if not aiding, both their suppliers and downstream distributors to do likewise. The ‘food control’ hypothesis is complementary to this. Processes of consolidation and formalization would seem to be compatible with regulatory solutions to food safety

problems. To date, the bulk of attention, by governments, donors and technical agencies, with respect to domestic food safety in low- and middle-income countries has focused on strengthening central government capacities to implement regulatory solutions, supplemented by efforts to increase scientific and other information. Pursuit of a functioning ‘food control’ model has stemmed from the recognition of the ways in which food markets may ‘fail’ in the context of food safety (see Box 1).

In this endeavour, emphasis has been placed on strengthening public institutions and facilities (for example, laboratories), updating legislation (guided by and often directed at harmonization with international standards), implementing food safety certification and accreditation, building human capital and facilitating the application of core operating principles (for example, relating to risk analysis and food emergencies). Ostensibly, this approach aims to replicate the structures and practices employed in high-income countries today. The bulk of capacity strengthening has occurred at the level of central ministries and agencies.

Box 1: Unsafe food as an example of ‘market failure’

Assuring the safety of food is challenging in any context, especially given the propensity of markets to fail in the context of the intrinsic information and incentives-related problems associated with foodborne hazards (see, for example, Henson and Traill 1993; Antle 2001). Many foodborne hazards are imperceptible to the consumer, making it difficult to judge the safety of a product at the point of purchase, prior to consumption and even once the food has been eaten. Further, consumers may lack information on how the product was produced and handled, with this posing potentially more problems as supply chains become longer and less personal. In such contexts, consumers often make food choices using visual cues that may be imperfectly related (at best) to the safety of the product. The result is that markets often send weak and/or perverse incentives to suppliers to make the necessary investments to enhance the safety of the food they sell, and businesses

will tend to compete based on other criteria, including price and quality characteristics that are immediately visible to the consumer.

Such market failures provide a *prima facie* case for governments to regulate food markets (Henson and Traill, 1993) including the establishment of legal limits on microbiological, chemical and/or physical contaminants, mandating certain food safety practices, requiring the implementation of food safety management systems, etc. The impact of such regulatory actions is dependent on the enforcement actions of government and on the ability and readiness of food operators to comply. In the context of weak regulatory capacity on the part of government and where the commercial viability of food businesses is precarious, the propensity of food businesses to upgrade their food safety controls is likely to be muted.

5) See Farina et al. (2015) for Brazil; Nickanor et al. (2019) for Windhoek, Namibia; Wertheim-Heck et al. (2015) for Vietnam; and Yuan et al. (2021) for China. Skinner (2019) refers to studies in multiple African countries highlighting the persistently strong role of informal markets in cities where supermarkets have emerged.

The 'food control' model places considerable emphasis on the proclamation and enforcement of regulations related to the premises and practices of all food system actors. Widespread compliance with these regulations is not expected to be fail proof but it should help to prevent most potential incidences of harmful hazards entering the food chain. Even in the best of circumstances, regulatory enforcement is challenging, and governments need to rely on voluntary compliance by most private enterprises in their own efforts to service clients, protect their brand or image and operate efficiently. Things are especially challenging in transitioning economies.

The circumstances associated with many enterprises and vendors in the informal sector are not conducive to effective (or sustained) regulatory oversight. Informal markets for food tend to be characterized by high rates of entry and exit of businesses, with large numbers of enterprises competing for consumers, predominantly based on price (Maloney 2004; Webb et al. 2013; Kok and Balkaran 2014). Lacking formal registration and with little or no engagement with the financial sector, enterprises struggle to access start-up and/or working capital, except perhaps from informal money lenders. Lacking formal title to the location where they operate, many of these enterprises frequently change their location (see, for example, Contreras et al. 2020). As a result, the rate of business failure in such markets tends to be high, with many informal enterprises struggling to grow (Grimm et al. 2012).

Where businesses engage with government officials, too often this is to limit or control their activities, usually in the context of corruption and bribery (see, for example, Sharma and Biswas 2020; Owuor 2020). In the traditional food markets that service large proportions of developing country populations, and especially the poor, any notions of food safety control are based more on visual cues, personal trust and experience than on official systems of regulation (see, for example, Rheinlander et al. 2008; Cardoso et al. 2014; Owusu-Sekyere et al. 2014).

'Food control' seems to be something of a misnomer when applied in these contexts. Here, formal food safety institutions have little sway. There is thus a wide chasm between top-down regulations and efforts to build centralized capacity on the one hand, and traditional structural patterns and operational conditions on the ground. Often, the institutions charged with food control lack an explicit policy vis-à-vis the traditional or informal food markets and/or a credible and effective strategy for operationalizing such a policy where this does exist. Where efforts are made to regulate food safety, this tends to focus on larger formal sector businesses that account for the minority of the food supply, especially when it comes to supplying the poor and near poor.



A young woman at a milk market in Meisso District, West Hararghe Zone, Ethiopia - ILRI/Apollo Habtamu ▲

The 'food control' model places considerable emphasis on the proclamation and enforcement of regulations related to the premises and practices of all food system actors



A farmer sells her fruits at the market in India - ILRI/Stevie Mann ▲

2.3. The trade compliance spill-over hypothesis

Contrary to the bleak picture above, is it not the case that many low- and middle-income countries have been relatively successful in dealing with 'especially challenging' food safety issues in relation to their agri-food trade? Could this experience not help to inform strategies and approaches for tackling food safety problems domestically and in relation to the food access of their poorer populations? This does not seem to be the case and the disconnects with the circumstances and possible solutions in the informal sector seem to be especially great.

Historically, food safety did primarily appear on the international development radar screen as a trade and market access issue (Jaffee et al. 2019). Thus, compliance with food safety regulations in international markets was seen as a problem to be addressed as part of efforts to enhance the trade competitiveness and performance of low- and middle-income countries (Unnevehr 2015). Analytical attention and development assistance were centred on identifying the impact of high-income country

food safety requirements on low- and middle-income country exports (see, for example, Feed the Future Innovation Lab 2019; Suanin 2022) and how best to tackle the compliance challenges faced by low- and middle-income countries, both at the level of national governments and export enterprises (van Veen 2005). Instances of importing countries imposing restrictions because of concerns about prevailing food safety controls, in particular exporting countries (Calvin et al. 2002) and/or high levels of border rejections (UNIDO 2015), gave food safety in the context of trade high visibility among policymakers.

Evidence on the impact of food safety on trade pointed to the potentially significant and rising costs of inaction, both to low- and middle-income country governments and strategic export sectors therein, and bilateral and multilateral donors. In response, significant resources have been devoted to strengthening regulatory oversight, upgrading infrastructure, modifying production practices and supporting the adoption of improved product quality and supply chain management systems in the export-oriented industries of low- and middle-income countries (STDF 2018; GFSP 2018). Many of these interventions have been successful at enhancing food safety control capacity in key export sectors, contributing to a pattern of increased low- and middle-income country exports and international market share for many higher-value, food safety-sensitive products, including fish, spices, nuts, fruits and vegetables (Henson and Jaffee 2006).

There have been expectations (or at least hopes) that efforts to establish rigorous food safety controls in export value chains would 'trickle down' to the domestic market, for example through updating of regulatory systems, enhancing the supply of skilled and experienced personnel and/or upgrading of food safety infrastructure (for example laboratories). There have been efforts, similarly, to identify instances where donor investments in food safety capacity-building for exports have generated 'spill overs' to domestic markets. To date, evidence of any 'trickle-down' or 'spill overs' is both limited and anecdotal at best (Bourquin and Thiagarajan 2018).

Export industries which have targeted high-income country markets have typically had to comply with exacting food safety requirements, which can be both technical and documentary in nature, to meet the requirements of regulators and/or customers in destination markets (Henson and Jaffee 2008). There is little or no demand to comply with comparable food safety requirements in the domestic markets of low- and middle-income countries. -Not only will suppliers be unlikely to gain competitive advantage from doing so, but the associated costs could erode their competitiveness in the context of markets where price competition is intense. - Admittedly, the management systems associated with system-based food safety requirements, such as Hazard Analysis and Critical Control Point (HACCP) and traceability, can yield appreciable economies of scale and scope in the context of consolidated or well-coordinated value chains (World Bank 2005). This is far from the typical structure of domestic food markets in low- and middle-income countries, however, which tend to be highly fragmented and are not conducive to such system-based approaches to food safety management.

2.4. Can bottom-up solutions fill the void?

The combination of rapid food system consolidation, the progressive development of official food safety controls and lessons gained from relatively successful food safety interventions for exports would seem to bode well for the effective control of food safety hazards in low- and middle-income countries. Yet this is not how the drama is playing out in many, if not most, low- and middle-income countries. The persistence of traditional and informal food market segments, and actors therein, does not conform to this narrative. It is not obvious that the strengthening of centralized official controls will have great impact, especially in the context of weak regulatory institutions

and the continued dominance of the informal sector. While the incremental formalization and consolidation of domestic food systems will likely enhance the incentives for private actors to enhance their food safety controls (in part because they will become more regulatable), as well as boosting their capacity to do so, this will take time. In low and lower middle-income countries, this process may take decades to play out.

With some few exceptions, it is not clear that such bottom-up initiatives have had much impact on public food safety policy or spending

The disconnect between top-down food safety control system interventions and the structural realities of hybrid food systems on the ground has not gone unnoticed. As long ago as the 1990s, the Food and Agricultural Organization of the United Nations (FAO) drew attention to the distinctive food safety challenges associated with the informal sector and provided support for several initiatives, including those focused on improving hygiene and preparation practices among street food vendors in various cities (summarized in FAO 2003). Somewhat later, researchers associated with the Consultative Group for International Agricultural Research (CGIAR) and others zeroed in on food enterprises and handlers servicing Asia's and Africa's urban poor (see, for example, Roesel and Grace 2014). They and others generated evidence regarding the origins and types of various food hazards and set about implementing interventions seeking to improve the food safety awareness, knowledge and practices of small-scale food processors, abattoir operators and market vendors.

Most of the tested interventions to date have involved the demonstration of how low-cost technologies could be effective in managing certain food safety risks. The resources made available for many such programs were modest, hindering parallel investments to upgrade physical infrastructure and strengthen prevailing

institutions, or the ability to maintain or re-enforce support over many years. While these interventions have significantly increased our understanding about the underlying problems and constraints, evaluation studies (see, for example, Alonso et al. 2018; Grace et al. 2019) indicate their practical impact has been relatively modest and/or raise questions about whether they are scalable or sustained. In addition, with some few exceptions, it is not clear that such bottom-up initiatives have had much impact on public food safety policy or spending. Importantly, for the most part, they have not endeavoured to engage elements of the formal food control system.

The harsh reality is that the policy and practitioner communities presently sit at a crossroads with respect to how to achieve significant and sustained improvements in food safety in low- and middle-income countries, and more specifically, what to do vis-à-vis the large informal sector. Neither turning away from the issue nor waiting for gradual improvements to emerge along with incremental structural changes appear to be desirable options. For many low- and middle-income countries, time is not 'on their side'. Instead, for many countries, there is a reasonable expectation that the food safety situation will worsen rather than improve in the coming years as the capacity to manage food safety continues to lag the growing incidence and consumer exposure to foodborne hazards.

Many low- and middle-income countries are experiencing rapid and profound changes in their agri-food systems stemming from urbanization, demographic shifts and rising incomes, among other things (Bene et al. 2019; van Berkum and Ruben 2021). Especially among growing urban populations, dietary patterns are rapidly extending beyond traditional starchy staples towards increased consumption of animal products, fruits and vegetables and ultra-processed foods (see, for example, Baker and Friel 2014; 2016; Baker et al. 2020). With urbanization has also come the greater reliance of consumers on purchased foods (as opposed to self-provisioning), increased out-of-home eating and a trend towards longer supply chains (Crush and McCordic 2017). Collectively, these factors tend to increase the range and incidence of foodborne hazards encountered by consumers, meaning that food safety management systems need to develop and adapt.

As illustrated in Jaffee et al. (2019), most low- and middle-income countries are at a stage in a food safety 'life cycle' in which there is a widening gap between food safety management needs, on the one hand (reflecting ongoing processes of economic development, dietary change, urbanization and agri-food system transformation), and prevailing capacities to implement and maintain food safety controls, on the other. This 'gap' is both common and persistent as countries transition from low to (and through) lower middle-income status. As countries transition to (and through) upper middle-income status this gap tends to narrow as food system formalization and consolidation progresses, and as administrative and technical food safety capacities are enhanced. The phenomenon of a food safety 'life cycle' also suggests that the food safety situation of countries across the low- and middle-income spectrum varies significantly and that the priorities for attention and the feasibility of different solutions will also tend to vary⁶. More on this in section 4 below. ◆

Many low- and middle-income countries are experiencing rapid and profound changes in their agri-food systems stemming from urbanization, demographic shifts and rising incomes, among other things

6) Jaffee et al 2019 highlight distinctive areas of emphasis among low, lower-middle and upper-middle income countries with respect to food safety policy, strategy and regulation, risk assessment, risk management, information/communication and education.



3. Unsafe food **is a serious** **and widespread** **issue in the** **informal sector**

3.1. Limited awareness of food safety by food operators

Comprehensive national or multi-country studies on the safety of food distributed through traditional, informal channels in low- and middle-income countries are generally lacking. However, evidence from small-scale or localized surveys of food and/or pertinent food operators broadly point to low levels of food safety awareness among food handlers, poor hygiene and/or food preparation practices, deficit operating conditions, and worrying levels of food contamination.

Many surveys in low- and middle-income countries have found low levels of food safety knowledge among food handlers, including street food and market vendors

Many surveys in low- and middle-income countries have found low levels of food safety knowledge among food handlers, including street food and market vendors (see, for example, Sibanyoni et al. 2017; Mwove et al. 2020; Nkosi and Tabit, 2021; Letuka et al. 2021; Sirichokchatchawan et al. 2021) and micro and small food processors (see, for example, Edia-Asuke et al. 2014; Mallhi et al. 2019; Prakashbabu et al. 2021)⁷. By way of illustration, the majority of food vendors, restaurant workers and food processor workers in Hanoi surveyed by Tran et al. (2018) lacked knowledge of proper food preparation procedures and contamination prevention measures. Siddiky et al. (2022) found low levels of

knowledge of foodborne pathogens and antimicrobial resistance among chicken vendors in Dhaka's traditional markets. In Kenya's Kiambu County, Mwove et al. (2020) found that some 93% of street food vendors had never received any training on food safety hygiene and safety. Finally, Samapundo et al. (2016) found that virtually no street food vendors in Ho Chi Minh City were aware of the importance of foodborne pathogens and only a minority had knowledge of proper food storage and temperature controls.

3.2. Hazardous operating conditions of informal food enterprises

Compounding limitations in food safety awareness, many market and street vendors and small-scale food processors operate in poor environmental conditions (see, for example, Khairuzzaman et al. 2014; Bormann et al. 2016; Loukieh et al. 2018; Ibrahim et al. 2021). Broadly, this reflects the fact that traditional community markets in many low- and middle-income countries have not been upgraded for decades and lack proper sanitation and waste disposal facilities, or municipal authorities have taken actions to actively disincentivize or even actively exclude informal food enterprises (see, for example, Roever 2014; Khairuzzaman et al. 2014; Cardoso et al. 2014). As for examples, Cortese et al. (2016) found that all street food vendors in Florianopolis, Brazil, had no access to a running supply of water. Similarly, Samapundo et al. (2016) observed that most market vending stalls in Ho Chi Minh City had no direct access to water and were in locations that lacked protection from sun, wind and dust.

Where food handlers do have access to water, this is often non-potable. For example, Onyango et al. (2019) found that the water used by street food vendors in Kisumu County, Kenya was contaminated with *Staphylococcus aureus*. The implication is that, even where food handlers broadly follow good food handling practices, this does not prevent food from being unsafe. As an example, Oguttu et al. (2014) found that, although street food vendors in Tshwane, South Africa, generally followed good hygienic practices, the unavailability of potable

7) For a more comprehensive review see, for example, Skinner (2016).

water and broader lack of proper infrastructure led their ready-to-eat chicken to be commonly contaminated by faecal and environmental contaminants.

One study (Rikolto et al. 2020) describes the common situation in one Asian capital city where only 60 of the more than 400 traditional community markets have been upgraded in recent years:

“Degradation is widespread; waste and wastewater collection and treatment does not meet the required capacity; the supply of clean water is insufficient; the risk of inundation and poor drainage is high; equipment for business does not meet food safety; fire protection doesn’t meet practical requirements; meat has not been stored in cold containers; exposure to the environment; vendors leave fresh meat and processed ones next to each other; no record on product origin; wastes are thrown directly to the floor and sidewalks. The infrastructure conditions and practices suggest a high risk of microorganism contamination to fresh agriculture product, especially meat. Especially in the summer when it is hot and humid, microorganism such as Norovirus, Salmonella, E. coli bacteria are in favourable conditions for growth, spoiling the meat and causing foodborne illness.”

This description is probably applicable in most cities in low- and middle-income countries.

3.3. Problematic food safety practices

The interplay of low awareness, poor operating conditions and weak incentives (see below) often translate into poor food safety practices by informal sector food handlers (see, for example, Adane et al. 2018; Choudhury 2011; Ababio and Lowatt, 2015; Johnson et al. 2015; Sezgin and Sanher, 2016; Cortese et al. 2016; Arora and Mogra, 2019; Mwove et al. 2020; Huynh-Van et al. 2022). Mallhi et al. (2019) found that very few of the workers in Lahore-based abattoirs and butcheries they surveyed used protective clothing during meat handling and nearly all stored meat at room temperature. Some 95% of the school food handlers in South Africa surveyed by Sibanyoni et al. (2017) had never used sanitized utensils or cutting surfaces while cutting raw meat. Numerous

studies of street vendors in low- and middle-income countries provide evidence of the widespread handling of food (and money) with bare hands, use of non-disposable plates, cups and cutlery, preparation of food on unsafe surfaces and storage of food under ambient conditions (Skinner 2016).

For many micro and small food processors and vendors, their poor food safety practices are a direct consequence of the day-to-day realities of being informal enterprises that operate in a challenging commercial and regulatory environment. Thus, in a bid to minimize costs, attract customers that are looking to minimize price and make at least a minimal operating surplus, businesses often procure the cheapest raw materials, frequently that are low quality and/or contaminated with foodborne pathogens (see, for example, Apaasongo et al. 2016; Tortoe et al. 2013; Alimi 2016). Further, to keep costs to a minimum, vendors often save food from one day to the next, even though they lack appropriate storage facilities (see for example, Kok and Balkaran 2014; Loukieh et al. 2018).



▲ A market in Can Tho, Vietnam - ILRI/Steven Jaffee

In many cases this reflects the fact that there is an excess number of vendors relative to the number of customers. These food vendors are also attracted to areas with maximum human traffic, even though they may be exposed to dust and vehicle exhaust fumes, lack access to water and are subject to harassment by police and other authorities (Roever 2014). A further consequence is that, even where food handlers are more aware of the hazards associated with food and the nature and importance of appropriate handling practices, this does not mean that they are applied in practice on a day-to-day basis, for example as they 'cut corners' in order to save time and money (see for example, Unusan 2007; Kok and Balkaran 2014; Hossen et al. 2020).

3.4. Consumer behaviour

Of course, consumers are not purely passive actors in their exposure to unsafe food, they can take actions to protect themselves through their food choices, food preparation practices etc. Yet, many types of food safety hazards cannot be effectively recognized by consumers when making food choices and even after consuming the food (Henson and Traill 1993). There may have insufficient awareness about food safety and find it difficult to reliably differentiate more from less safe food⁸.

The empirical evidence on consumer appreciation of food safety is mixed and suggests significant variation country-to-country and according to socio-demographic factors such as education, age and income (Peng et al. 2015; Nguyen et al. 2018; Odeyemi et al. 2019; Bukachi et al. 2021; Liguouri et al. 2022). For example, several studies in Nigeria found most consumers of street foods to be unaware of the associated health risks (Ezekiel et al. 2013; Alimi et al. 2016). Conversely, a 2019 survey of the social concerns of households in major cities of Vietnam found food safety to be the number one concern, far outpacing pollution, social service and education access, amongst other issues (Indochina Research 2019). Foods generally considered the 'most unsafe' by Vietnamese consumers are meat, vegetables and fruit, with decidedly lower proportions of consumers identifying fish and processed

foods and very few identifying eggs or dairy products⁹. When it comes to the specific hazards associated with food, however, there is compelling evidence that consumers misperceive the risks they face. In many countries, for example, consumers are most concerned about chemical residues in their food although microbial pathogens normally pose a more significant health risk (Petrescu et al. 2020).

Several studies have been undertaken of the 'willingness to pay' of consumers for safer food in low- and middle-income countries (see, for example, Radam et al. 2007; Magraby et al. 2013; Alphonse and Alfnes 2016; Ortega and Tschirley 2017; Wongprawmas and Canavari 2017; Hoffman et al. 2019). In such surveys, consumers frequently express a willingness to pay extra for food that is safer, often in the context of foods that are 'certified' and/or labelled as such (see Akerelle et al. 2010; Akinbode et al. 2011; Ifft et al. 2012; Lagerkvist et al. 2013; Owusus-Sekyere et al. 2014; Alimi et al. 2016;

The empirical evidence on consumer appreciation of food safety is mixed and suggests significant variation country-to-country and according to socio-demographic factors

De Groote et al. 2020; Otieno et al. 2017). Practically, however, affordability and convenience tend to dominate the choices of consumers, with the most valued quality attributes being appearance, freshness and taste. Further, the sub-set of consumers that are willing and able to pay a premium for certified 'safe' food are commonly held back by their lack of understanding of specific labels and/or their lack of confidence in the integrity of the oversight systems which govern the sourcing, labelling and distribution of such foods¹⁰.

8) Trusted sources of food safety information vary among countries and consumer groups, yet in many developing countries, there is remarkably low trust in information provided by official agencies and the most trusted information is that provided by friends and family (Lloyds Register Foundation 2021).

9) These perceptions broadly align correctly with the food safety risks associated with meat and vegetables but probably not fruit (which is less risky), fish (which may be quite risky) and eggs (where a specific problem of antimicrobial residues applies) (Wertheim-Heck and Spaargaren 2016).

10) See the discussion of this topic in relation for China (Ma and Qin 2009; Yin et al. 2010) and Vietnam (My et al. 2017; Vagneron et al. 2018).

Consumers that are willing and able to pay a premium for certified 'safe' food are commonly held back by their lack of understanding of specific labels and/or their lack of confidence in the integrity of the oversight systems which govern the sourcing, labelling and distribution of such foods

In the context of informal food markets, relatively little is known about the influence of concerns about food safety on food choices and related behaviours. The limited studies that do exist, however, suggest the dominant use of visual cues (such as the appearance of the food handler and their surroundings) and/or frequenting the same vendor to avoid unsafe food (see for example, Badrie et al. 2004; Akinbode et al. 2011; Owusus-Sekyere et al. 2014). For example, in a survey of consumer perceptions of the safety of food sold by street vendors in Lesotho (Letuka et al. 2021), the most used indicators were whether the vendor's stall was clean and tidy, whether the environment around the stall was clean, and the use of clean utensils. Similarly, Rheinlander et al. (2008) found that consumers in Kumasi, Ghana, judged the safety of a street vendor based on social and normative norms such as 'neatness', 'tidiness' and being 'orderly'. Further, interpersonal trust played a major role, such that they tended to frequent the same vendor(s). At the same time, price and accessibility played a more dominant role in their choice of street

food vendor rather than food safety. More generally, it is evident that consumers manage concerns about food safety alongside more dominant factors driving their choices, including convenience, product freshness and cost¹¹. As a whole, this evidence suggests that, in informal markets, food safety is a minimal driver of consumer behaviour, while the cues that consumers do use may be a partial indicator, at best, of the safety of the food being chosen.

3.5. The safety of food in informal markets

Evidence from many localized studies indicates that such poor practices, unhygienic operating conditions and the use of low-quality ingredients, among other factors, result in high levels of microbial pathogens in food produced, processed and/or handled by informal food processors and vendors (see for example, Cardoso et al. 2014; Odwar et al. 2014; Johnson et al. 2015; Jahan et al. 2018; Contreras et al. 2020; Salamandane et al. 2021). To illustrate, high levels of microbial pathogens have been found in street-vended salads and gravies in Johannesburg (Kubheka et al. 2001), salads and traditional fermented foods in Ghana (Mensah et al. 2012), and chicken in Guatemala (Jarquin et al. 2015). Further, a series of surveys (summarized by Rikolto et al. 2020) conducted in and around Ho Chi Minh City found that nearly 60% of meat samples taken from small manual slaughterhouses failed to meet microbiological standards, and that nearly 75% of meat samples taken from the city's traditional markets were contaminated with antibiotic-resistant Salmonella strains. These same studies found that 40% of lettuce and herb samples were contaminated with lead and arsenic, while 40% of other green vegetable samples had unsafe microbial pathogen levels. These are not outlier examples. Evidence from many other locations points to a similar (or greater) incidence of unsafe food in traditional channels and amongst informal food business operations¹².

This is not to imply that larger (and better regulated) formal sector enterprises and distribution channels in

11) See the discussion of consumer strategies in Vietnam (Wertheim-Heck et al. 2014), China (Si et al. 2018), Nepal (Thapa et al. 2020) and Kenya (Blackmore et al. 2021).

12) Mixing dense human populations and animals often translates into high biosecurity risk in developing country cities. For example, a long-standing preference for purchasing warm meat has resulted in large movements of live animals to Vietnamese cities and their slaughter in close vicinity to residential areas. Each day, some 150,000 chickens are moved, sold and slaughtered in both Hanoi and Ho Chi Minh City. On an annual basis this translates into 55 million chickens. Many of these are channelled through live bird markets. Research in Vietnam and elsewhere has shown that such markets play a significant role in the ecology and zoonotic transmission of avian influenza (Fournie et al. 2012).

low- and middle-income countries are devoid of food safety challenges. Even in more advanced food safety systems, lapses occur and can be the cause of significant FBD. For example, one of the world's largest ever outbreaks occurred in South Africa in 2017. This outbreak was linked to a contaminated ready-to-eat meat product manufactured and sold by a major meat processor (Tchatchouang et al. 2020). A total of 216 deaths were recorded, while the estimated human and economic cost of the outbreak was estimated at United States dollar (USD) 537 million (Olanya et al. 2019).

No reliable data are available on the incidence of FBD in low- and middle-income countries that is attributable to foods sold by informal enterprises

Further, some studies have highlighted circumstances where food sold through formal sector marketing channels is at least no safer than that sold by the informal sector. For example, Roesel and Grace (2014) reported that levels of microbial pathogens were lower in poultry bought from live bird markets in Mozambique than from formal sector abattoirs. Further, they found that the microbiological quality of beef from a typical small slaughterhouse in Kenya was little different to beef from an improved mechanized slaughterhouse selling to supermarkets. Likewise, studies in Thailand (Minami et al. 2010), China (Zhu et al. 2014), Mexico (Regalado-Pineda et al. 2020) and Malaysia (Shafini et al. 2017) found significant levels of Salmonella contamination in chicken sold in both supermarkets and traditional markets. Other studies suggest much lower levels of food safety awareness and poorer practices in micro and small rather than among medium and large food enterprises¹³.

3.6. The informal sector and the incidence of foodborne disease

Unfortunately, no reliable data are available on the incidence of FBD in low- and middle-income countries that is attributable to foods sold by informal enterprises. Given the small scale and fragmented nature of informal sector enterprises and the lack of active systems of surveillance, deriving reliable estimates of the importance of the informal sector in specific countries is problematic. Further, while sporadic outbreaks of disease where the informal sector is implicated do occur, these are rarely investigated in a robust manner. As a result, any attempt to make judgements as to the importance of the informal sector in the overall incidence of FBD are inevitably based on a process of piecing together disparate information and data. We can consider the following factors or assumptions:

- First, estimates of the overall incidence and burden of FBD in low- and middle-income countries. The most authoritative source of these data is the Foodborne Disease Epidemiology Reference Group (FERG). Of the estimated 600 million cases of FBD globally in 2015, 53% were in low- and middle-income countries in South Asia, Southeast Asia, and sub-Saharan Africa; thus, around 318 million cases (Havelaar et al. 2015).
- Second, estimates of the role of different types of foods in the incidence of FBD. This work started under FERG (Hoffmann et al. 2017) and continued later with more specific attention to animal source foods (Li et al. 2019) and to the role of heavy metals and other natural toxins (Gibb et al. 2019). Estimates indicate that animal-based foods and fruit and vegetables collectively account for the majority (and sometimes a large majority) of total cases of FBD. The pace of change in diet with ongoing economic development is thus relevant to the evolving exposure of consumers to food safety risks.
- Third, a certain proportion of FBD arises from non-marketed food, with this mostly taking place in rural areas in the case of subsistent or semi-subsistent households. Here, FBD mainly arises from microbiological or chemical contaminants, some of which are naturally-

13) For example, in a survey by Kahindi (2016), micro-enterprises with 1–10 employees were found to recognize less well the potential benefits of food safety systems, be less likely to provide pertinent training to staff and managers, follow industry guidelines for assuring safety measures applied by their suppliers, have staff wearing uniforms and regularly washing their hands, and to promptly discard contaminated food. Some 45% of the surveyed microenterprises applied no food safety system at all, while this passivity was very rare among small, medium and larger enterprises.

Table 1. Food system composition and the attribution of foodborne disease (FBD)

Source of Food	Country income level		
	Low income	Lower middle-income	Upper middle-income
Household provision (non-marketed; primarily rural)	30%	20%	10%
Formal sector (marketed)	10%	30%	50%
Informal sector (marketed)	60%	50%	40%
Total food system	100%	100%	100%
FBD burden share attributable to informal sector:			
Considering the total food supply	50%	40%	35%
Considering only marketed food	80%	65%	50%

Source: Authors' estimates

A dairy farm worker pours fresh milk into a container for transportation to market at Kamagut in the outskirts of Eldoret Town, Kenya - ILRI/Kabir Dhanji ▼



occurring (for example, mycotoxins) and/or result from cross-contamination between animals and plants, or improper storage or food preparation practices. Food shared or bartered within rural communities may also be a factor here. In urban areas, non-marketed foods generally account for only a small proportion of food consumed.

- Fourth, account needs to be taken of the share of traditional and informal marketing channels in the supply of food in general and especially foods that are a major source of FBD. In urban areas of low- and lower middle-income countries, such channels may account for 60–80% of the market-procured food of consumers, while in upper middle-income countries, it is generally 50% or less (see, for example, Crush and McCordic 2017; Young and Crush 2019).
- Finally, assumptions need to be made about the relative riskiness of the formal versus informal food sectors in terms of the incidence and levels of foodborne hazards, including the extent to which these are mitigated by the actions of consumers (for example, through cooking) prior to consumption. While there are examples where the safety of foods supplied by formal and informal market channels is broadly similar (see above), more frequently, food supplied by informal enterprises presents a greater food safety risk, for all the reasons discussed above.

Considering these data and considerations, crude estimates can be made of the proportion of FBD in low- and middle-income countries that can potentially be attributed to the informal food sector (**Table 1**). We estimate the FBD burden share attributable to the informal sector in two ways: first by factoring in subsistence-

oriented production/consumption, recognizing that some proportion of own-produced and consumed food in rural areas is contaminated by naturally-occurring toxins or by improper hygienic or cooking practices, and second, by only considering unsafe marketed food. Regarding marketed food, the estimated FBD burden attributed to the informal sector is higher across all country income groups than its estimated share of marketed sales. This reflects three factors; the continued dominance of the informal sector in the supply of food safety-sensitive foods (including animal-based foods, fruit and vegetables etc.), its outsized role as a source of ready-to-eat foods in the form of street food vendors, and the higher incidence of unhygienic conditions and/or unsafe practices in the informal sector.

Importantly, **Table 1** is only intended to provide indicative ‘order of magnitude’ estimates of the proportion of the food safety problem in low- and middle-income countries that can be attributed to the informal sector; we recognize that the structure of marketed production and the significance of subsistence production/consumption does vary across these countries. However, even if the share of the formal sector in some countries is higher than the norm for their level of income, the overall picture presented by these estimates is that issues related to unsafe food in the informal sector cannot be considered a minor problem. *For many, if not most, low- and lower-middle income countries, unsafe food in informal channels probably accounts for a large proportion of the FBD attributable to marketed foods. The implication is that concentrating attention on enhancing the capacities and regulatory reach of centralized food safety agencies may have little impact on the safety of food, especially higher-nutrient fresh foods.* ◆



4. Recasting the problem, players and settings

To understand better how to proceed in addressing the food safety problems in the informal sector, it is useful to articulate why the problems exist and to go beyond the notions of a homogenous 'informal sector' and homogenous 'developing country' context.

4.1 Reframing the fundamental constraints

Why is unsafe food such a pervasive problem in the informal sector? Further, why do informal food enterprises not employ better food safety practices? There are two standard responses to these questions. One is that the players themselves lack the requisite awareness about food safety hazards and the basic knowledge about approaches and practices to prevent these hazards from entering their businesses and the overall food supply. This we can call the *awareness and knowledge deficit*. The other explanation relates to alleged gaps in regulatory and other official oversight systems, on paper and/or on the ground. This we can refer to as the *regulatory or food control deficit*. A combination of low awareness of potential problems among the food actors and limited administrative tools and personnel among regulators does not bode well for safe food outcomes. Yet, we approach the prevailing situation as reflecting somewhat of a broader range of capacity and incentive-related constraints.

A combination of low awareness of potential problems among the food actors and limited administrative tools and personnel among regulators does not bode well for safe food outcomes

Food safety is the outcome of the collective behaviour of enterprises and the environment in which they operate along the food value chain, from the manufacture and distribution of agricultural inputs, through production, processing and distribution, to ultimate consumption. Thus, improvements in the safety of food require changes in behaviour and/or improvements in the operating environment of food enterprises. The implication is that the burden of FBD in low- and middle-income countries results from the actions of large numbers of enterprises and food handlers therein. In looking at how most effectively to improve food safety, therefore, the focus needs to be on how best to improve controls within these enterprises. Why do they do what they do? What prevents them from applying more appropriate practices and/or operating in an environment that is more conducive to safer food? Further, how might these impediments be more effectively removed?

The status of food safety measures in food enterprises can be seen to reflect the interplay of two core sets of factors. First are the *incentives* for enterprises, and food handlers therein, to implement and maintain improved food safety practices. These incentives alter the balance between the costs and benefits for the enterprise of implementing or not implementing these practices. Second is the *capacity* of food enterprises, and food handlers therein, to implement improved food safety practices. Here, factors both internal (for example, condition of the enterprise's physical establishment and level of human capital) and external (for example, physical environment in which the enterprise operates, access to potable water and availability of training resources) to the enterprise are relevant. Each of these dimensions is briefly discussed in turn.

4.1.1. Incentives

The incentive for food enterprises to adopt enhanced food safety practices will, everything else being equal, reflect the benefits and costs for the enterprise of doing so. These costs and benefits will be both economic/commercial (for example, the impact on the enterprise's profitability) and social (for example, the reputation of the enterprise and its standing within the community). Three key factors will play a role here:

- The **regulatory system** in which the enterprise operates, notably the practices that the enterprise is required to adopt (and the associated costs of implementation) and the actions that might be taken should the enterprise fail to comply (including fines, seizure of property and loss of customers due to reputational losses);
- The degree to which the markets in which the enterprise operates **reward the adoption** of enhanced food safety practices (reflecting consumer demand for safer food and propensity to show loyalty towards and/or

pay a premium to enterprises providing food perceived to be safer); and

- **Social pressures** for enterprises to apply appropriate practices and/or to supply safe food, including from other vendors and the wider community where the enterprise operates.

Regulatory incentives to adopt enhanced food safety practices are generally missing or muted at best

In many low- and middle-income countries, regulatory capacity is weak, both at central and decentralized levels, as will be illustrated in Section 5. The resources allocated to enforce regulatory requirements among micro and small enterprises tends to be quite limited, especially in relation to the sheer size of the informal sector and the multitude of enterprises operating there. The consequence is that most informal sector enterprises are virtually untouched by regulators (at least when it comes to food safety). The implication is that regulatory incentives to adopt enhanced food safety practices are generally missing or muted at best.

A key question is whether market-based incentives can motivate enterprises to upgrade their food safety controls in weak regulatory contexts. This depends upon several factors, including whether consumers are sufficiently aware and concerned about food safety, whether they are willing and financially able to pay for foods that are safer, and whether they can reliably distinguish more from less safe foods or, at a minimum, distinguish better from worse food handling practices. The literature reviewed above suggests that, in many low- and middle-income contexts, market-based incentives are likely to be weak and/or misdirected.

To provide market-based incentives for the adoption of better food safety controls, private systems of food safety governance, for example in the form of certification and/or labelling that aim to provide more reliable visual cues of safer food for consumers, have been trialled in low- and middle-income countries. Most of these efforts, however, have focused on the formal sector (including supermarkets and larger branded food businesses). At the same time, experiences with private governance of food safety in

high-income countries suggests that such initiatives are generally employed where regulatory systems are strong, such that private standards and systems of certification build upon regulatory norms (Henson and Humphrey 2010). The efficacy of private governance of food safety in weak regulatory contexts is largely untested.

The third and perhaps more promising potential source of incentives to upgrade food safety controls in food enterprises comes from social pressure. Even within the informal sector, which is frequently characterized as being 'disorganized', relations exist between vendors, such that operators may wish to be seen by others to 'do the right thing' and/or may feel pressure to adopt the practices of others in their community, for example religious or other social leaders. Further, in many informal markets, systems of organization exist in order, for example, to control the entry of vendors to prevent over-supply, deal with conflicts between vendors and/or between vendors and their customers, ensure common trade practices etc. The role of market queens in managing traditional markets



Vendors sell food items at Quelimane Market, Mozambique - ILRI/Stevie Mann ▲

(sometimes alongside other forms of social organization such as trades unions) in part of sub-Saharan Africa, for example, are well-documented examples (see, for example, Hendriks 2017; Clark 2018). While food safety may not be an explicit objective of such informal systems of market organization, conceivably, they could promote conducive practices with better food safety controls, for example through the management of garbage disposal (see, for example, Asomani-Boateng 2016) and requiring vendors to be physically organized.

There may be only limited actions that an enterprise can take to ensure the food it sells is safe if appropriate controls have not been taken by upstream actors from which it procures raw materials and other inputs

4.1.2. Capacity

The capacity of food enterprises not only determines their ability to implement and maintain enhanced food controls, but also the costs entailed in making the necessary upgrades to physical infrastructure and equipment and/or changes in operating procedures. Critical here are the scale of the upgrades required (which will reflect the gaps between the prevailing and desired food safety controls) and the financial, human and technical resources of the enterprise. Also, the ability of the enterprise to access necessary external resources, including finance, technical expertise and advice, training, appropriate technology and equipment. Both public and private sector entities can play a critical role in the availability of these external resources.

A second critical factor influencing the capacity of food enterprises to implement enhanced food safety controls is the external infrastructure and environment in which they operate. This can include the suitability (for example, by the side of the road versus a dedicated food market) and state of repair of the physical surroundings, access

to potable water and sanitation. In situations where food enterprises operate in unsanitary conditions, it will likely be impossible for enhanced food safety controls to be implemented and/or maintained, whatever the capacity of the enterprise itself.

Finally, the capacity to implement effective food safety controls on the part of an individual food enterprise will be influenced by the value chain in which it operates. Thus, there may be only limited actions that an enterprise can take to ensure the food it sells is safe if appropriate controls have not been taken by upstream actors from which it procures raw materials and other inputs. An example is contamination with mycotoxins, which can result from inappropriate storage but that largely cannot be mitigated by the actions of downstream actors.

4.1.3. Interplay between incentives and capacity

The upgrading of food safety controls by enterprises, rather than being a discrete event, is an ongoing process involving step-by-step improvements and adjustments in response to changing incentives, availability of resources, changing in environmental conditions etc. Thus, the food safety controls that prevail at any point in time will reflect the interplay of incentives and capacity. In turn, this will be influenced by the characteristics of the enterprise and the external infrastructure and environmental conditions under which it operates, in the context of the characteristics of the enterprise, the value chain in which it operates and its physical surroundings, the value chain in which it operates, and the regulatory system as it interfaces with the enterprise.

Recognizing the interface between incentives and capacity, four broad scenarios can be defined with respect to the enhancement of food safety controls within the informal sector (**Figure 2**). In practice, of course, there are not four distinct segments, but rather incentives and capacity will vary along a spectrum of strength. Thus, while for analytical simplicity it may be helpful to think of informal food enterprises lying in and/or moving between particular quadrants, in reality there will be a wide variation in the blend of incentives and capacity and what matters is the balance between the two.

The prevailing situation in the informal sector of many low- and middle-income countries is a situation of low incentives and low capacity (L-L in **Figure 2**). Enterprises in this context are in a low-level food safety trap. Thus, they have minimal capacity to enhance their food safety procedures, except for virtually costless actions such as handwashing if the local environment permits access to water. At the same time, there is little or no incentive to change their practices, except, again, if they are virtually costless.

Figure 2. Interplay between incentives and capacity in enhancing food safety in informal markets.

		Incentives	
		Low	High
Capacity	Low	L-L	L-H
	High	H-L	H-H

The aim of policies and programs should be to shift the situation from the red to the green quadrant of **Figure 2**; from a very low-level equilibrium to a higher level one. In this cell, informal enterprises have access to the necessary internal and external resources and operate within a conducive external environment to upgrade food safety controls and have the incentive to do so even if the required upgrades come at an appreciable cost. How to set that process in motion and at scale is the fundamental challenge. Packages of interventions are needed which simultaneously enhance incentives and capacity for informal food enterprises to implement and maintain enhanced food safety controls. These might include efforts to train informal food operators and upgrade public infrastructure (such as markets or sanitation) paired with the enhancement of regulatory systems within municipalities, raising consumer awareness, certification of food handlers who enhance their food safety practices and/or promotion of other visual cues such as badges or uniforms.

The remaining two quadrants in **Figure 2** represent misalignments of incentives and capacity and they are unlikely to be sustainable. When incentives are weak but capacity is high (L-H), enterprises have the capability to enhance food safety controls but little or no incentive to do so (or continue to do so). Lots of awareness-raising and training programs run into this lacuna. Temporarily improved practices are unlikely to be maintained, especially if there are associated costs, unless significantly re-enforced, perhaps by consumers giving preference to these enterprises/vendors and paying more than the prevailing market prices to compensate for those costs at least partly. Thus, appropriate interventions might also include efforts to train informal food operators and/or upgrade public infrastructure.

When incentives have been strengthened yet capacity remains weak (H-L), safe food outcomes are unlikely to occur. Here, perhaps a sub-set of consumers or downstream distributors has shown willingness and ability to pay more for safer food, yet enterprises are thwarted in their efforts to improve their food safety

Packages of interventions are needed which simultaneously enhance incentives and capacity for informal food enterprises to implement and maintain enhanced food safety controls

controls because they lack the financial, human or technical resources to implement the required changes, and/or there are constraining factors that are outside their control. A common example of the latter is where the prevailing environmental hygiene conditions (that is

access to potable water and/or improved sanitation and waste management) remain poor¹⁴. These limitations could prevent the enterprises from acting on enhanced incentives or very quickly to curtail this market as buyers come to realize that even the well-intentioned vendors cannot effectively compensate for the risky physical environment in which they operate. Thus, it is important to avoid driving up incentives to implement enhanced

Even as we place enterprises at the 'centre of the storm', the range of necessary solutions may have to cover interventions in the physical environment and at other links in the supply/value chains in which they operate

food safety controls if informal food enterprises lack the capacity to respond; the impact of such interventions, if anything, will be to drive informal operators out of business through a process of induced structural and and/or formalization. The message once again is the need for food safety interventions to be implemented as packages that simultaneously address incentives and capacity.

The discussion here illustrates the importance of addressing capacity and incentive-related deficits in parallel and assuring synergies between efforts to improve internal capacities (and incentives) and external ones. Training vendors to regularly wash their hands has no value if the available water sources are still contaminated. Upgrading market infrastructure and training market vendors in improved hygienic practices will collectively have little payoff if a large proportion of the produce sourced into that market has already been contaminated

by multiple hazards. Even as we place enterprises at the 'centre of the storm', the range of necessary solutions may have to cover interventions in the physical environment and at other links in the supply/value chains in which they operate. Of course, one potential solution to this complex situation is to promote the accelerated turnover and formalization of enterprises, such that the marketplace becomes populated by better resourced, better located and more knowledgeable players and who are servicing a clientele which is more willing and able to pay for safer food. Inevitably, however, this comes at a significant social cost if this strategy is pushed very quickly. We will return to this later.

4.2. Reframing the players

Part of the problem in addressing the issue of unsafe food in low- and middle-income countries stems from a failure to recognize the specificity of enterprises engaged in the informal sector. Seeing the informal sector as a homogenous cluster of players leaves little room for differentiated policies or strategies that recognize the different lived realities of enterprises and their operators. Certainly, many enterprises share core economic characteristics, including ongoing commercial vulnerability, and operate with the harsh realities of not being registered. At the same time, however, distinctive types of enterprises face quite different situations when it comes to the incentives to enhance their food safety controls and/or their capacity to do so; in turn, they will likely be more or less amenable to influences from regulatory agencies, food consumers and/or formal sector enterprises.

For simplicity, we distinguish among three types of informal food enterprises:

- **Traditional retail vendors:** community market vendors and small stores/kiosks etc.
- **Traditional food processors:** micro food processors, small animal slaughter units etc.
- **Informal food service vendors:** street vendors of prepared foods, micro/alleyway restaurants etc.

Each is discussed in turn below.

¹⁴) This is like situations where poor farmers who cannot afford inputs get certified as 'organic' suppliers of commodities and are promised (modest) price premiums for supplying particular buyers. Where parallel efforts are not made to improve the productivity of such farmers, the impacts of the interventions are often ephemeral as the price premiums wane with greater supply as little or no capacities of the farmers have been enhanced.

Very large numbers of **traditional retail vendors and enterprises** are found in most cities of low- and middle-income countries. For a small city, the number could be in the thousands, while in medium and larger cities there could be more than 10,000 such actors. Many of these enterprises could be registered in some way. Most undertake their business on a continuous basis in the same location. These enterprises operate with minimal or low capital or fixed equipment, although some shops might have small storage or cooling units. Most of these enterprises operate in a 'public place' (such as a market or on a street with an address). Traditional stores will mostly sell non-perishables foods, many of which are packaged (although packaging may be broken for small lot sales). Conversely, many market vendors sell perishable food including fruit and vegetables, meat and fish. With respect to food safety, the availability of water and sanitation, and the immediate environmental conditions, are more important in the context of enterprises operating in community markets. Kiosks will generally source packaged foods from both small and large processors, directly or via intermediaries, while market vendors might have varied sourcing arrangements and will generally procure foods unpackaged. Thus, traditional kiosks might be comparatively low risk operators, while market vendors could be associated with multiple food safety risks from source, intermediation, their own hygienic and other practices, and local environmental conditions. For

all these enterprises, regularized consumers (based on convenience and personal trust) might account for the bulk of sales.

There are likely to be fewer **traditional food processors** in most cities of low- and middle-income countries. Perhaps there will be a few dozen in smaller cities, up to a few hundred in medium or larger cities. While some of these enterprises will be registered, these will probably be the minority. These enterprises will operate from a fixed location which may or may not be safe from an

The availability of water and sanitation, and the immediate environmental conditions, are more important in the context of enterprises operating in community markets



environmental health perspective. This will generally be a private location, not in a market or along a pedestrian road. These processors will have some fixed equipment. The business may be a full or part-time occupation for the owner, with the number of employees varying from a few up to 10 or so. These enterprises will tend to compete based on lower price for the product or service they offer. These enterprises might not directly interface with the final customer but rather sell their output to a retailer or food service operator. Food safety risks may stem from the use of contaminated inputs (for example animals or cereals) or unsafe ingredients (for example unapproved additives), from prevailing environmental conditions, and/or from poor production and/or unhygienic practices.

Food safety risks may stem from contaminated ingredients, environmental conditions and food preparation and hygienic practices

Large numbers of *informal food service vendors* are commonly found in low- and middle-income countries, numbering in the thousands in small cities and 10,000 or more in medium and larger cities. Almost all these enterprises will be unregistered. Both street food vendors and informal restaurants may aim to operate in the same location, although while the former are mobile, the latter work in a static location. Both may directly interface with regular and irregular customers. Informal food service vendors generally have very limited fixed equipment, usually being restricted to a cart or stand, basic cooking equipment and/or utensils. In this sub-sector, the rate of business turnover tends to be higher than in other informal food sub-sectors due to an over preponderance of operators, low profitability and/or periodic regulatory crackdowns. While price competition tends to be intense, some non-price competition may play a role, for example due to location and/or real or perceived quality of the food. The physical surroundings in which these vendors operate and their access to public utilities may vary yet are often poor. Food safety risks may stem from contaminated ingredients, environmental conditions and

food preparation and hygienic practices. Use of non-food grade food additives and cleaning substances may also occur. Some foods may be prepared off-site (usually at home) and/or stored and reused from one day to the next.

The above stylized typology of the informal food sector in low- and middle-income countries, while based on broad generalizations, brings out important insights for the design, prioritization and implementation of interventions. For example:

- **Itinerant and/or sporadic food service vendors are likely to present very high food safety risks.** At the same time, the significant rate of turnover of these enterprises and intense price competition are likely to make any upgrades in food safety controls problematic. Large-scale interventions will likely be required, for example involving spatial clustering to address environmental conditions and some form of registration to enable any form of regulation. Both operator and consumer education about food safety will be beneficial.
- **Small slaughterhouse and community market vendors of perishable foods tend also to be associated with high food safety risks.** However, their fixed location and greater continuity of action likely makes it easier to implement interventions aimed at enhancing food safety controls. Examples might include systems of inspection and regulation, improvement of environmental conditions, training and certification.
- **Micro-level food processors likely present a more moderate level of food safety risk,** although there may be instances of high risks for some more perishable products. At the same time, interventions directed at this sub-sector will be hindered by the fact that most enterprises are not registered and are geographically dispersed. The motivation for these enterprises to upgrade their food safety controls, especially if they do not interface directly with consumers, is likely to be minimal.
- **Traditional food retail stores and kiosks selling packaged food will tend to present modest food safety risks** that relate mainly to local environmental conditions or poor food storage arrangements. Targeted interventions, for example subsidies for the installation of refrigeration, could be beneficial, although a challenge will be the large number of operators needing to be impacted. The incentives for these enterprises to make any further form of investment in upgraded food safety controls is likely to be limited.

These simple distinctions point to sub-sectors of the informal food sector where there is a higher or lower priority for intervention, based on the associated food safety risks, and the scope to undertake such interventions

given the associated motivations to upgrade food safety controls and the capacity to do so. This is summarized in **Figure 3**.

The forgoing discussion has highlighted the importance of breaking down the 'informal sector' into its constituent sub-sectors when considering the nature and level of food safety problems. Thus, if workable solutions that achieve appreciable and sustainable improvements in food safety are to be implemented, it is necessary to diagnose why operators within specific sub-sectors do what they do (and do not do what we would like them to do). In turn, this means we need to recognize their characteristics and operating conditions and tailor interventions to fit them. **Table 2** provides a summary of what these various sub-

sectors of the informal food sector look like in low- and middle-income countries.

For example, municipal regulation of food safety (and associated systems of inspection, enforcement and other forms of incentivization) tend to be easier to implement and more effective where enterprises are more limited in numbers and rates of turnover are relatively low, operate in a fixed location and/or are registered in some way. Micro food processors, small slaughterhouses, informal food service operators and small food kiosks partly fit this characterization (**Table 3**). Conversely, street food vendors, for example, display few if any of these characteristics, such that municipal regulation is likely to be of limited utility.

Figure 3. Priority and scope for food safety interventions in sub-sectors of the informal food sector in low- and middle-income countries.

Risk profile	Scope for intervention	
	Lower	Higher
Higher	Informal food service Street food vendors	Community market vendors Small slaughterhouses
Lower	Micro food processors	Small food kiosks



A shop attendant fills bottles with fresh milk in Turbo, outside of Eldoret Town, Kenya - ILRI/Kabir Dhanji

Table 2. Characteristics of informal sector sub-sectors

Characteristic	Informal food service	Street food vendors	Community market vendors	Small slaughter-houses	Micro food processors	Small food kiosks
Numbers in a medium-sized city	1,000s	1,000s to 10,000s	1,000s to 10,000s	100s	100s	1,000s to 10,000s
Registration status	Variable	Few if any registered	Few, if any, registered	Variable	Variable	Variable
Rate of enterprise turnover	Medium	High	Medium	Relatively low	Medium	Relatively low
Operating environment	Fixed location Public location	Variable location City streets	Fixed location Public markets	Fixed location Public or private locations	Fixed location Private location	Fixed location Public streets
Food types	Prepared ready-to-eat foods	Fresh or prepared ready-to-eat foods	Perishable foods Grains, pulses etc.	Animal products	Various perishable and non-perishable foods	Packaged foods
Clientele	Low- and medium-income consumers Regular clientele	Low-income consumers Variable clientele	Low- and middle-income consumers Regular clientele	Low-income consumers. Food retailers and food service operators Regular clientele	Mainly retailers and food service operators Regular clientele	Low- and middle-income consumers Regular clientele
Engagement with regulatory authorities	Periodic	Minimal/ sporadic	Minimal/ sporadic	Minimal/ sporadic	Periodic	Periodic

The evidence generally shows that FBD and the incentives for enhancing food safety management capacity vary systematically with the level of economic development

4.3 Reframing the setting

We should not be casting the setting for discussions about the need and scope for food safety interventions as some homogeneous rendition of ‘developing countries’. There are clearly vast differences among countries; for example, in terms of size, per capita income, administrative capacity, level of urbanization, food consumption patterns and conditions of physical infrastructure. As suggested in Section 3, there are also important differences in the position of the informal sector in national food systems and the likely prominence of informally distributed foods in each country’s burden of foodborne disease. While the earlier discussion suggested that most informal sector enterprises currently operate in the dreaded L-L capacity and incentive domain, this may not be entirely correct. For example, in upper middle-income countries, one

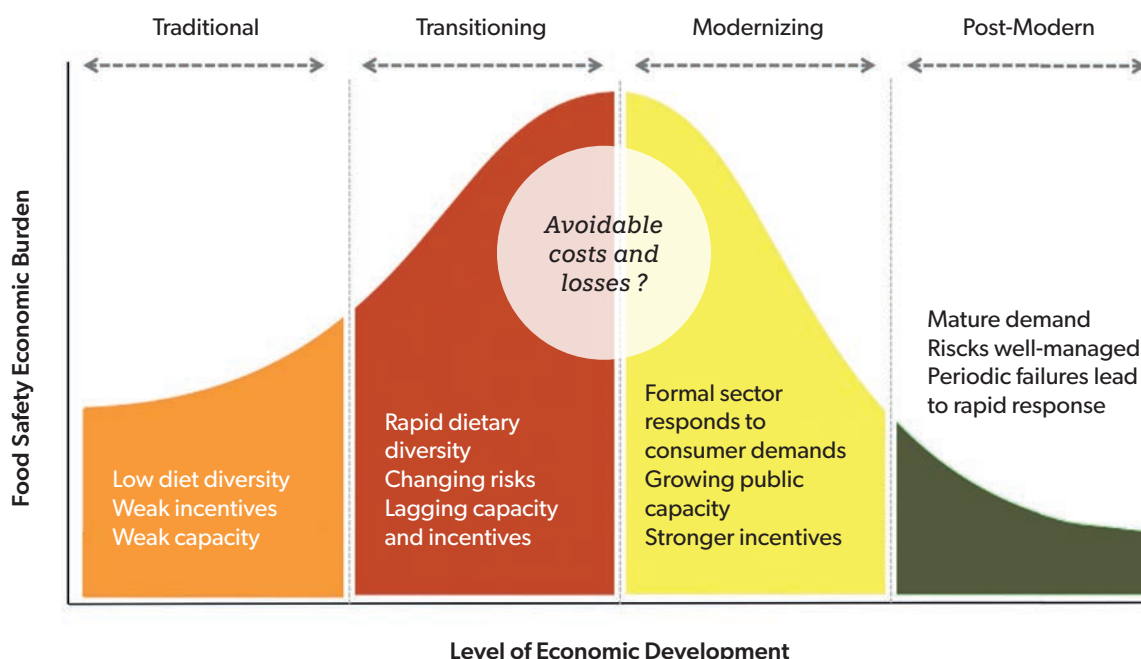
might commonly find large numbers of informal food enterprises positioned in or on the borders of the L-H or H-L quadrants. This situation may make it somewhat easier to achieve, within a modest amount of time, a wider shift in the direction of the H-H quadrant.

While food safety represents major challenges and opportunities for all countries, the (relative) prominence of issues and their specificity vary significantly among countries. The evidence generally shows that FBD and the incentives for enhancing food safety management capacity vary systematically with the level of economic development. In earlier work (Jaffee et al. 2019), we introduced and applied the concept of a food safety life cycle, tracking changes in the strength of incentives and capacity for safer food and the relative economic burden of FBD across four categories of countries; these more or less conform with the common situations for low, lower-middle, upper-middle, and high-income countries. The shape of the life cycle is illustrated

in **Figure 4** and a brief description of the four categories (or stages) follows this.

Traditional stage: In most low-income countries, where many food safety problems are emerging, both the supply of and demand for safe food remain underdeveloped and traditional concerns about national and household food security remain paramount. Often, the process of diet transformation has barely commenced, or is found only in very isolated urban clusters. The diet predominantly consists of starchy staples that are produced domestically. Much food is produced relatively close to the point of consumption and undergoes limited transformation before reaching households. The predominant FBDs come from microbiological pathogens that result from limited access to clean water and improved sanitation and naturally-occurring toxins, such as mycotoxins. Domestic market drivers or incentives for safer food are often weak. In these settings, food safety controls tend to be rudimentary, with instances of more developed systems tending to be geographically concentrated and focused, for example, on high-income consumers. For higher value exports, oases of strong food safety management capacity, usually built around a limited set of lead firms and designated 'competent authorities', may emerge but these tend to be divorced from domestic systems.

Figure 4. Food safety life cycle with economic development.



Source: Modified from Jaffee et al. (2019).

During the transitioning stage, agri-food value chains begin to evolve, although the emergence of the formal sector and more organized value chains tends to be geographically concentrated, predominantly in urban areas

Transitioning stage: Countries entering lower middle-income status have a broader range and steeply accelerated exposure to food safety hazards. For these countries, diets are rapidly transforming beyond starchy staples and towards a wider array of plant and animal-source foods. In addition, more foods are consumed outside of the home. As populations become increasingly urbanized, the distances between food production and consumption tend to increase, and as supply chains elongate, they also tend to involve a growing number of processes and intermediaries. At the farm level, the intensification of production often involves increased use of agricultural chemicals, veterinary drugs and so forth. Food imports, including of perishable foods, often increase. As a result, domestic consumers are exposed to new foodborne hazards of a microbiological, chemical and physical nature.

During the *transitioning* stage, agri-food value chains begin to evolve, although the emergence of the formal sector and more organized value chains tends to be geographically concentrated, predominantly in urban areas. Most domestic markets continue to be served by the informal sector. The modern retail sector gradually emerges, but with a focus on urban markets for packaged processed foods. Overall, food safety controls remain underdeveloped. Where there are centres of enhanced food safety capacity, these predominantly serve export and urban middle-class markets. Very quickly, the domestic regulatory apparatus becomes overwhelmed by the rising range and incidence of foodborne diseases. And, because government administrative systems change slowly, it is common to see existing food safety controls used ineffectively.

The slow rate of evolution and development of food safety controls through the transitioning stage reflects the weak incentives for investment across the public and private sectors. The polity is slow to respond to the growing burden of foodborne diseases. This largely reflects the fact that existing systems of surveillance are inadequate, such that the scale and rate of change in the prevalence of foodborne disease is largely unknown. There is little incentive to allocate scarce public resources to address a problem whose impact is largely invisible and predominantly affects the politically weak (for example the poor). Furthermore, market-based incentives are also largely missing, except amongst urban elites. While consumer awareness and concerns about food safety grows (along with increased social media attention) and some consumers are willing to pay extra for food they perceive to be safer, most consumers continue to be value rather than quality focused in making their actual food purchases. This, and the credibility of 'safe food' claims, inhibits private investment in enhanced food safety management systems.

Modernizing stage: The modernizing stage is characterized by the increasingly rapid upgrading of food safety management systems across the public and private sectors. As a result 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 systems upgrades in the private sector. More effective surveillance systems also cast light on 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 (Lloyds Register Foundation 2020).

The modernizing stage is also characterized by profound and often rapid restructuring of agri-food value chains

The *modernizing* stage is also 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 centres and rural areas. Modern retail comes to play a more dominant role beyond processed packaged foods, including in the fresh produce and fresh and semi-processed animal product sectors. The food service sector begins to emerge and, at later phases of *modernization*, expands rapidly in urban areas. At the same time, the branding of foods becomes more widespread and even the dominant basis of food marketing and consumer choice. As businesses become better organized, both as individual enterprises and collectively across sectors, they can exert greater pressure on the government to take actions to enhance public food safety management systems¹⁵.

Everything else being equal, we might expect that the role of market-based incentives will become relatively more important as consumers become more aware of the potential hazards associated with the food they eat

Overall, in the modernizing stage, the significant enhancement of food safety management systems translates into a decline in the burden of FBD. The rate of decline reflects the appropriateness, efficacy and efficiency of the enhancement of food safety controls. At the same time, the direction of this investment will reflect



Eggs for sale in Muang Phu Khoun Market, Laos -
ILRI/Susan MacMillan ▲

the relative magnitude of market-based and/or political incentives. Everything else being equal, we might expect that the role of market-based incentives will become relatively more important as consumers become more aware of the potential hazards associated with the food they eat. Furthermore, we might expect that the 'voice' of middle and eventually low-income consumers will get louder, through both market and political channels, such that a greater proportion of investment in the enhancement of food safety capacity will be directed at the supply of foods to poorer parts of the population.

The post-modern stage relates to high-income mature economies. The storyline there falls outside of the scope of this study.

15) They also face market pressure to improve the safety of the products they sell, as consumers become more aware of foodborne diseases and have increased ability and willingness to pay for food they judge to be safer. At the same time, suppliers begin to differentiate their products in the eyes of the consumer based on food safety. Thus, broader application of good agricultural practice (GAP), good manufacturing practice (GMP) and hazard analysis and critical control point (HACCP) is observed, driven by proactive businesses that now yield the private gains necessary to incentivize innovation in the food safety management systems they employ.

How does all of this relate to the present study? The gravity of the informal sector food safety problem differs significantly across the food safety life cycle as does the likely feasibility of various strategies, policy instruments and programs. Upper middle-income countries will tend to have much greater financial and administrative resources and much better physical market conditions to address food safety concerns among informal enterprises. Furthermore, the scope of the problem might be much smaller there because of the more advanced formalization of the food system and, likely, the greater opportunities for people to exit/transition away from informal food vending or processing and enter the wider labour market. The incremental or even accelerated formalization of food enterprises could well be feasible in these settings with transitional costs (and social tensions) being relatively manageable.

The situation would seem to be entirely different for countries/settings transitioning from low to lower-middle income status and among the countries traversing the lower middle-income phase of economic development. Here, changing demographics and diets and other factors are potentially adding to the food safety risk profile; while informal sectors remain dominant, formalization is only incipient, and central government, let alone sub-national capacities, for food safety management remain highly underdeveloped. This would seem to be the hotspot where the nexus of problems and constraints trumps prevailing capacity as well as prevailing ideas on what to do. For these countries, a passive approach or simply pursuing 'business as usual' would come at a great cost. Many such countries could be a decade or more away from a situation in which the food system is more substantially formalized and vertically coordinated. For them, a passive (or simply reactionary) approach to unsafe food in the

informal sector will likely result in a much higher public health and economic burden of unsafe food for years to come. This, however, is not inevitable and there are opportunities to change course. We return to that theme later in the paper.

One more thing when considering the setting for interventions related to food safety in the informal sector: we need to recognize that the locus for regulatory, facilitative or any other action will normally NOT be at national level. Rather, it is at the level of local and especially municipal governments. Typically, only municipal government agencies or locally based departments of national ministries interface with informal enterprises on a regular basis. This suggests that efforts to build the food safety capacity of higher levels of government could have little or no impact on the incentives for informal sector food enterprises to upgrade their food safety controls. It is only when the formal sector begins to predominate, as in some upper middle-income countries, that centralized government capacity becomes the greatest priority¹⁶.

Pulling the themes together, it is evident that there is a need to: (i) combine attention to incentives and capacities; (ii) combine interventions which tackle those dimensions both internally to and externally of the informal enterprises; (iii) prioritize interventions vis-à-vis the types of informal enterprises which are high-risk yet also more highly accessible; (iv) differentiate the settings in which problems are arising and opportunities are presenting themselves; and (v) move away from the notion that central agencies can potentially implement a coherent set of interventions vis-à-vis the informal sector. We explore the various elements of this prescription for more effective and sustainable food safety interventions in low- and middle-income countries below. ◆

16) That is beyond putting in place the legal instruments necessary to give municipalities the regulatory authority over food safety within their jurisdiction.



5. Status of domestic 'food control' systems

In this section, we draw attention to capacity deficits commonly found in domestic food safety control systems in low- and middle-income countries.

5.1. Central or national level capacities

Before examining the status of food safety capacity in low- and middle-income countries, it is important to recognize the limitations these countries face in their overall public sector governance. The World Bank's Worldwide Governance Indicators (Kaufmann et al. 2010), for example, show how low-income countries especially, but also lower middle-income and upper middle-income countries too, are limited in their ability to design and implement sound policies. One indicator, 'government effectiveness', captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Out of a possible score of 100%, low-income countries average 15%, lower middle-income countries average 33%, and upper middle-income countries average 46% (Figure 5). On average, high-income countries score 87%. Low- and middle-income countries also have low scores for regulatory quality, control of corruption and the rule of law. Broadly, therefore, it is fair to characterize most low- and middle-income countries as 'weak regulatory states'; countries that have highly constrained abilities to formulate and implement policies and regulations to govern economic activities, including food safety, within their jurisdiction.

Undertaking a broad assessment of food safety capacity in low- and middle-income countries is hampered by the lack of a standard set of indicators that can be applied to contexts where there is a paucity of data and food markets are predominantly informal in nature¹⁷. For some low- and middle-income countries, detailed assessments have been undertaken of public food safety controls, for example using the FAO/WHO Food Control Assessment Tool¹⁸. However, many of the findings are not conducive

to quantification or cross-country comparisons and/or the results are not in the public domain; the results of such formal assessments are often considered to be politically sensitive and/or there are fears that they will reveal weaknesses in the efficacy of food safety controls to trading partners.

The limited assessments of food safety capacity that are available highlight how countries at similar levels of economic development tend to show many common weaknesses and common areas of strength. For example,

Undertaking a broad assessment of food safety capacity in low- and middle-income countries is hampered by the lack of a standard set of indicators that can be applied to contexts where there is a paucity of data and food markets are predominantly informal in nature

a series of recent food control assessments carried out by the FAO in lower middle-income countries in South Asia and Southeast Asia found common situations in terms of¹⁹:

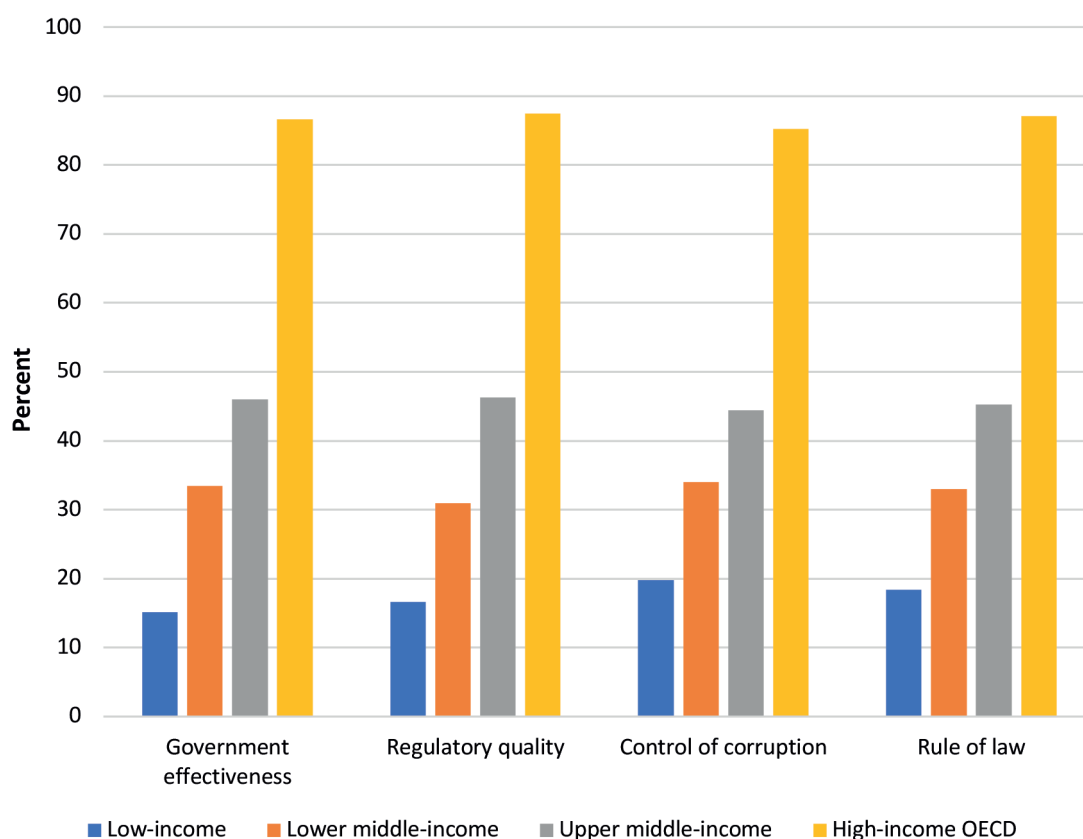
- **Policy and regulation:** (i) A lack of a comprehensive national policy, translating into a lack of prioritization of key elements of food safety management capacity; (ii) evidence of progress on food law modernization but less on regulations to enable implementation and enforcement of the law; (iii) the presence of

17) Efforts have been made to construct indicators of food safety capacity for industrialized countries. For example, a Food Safety Performance World Ranking has been applied to the (higher income) members of the Organization for Economic Cooperation and Development. That assessment combines quantitative and qualitative indicators to evaluate important elements of food safety management systems (Le Vallee and Charlebois 2014). For many of the indicators, the pertinent data would be lacking for the vast majority of low- and middle-income countries.

18) See: <https://www.fao.org/documents/card/en/c/ca5334en/>

19) For example, FAO (2015a), FAO (2015b), FAO (2016), and FAO (2018) in assessments related to Vietnam, Myanmar, Sri Lanka and Indonesia.

Figure 5. Worldwide Governance Indicators by country income group, 2021.



Source: World Governance Indicators (2022)²⁰.

many standards, yet a lack of clarity on their voluntary versus mandatory nature; and (iv) the categorization of food businesses on the basis of size and market orientation (i.e. domestic versus export) rather than on considerations of risk.

- **Institutional arrangements:** (i) Fragmentation of institutional responsibilities among lead agencies/ministries with often weak coordination due to overlapping mandates or gaps; (ii) weak coordination or delegation of functions between central agencies and those at sub-national level and significant limitations of manpower and other resources at the sub-national level; and (iii) fragmented systems for laboratory testing, which typically do not function as a network and therefore do not yield broader inferences on food safety.
- **Data to inform priorities and decisions:** (i) Research from different disciplines often use different samples

and methods, making it difficult to analyse results in an integrated way; (ii) the lack of coordination among agencies inhibits the aggregation of data monitoring food safety hazards or illness outcomes; and (iii) while there are some in-depth studies on specific industries or hazards, research tends not to link up with broader changes in the food system and therefore cannot generally inform forward-looking policy-making.

Each of these deficiency dimensions represent especially strong barriers for coherent and effective public action vis-à-vis the informal sector. For example, consider the lack of coordination and proper delegation between central agencies and those at the sub-national level. This typically translates into situations where municipalities either lack the legal authority to act or lack the requisite human, financial and technical resources and guidance to act effectively. Data concerning food safety hazards and how and where these enter informal food distribution channels tend to be

20) <https://info.worldbank.org/governance/wgi/>

generated in sporadic, location-specific surveys and the results may not help inform priorities or interventions in other locations or value chains.

In the absence of comprehensive data on food safety controls in low- and middle-income countries, more partial indicators and benchmarks have been employed to assess and monitor prevailing capacity. For example, the World Health Organization (WHO) uses an annual survey of United Nations Member States to monitor compliance with the International Health Regulations (IHR)²¹. With respect to food safety, the WHO applied a single benchmark until 2018, namely mechanisms for multisectoral collaboration established to respond to food safety emergencies and outbreaks of foodborne diseases. Since 2018, two benchmarks have been

Data concerning food safety hazards and how and where these enter informal food distribution channels tend to be generated in sporadic, location-specific surveys and the results may not help inform priorities or interventions in other locations or value chains

employed: the strength of surveillance systems in place to detect and monitor foodborne diseases and food contamination; and mechanisms are established and functioning for the response and management of food safety emergencies (WHO 2018). Countries are rated on a scale from one ('little or no capacity') to five ('sustainable capacity').

The most recent data suggests appreciable variation in the strength of mechanisms for multisectoral collaboration to respond to food safety emergencies (Figure 6). Some 60% of low-income countries are rated as having 'little or no capacity', and most of the remaining countries in this category having a rating of two. The situation is more varied among lower middle-income countries: while most countries have a rating of two, nearly 20% have a rating of three, which is generally considered to be the threshold for satisfactory capacity. Most upper middle-income countries have at least a satisfactory rating, with more than a third having a rating of four or five.

With respect to surveillance systems to detect and monitor foodborne diseases and food contamination, all low-income countries have a rating of 'little or no capacity' (Figure 7). A significant proportion of both lower and upper middle-income countries have a less than satisfactory rating. For example, 75% of lower middle-income countries and 44% of upper middle-income countries have a rating of one or two. A broadly similar pattern is seen about mechanisms for the response and management of food safety emergencies (Figure 8), although with upper middle-income countries exhibiting lower levels of capacity on average than for surveillance systems to detect and monitor foodborne diseases and food contamination.

A particular weakness in the already limited data on the food safety capacity status of low- and middle-income countries relates to the informal sector. One data set that is potentially useful in this regard, however, is that provided by the Performance of Veterinary Services (PVS) framework of the World Organization of Animal Health²².

21) Other international organizations have developed self-assessment tools to enable countries to assess and benchmark their food safety control capacity. For example, the Inter-American Institute for Cooperation in Agriculture (IICA) developed a tool enabling countries to self-assess using scales rating their strengths and weaknesses in relation to various technical capacities as well as the available funding and human resource cadre for managing food safety (IICA 2008). Multiple countries in Latin America and the Caribbean have applied this tool although the results are not available in the public domain. The United Nations Industrial Development Organization (UNIDO) has periodically undertaken surveys to gauge country 'quality infrastructure and institutions', including those related to metrology, standardization, certification and testing. Its 2015 report on food safety capacities across 66 countries was mostly based on 'yes/no' evaluations on whether countries had food safety laws, policies and entities to perform certain food safety-related functions (UNIDO 2015). The African Union has been collaborating with the International Livestock Research Institute (ILRI) and others to develop and apply an Africa Food Safety Index. Work on this is still evolving but the index intends to capture a combination of pertinent health, trade and system capacity indicators. In its present version, the Food Safety Systems Indicator (FSSI) component of the index consists of affirmative indicators that related policies, standards, monitoring plans, focal institutions, laboratories, capacity development plans and awareness programs are in place (PACA Secretariat 2021).

22) <https://www.woah.org/en/what-we-offer/improving-veterinary-services/pvs-pathway/>

Figure 6. Rating of strength of mechanisms for multisectoral collaboration to respond to food safety emergencies by country income (n=81).

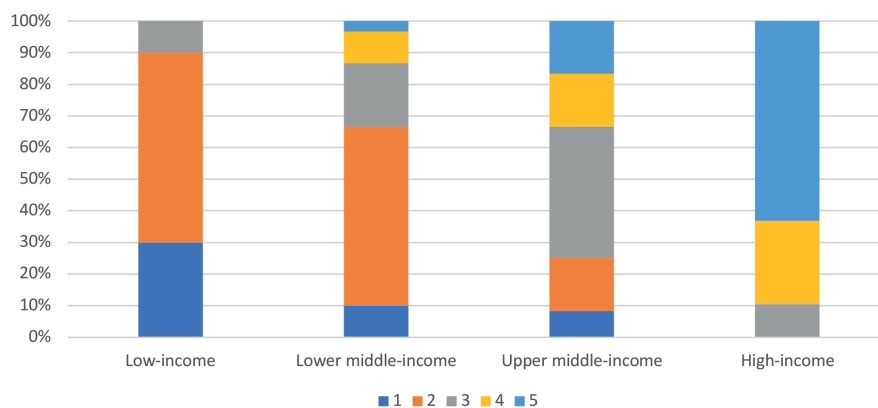


Figure 7. Rating of surveillance systems in place to detect and monitor foodborne diseases and food contamination (n=24).

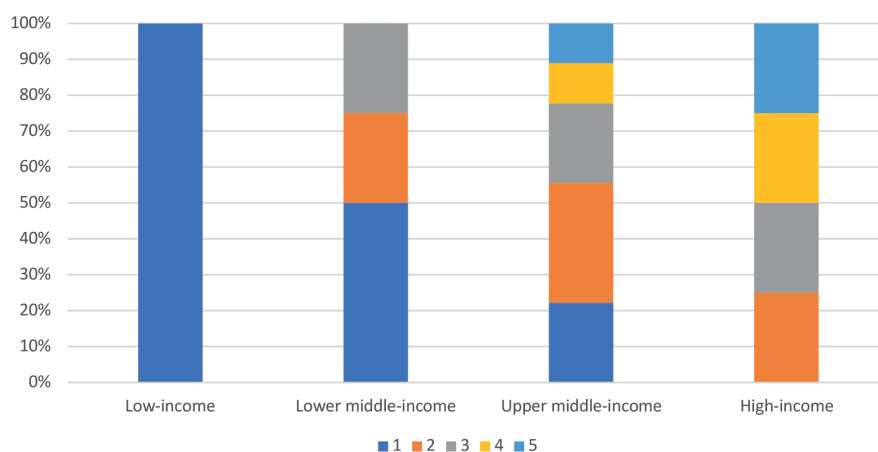


Figure 8. Rating of establishment and functioning of mechanisms for the response and management of food safety emergencies (n=24).

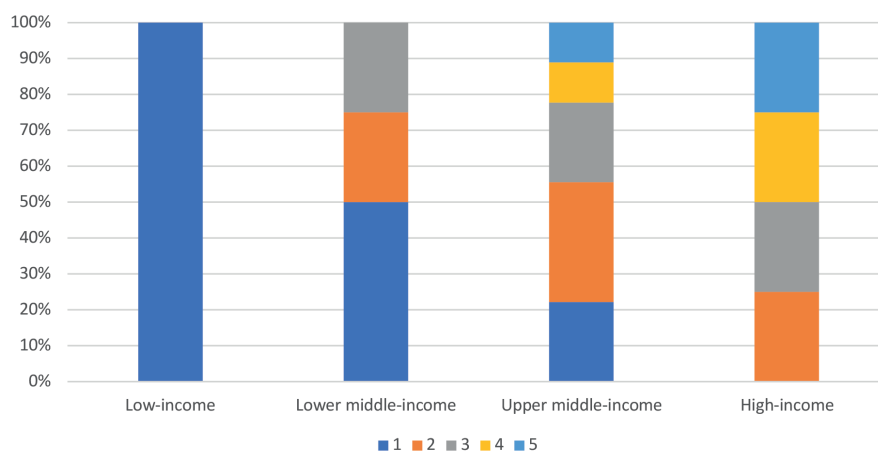


Table 3. Selected PVS capacity indicators for representative countries

Country	Operational funding	Inspection of abattoirs	Inspection of product collection and distribution centres	Animal product identification and traceability	Veterinary drug residue testing	Emergency response	Average of capacities	Animal source food disability-adjusted life years (DALYs) per 100,000 people
Low-income countries								
Afghanistan	2	1	1	2	1	2	1.5	224
Ethiopia	4	3	2	2	1	3	2.5	207
Haiti	2	1	1	1	1	2	1.3	196
Madagascar	1	1	2	1	1	2	1.3	593
Senegal	3	3	1	1	1	3	2.0	250
Lower middle-income countries								
Bangladesh	2	1	1	1	1	1	1.2	118
Honduras	1	2	2	1	2	1	1.5	116
Morocco	4	3	3	2	3	5	3.3	136
Uzbekistan	2	1	2	2	1	3	1.8	34
Vietnam	2	2	2	1	3	3	2.2	144
Upper middle-income countries								
Botswana	4	2	2	3	3	4	3.0	131
Brazil	4	4	4	3	3	4	3.7	68
Colombia	4	3	3	3	3	4	3.3	91
Costa Rica	3	2	3	2	3	3	2.7	54
Malaysia	4	3	3	3	3	4	3.3	43

Source: Based on OIE data and Li et al. (2019).

While the focus of the PVS assessment of countries is on veterinary services, these data are useful because of the importance of these services for the management of food safety with respect to animal-based foods; these are often the riskiest foods and account for a significant share of the FBD burden of foods sold through the informal sector in low- and middle-income countries. Of the 38 critical competences in the PVS framework, six are important for the management of the safety of animal-based foods in the informal sector of low- and middle-income countries. Each is assessed on a five-point scale from one ('little or no capacity') to five ('very high level or capacity or application of best international practice').

The results of the PVS assessments of low- and middle-income countries are reviewed in detail in Jaffee et al. (2019), including prominent distinctions among categories of countries and an illustrative mapping of 'capacity gaps'²³. To illustrate the variation in critical capacities for food safety controls for animal-based foods in low- and middle-income countries, **Table 3** provides data for selected countries. Most low and lower middle-income countries are assessed to have inadequate capacities in many of the displayed functions; scores of one and two that are highlighted red and yellow, respectively. Even among low-income countries, however, there are outliers of enhanced capacity, for example in the case

23) This earlier analysis also considered functions which would be primarily important for food safety in the formal sector, including quarantine and border controls, regulation of veterinary drugs, laboratory infrastructure and quality assurance, animal traceability, and certification of animals and products.

Even among low-income countries, however, there are outliers of enhanced capacity, for example in the case of Ethiopia and its pertinent operational funding and its oversight of the operations of abattoirs

of Ethiopia and its pertinent operational funding and its oversight of the operations of abattoirs. In contrast, all the upper middle-income countries in **Table 3** have attained at least minimally satisfactory capacity in most or all the six core functions, although, again, there are some notable exceptions.

The last column in **Table 3** draws from the work of Li et al. (2019) that took estimates from FERG and attributed the burden of FBD to animal-based foods. A strong correlation can be observed between the PVS assessment of the six core capacities and the FBD burden. Countries with low or very low capacity have a higher FBD burden in comparison with countries both within and beyond their income group. This implies that under-investment in capacity to manage the safety of animal-based foods in low- and middle-income countries is costly in public health terms²⁴.

5.2. Food safety action at the sub-national level: a regional illustration

The data discussed above provide a fragmented picture as to the status of food safety capacity in low- and middle-income countries. Further, their focus is very much on centralized capacity within these countries, with little or no consideration of food safety controls at the level of municipalities. This omission is problematic given that it is typically at the local government/municipal level that regulatory and other authorities interface with the informal sector. Thus, if we want to know the prevailing status of capacity to manage food safety within the informal sector of low- and middle-income countries, it is to municipal governments we must look. Unfortunately, however, this is an area where literature is scarce. While there is a quite plentiful body of prior research on municipal government in low- and middle-income countries, this most frequently addresses issues like urban planning, tending only to engage with the informal sector when it comes to planning issues such as location/relocation, provision of basic infrastructure and services (see, for example, Meyer and Auriacombe 2019; Tan and Teaihagh 2020).

To gain some insights into the food safety control capacity at the level of municipalities in low- and middle-income countries, we draw upon results of a joint World Bank/FAO survey of Asian cities conducted in 2019 (reported on in Acharya et al. 2020). This survey covered 170 cities across 21 countries within East, Southeast and South Asia. Survey respondents were drawn from a wide variation of cities in terms of size and national per capita income²⁵.

24) The correlation between a broader set of PVS capacities and the burden of FBD is mapped out for several dozen countries in sub-Saharan Africa in Jaffee et al. (2021).

25) The survey sought to characterize and benchmark the overall engagement of cities on food-related matters from primary production through aggregation and distribution, and on through to matters related to consumption, dietary quality and food waste management. City representatives were asked about their perceptions of various food-related challenges and opportunities for their cities, and the mandates available to their cities to act on various issues. They were also asked about the portfolio of policies, programs and regulations which are applied, and the leading and secondary constraints inhibiting these actions and/or their effectiveness.

The survey found that in most Asian countries, municipal authorities have an important yet often unrecognized role in addressing emerging food safety risks. Often, it is municipal departments that are responsible for the inspection and oversight of wholesale and retail markets and food businesses and vendors, and the reporting of FBD among the urban population. However, these functions are often under-resourced. Municipal food safety units commonly focus their day-to-day efforts on policing the limited pool of larger formal sector food enterprises, and otherwise react to food safety outbreaks and other negative events with a ‘firefighting’ modus operandi. As argued in Acharya et al. (2020), with growing recognition of the public health and commercial costs of unsafe urban food, municipalities now need to invest more, and more smartly, in food safety capacity, to focus more on preventive rather than reactive measures, and to place as much effort on enabling and facilitating improved food vendor and provider practices as on enforcing regulatory infractions.

The survey found that in most Asian countries, municipal authorities have an important yet often unrecognized role in addressing emerging food safety risks

Over 65% of the respondent cities indicated that unsafe food in the informal sector is either a ‘highly significant’ or ‘moderately significant’ problem. This proportion is higher than the concern expressed for unsafe food in the formal sector, which around 50% of the respondent cities recognized to be a problem. With respect to both the formal and informal sectors, however, there appears to be a considerable gap between concern about food safety and practical actions. An illustration of this can be seen in **Figure 9**, which contrasts the state of action in multiple areas across city size categories. With a few exceptions, only a minority of cities are actively engaged in actions to manage food safety despite having the legal/administrative mandate to do so. Thus, approximately 40% of cities across all size categories indicated that they are taking significant action to manage food safety

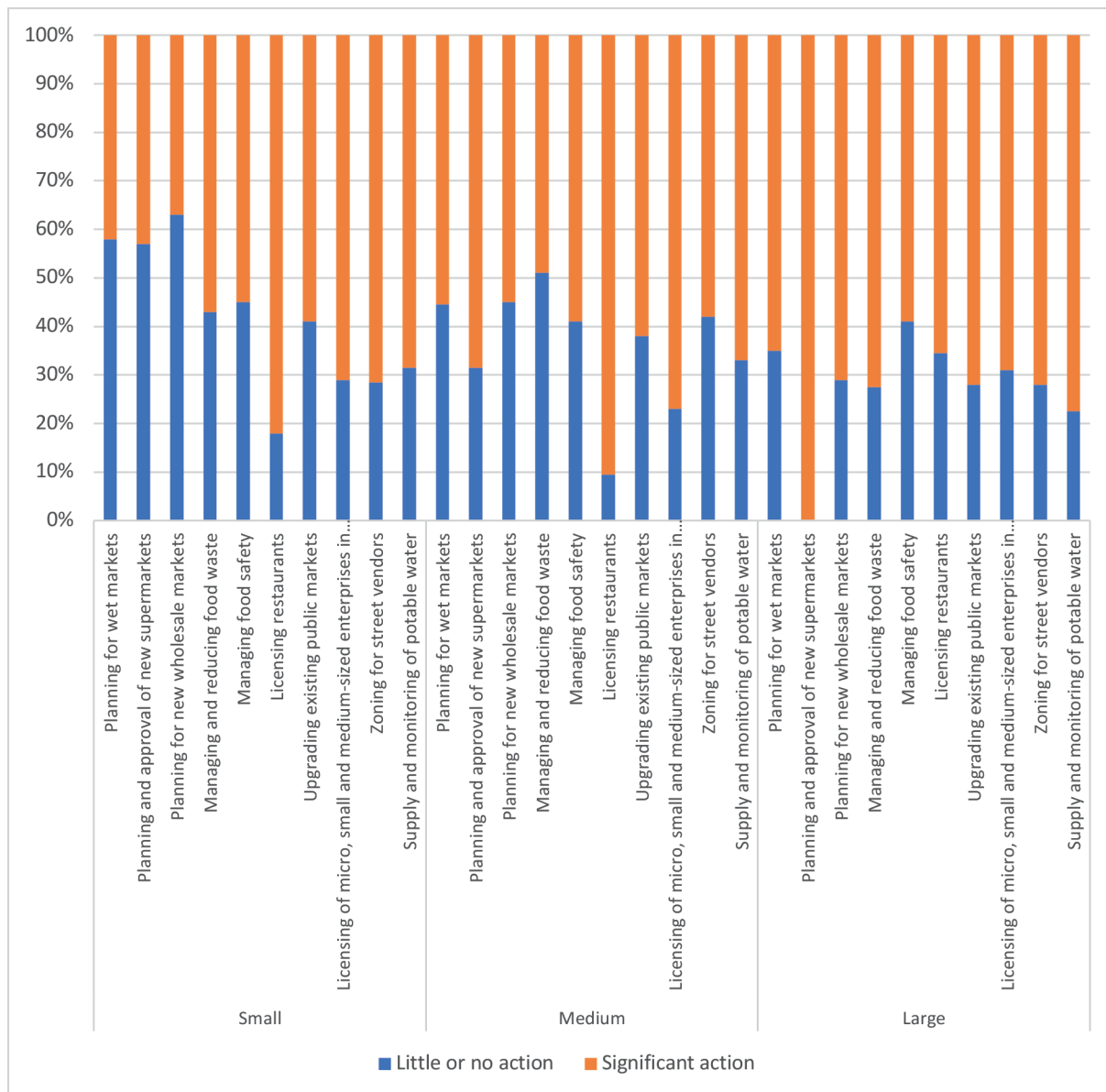
overall. With respect to the traditional/informal sectors specifically, the planning of wet markets remains a significant area of focus only for most small cities, while the upgrading of public markets remains a significant activity for less than 40% of medium and larger cities. The licensing of restaurants and micro, small and medium-sized enterprises or zoning of street vendors is undertaken by less than one-third of cities in all three size categories.

Respondents were asked about obstacles to their city’s deeper engagement on matters related to food, including food safety. Weaknesses in prevailing (national) laws and city mandates appear to be less significant obstacles (**Figure 10**) than financial and human resource constraints, weaknesses in the pertinent physical infrastructure, the presence of large numbers of unregistered operators, and limited public awareness about or engagement with food safety and other issues.

As a result of the weaknesses in food safety regulatory capacity observed in low- and middle-income countries, and especially as regulatory systems interface with the informal sector at the municipal level, the incentives for enterprises to upgrade food safety controls tend to be minimal. For example, Singh et al. (2018) highlight how, because of the lack of legal controls and hygiene inspections on street vending sites in India, vendors have little or no motivation to follow food safety best practices even when trained to do so. Further, adulteration of street food, for example with illegal additives (including colours) is a frequent occurrence in India, predominantly because of the lack of regulatory oversight (Sezgin et al. 2016). In many cases, this neglect of the informal sectors is not intentional, but rather, as Resnick et al. (2019) relate, more a case of benign neglect. Thus, even where government-mandated oversight is in place, this

Even where government-mandated oversight is in place, this is rarely comprehensively implemented and/or there is a tendency to ignore unlicensed operators as if they did not exist

Figure 9. Significance of action by municipalities with mandate for food safety-related actions by municipality size.



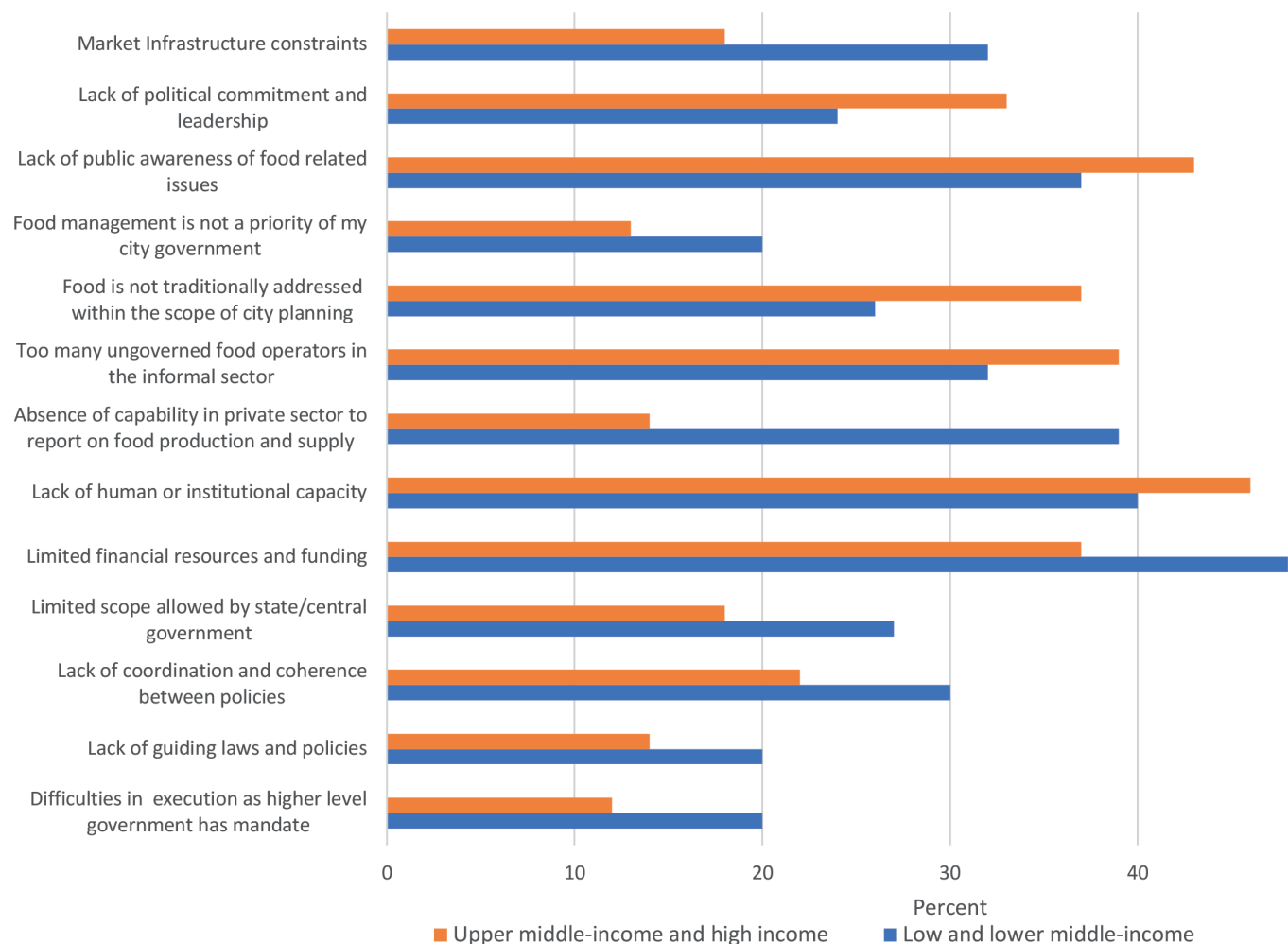
Source: Calculations by authors of the WB/FAO survey data.

is rarely comprehensively implemented and/or there is a tendency to ignore unlicensed operators as if they did not exist (Te Lintelo 2009).

The over-emphasis on the upgrading of centralized food regulatory systems can have significant and unintended consequences for the informal sector and the food safety controls it employs. Thus, to the extent that regulatory controls impose significant costs on formal sector enterprises, for example where the financial and other costs of non-compliance are significant, these can act

to disincentivize informal enterprises from formalizing. This has been observed, for example, in the case of food safety regulation in the Brazilian meat sector (Azevedo and Bankuit 2019). Perversely, therefore, in this context, less onerous food safety rules can be associated with a decline in informality. Also, where fines and/or unofficial payments (in the form of loans, confiscation of goods etc.) are high, and given the larger and formally registered enterprises are more able and willing to pay, such payments can act to enhance the competitiveness of the informal sector vis-à-vis the formal sector. ◆

Figure 10. Factors deemed major obstacles for cities in Asia addressing food issues.



Source: Calculations by authors of the WB/FAO survey data.



6. Broad strategies for addressing food safety in the informal sector



▲ *Lois Jemutai at her shop in Mosormbor, Kapsaret, outside of Eldoret, Kenya. ILRI/Kabir Dhanji*

In this section, we examine two key approaches to addressing unsafe food in the informal sector. We start with one unfortunately common approach, which aims to solve the problem by driving informal enterprises out of business. This rarely ‘works’ and, even when it does, it often results in a lowering of food access and affordability for large numbers of urban residents, in turn generating demand for the re-emergence of informal food vendors. We next examine different ways in which interventions have sought to impact the sector, framing these in relation to the concepts laid out in Sections 3 and 4 above.

6.1. Exclusion—washing away the problem through punitive actions

In food safety management, one of the elements of good practice is to have an overarching policy framework, laying out core objectives, operating principles, and institutional responsibilities. This framework may be provided in a national food law and/or through some type of strategic or planning document. With the help of development, trade and other partners, many low- and middle-income countries now have such a framework

in place. Yet, most such frameworks devote little or no specific attention to the challenges associated with traditional food distribution channels and the informal enterprises therein. In most low- and middle-income countries, therefore, there is no distinctive vision and/or set of approaches which might be applied to address the specific challenges faced in efforts to boost food safety controls in the informal sector.

For many low- and middle-income countries, the implicit (and sometimes even explicitly stated) solution to the ‘backwardness’ of the informal sector and the food safety risks it presents is to hasten its demise

For many low- and middle-income countries, the implicit (and sometimes even explicitly stated) solution to the 'backwardness' of the informal sector and the food safety risks it presents is to hasten its demise. This is achieved by rendering informal enterprises illegal, evicting businesses from their place of operation, raising their operating costs through harassment and/or confiscation of goods and assets, and demanding bribes (Kamete 2007; Resnick 2017; Resnick et al. 2019; Steel et al. 2014). Further, by neglecting the upkeep of infrastructure, such as markets, necessary for the proper functioning of these enterprises, this inaction has increased the food safety risks these enterprises pose. During the past decade, new laws banning street food trading have been passed in multiple countries (see, for example, Young and Crush 2020). Indeed, some countries have gone so far as to make the purchase of food from informal vendors an offence.

A news database maintained by Women in Informal Employment: Globalizing and Organizing (WIEGO) found that, over a three-year period, there were more than 50 cases of significant eviction of street traders across major cities in Africa, Asia and Latin America and ongoing harassment of vendors in other locales (Roever and Skinner 2016). Where bans or evictions are not a common occurrence, restrictive licensing has frequently been applied to 'bring order' to situations which otherwise could not be properly monitored or regulated. A rich literature documents many such cases and the adverse consequences, for informal food enterprises and the (predominantly poor) consumers they serve (see for example, Roever 2014; Brown and Roever 2016; Roever and Skinner 2016; Owuor 2020). This literature is dominated by case studies involving informal street vendors. There is far less systematic analysis of policies and practices with respect to informal market vendors, food processors and/or restaurant operators (exceptions include, for example, Kazembe et al. 2019; Skinner and Watson 2020). It does seem, however, that there is somewhat greater tolerance of these sub-sectors of the informal food sector in many cities of low- and middle-income countries, except where concerted efforts are being made to 'modernize' city business districts or neighbourhoods and/or where hygiene, health or other 'campaigns' have included the targeted removal or relocation of informal food enterprises (see for example Maharaj 2015)²⁶.

Repressive approaches to root out the informal sector from the cities of low- and middle-income countries are

increasingly seen as ineffective at best, and more likely harmful to those who operate food businesses and their families, and to urban food security, especially for the poor (Young and Crush 2019; 2020). Forcing informal food enterprises to cease their operations does not suppress the reasons why they emerged and operate in the first place. Thus, such actions often simply drive informal enterprises to relocate and/or present opportunities for new enterprises to emerge and fill the commercial and/or physical spaces that are created. The overall lesson is that efforts that recognize the value of the informal food sector and provide support for the progressive upgrading of enterprises, including the food safety practices they employ, are likely to be far more successful. Of course, this will not happen overnight; as such, there needs to be both more realistic expectations of the pace of change and rather more patience.

6.2. Incremental formalization

An alternative to repressing the informal sector is to promote its gradual formalization, for example through provisions for registration/licensing, application of fees/taxes, development of peer support and monitoring networks, and stepwise application of product standards and process or facility regulations. In 2015, the International Labour Organization embraced formalization efforts through its Recommendation 204²⁷. This recommendation emphasizes the need for an appropriate legal and regulatory framework and for the provision of incentives to ease the transition to the formal economy. Simplified registration, and tax assessment and payment systems can reduce the costs of transition, while the incentives to formalize are cast in terms of improved property rights and potentially improved access to infrastructure, business services, education and skill programs, and/or access to public procurement and other markets. There are several critical elements here for improvements in food safety controls.

With the literature focusing more on street foods than other types of informal food enterprises, there is relatively little documentation of experience in the formalization of food enterprises. Although not specific to food, a recent

26) Such 'campaigns' have been particularly common following changes in local administrations or in the lead up to major (sports, cultural, diplomatic or other) events (see for example, Steinbrink et al. 2011).

27) https://www.ilo.org/ilc/ILCSessions/previous-sessions/104/texts-adopted/WCMS_377774/lang-en/index.htm

review (OECD 2020) highlights numerous examples from among Association of Southeast Asian Nations (ASEAN), Organization for Economic Cooperation and Development (OECD) and other countries of measures to facilitate fairly and effectively the transition of microenterprises from informal to formal status. Particular attention is given to efforts that: reduce the costs of business entry and streamlining business registration; diminish the financial, fiscal and regulatory burdens placed on (newly) registered companies; improve enterprise access to finance and business development services; enable registered companies to become eligible to participate in public procurement; and facilitate ways in which information technology/digitization services can improve the ways that microenterprises operate.

Three examples specifically related to food safety in micro and small food businesses are noteworthy. One comes from the United Kingdom. In 2005, the Food Standards Agency (FSA) introduced a 'Safer Food Better Business' (SFBB) program targeting very small food catering, restaurant and take-away operators in London. The approach centred on getting these operators to incrementally adopt the basics of proper hygiene and safer food preparation and storage. Diagrams and videos were created in multiple languages to illustrate safer practices at the microenterprise level. The operating philosophy was to 'engage and enable' the targeted operators rather than the traditional regulatory approach of 'enact' and 'enforce'. A review of the scheme's initial implementation found that most enterprises adopting the practices also improved their overall business by reducing waste, improving procurement practices etc. Over the years, the SFBB program has continued to evolve in order to cover a broader set of clients and services, including residential care homes, child minders etc.

A second and historic example comes from Singapore. In the 1960s, around 40,000 hawkers plied Singapore's streets and riverside selling food and other low-cost goods and services (Henderson 2010; Lee et al. 2020). This activity gave rise to serious food safety and environmental concerns. To tackle this problem, a licensing and inspection scheme was introduced but this failed to address the major problems. The decision was made to move food vendors from the streets and to relocate them into clusters in so-called hawker centres that were built by the government. By the late 1970s, some hawker centres had been built, with an additional

59 constructed by the early 1980s. These centres were located to ensure convenient access and adequate levels of business for the vendors. Most hawker centres combined market stalls and a cooked food section. Vendors were required to comply with public health guidelines. Hawker centre inspectors were deployed to enforce these guidelines. These efforts, however, were less successful than envisaged, leading the government to undertake a public health campaign tied to the hawker centres. Incentives for improved practice were adopted, first through a system of graduated fines tied to violations and later through the introduction of a grading system. Existing and new vendors were subsequently required to complete a hygiene course prior to starting business.

By the 1990s, some of the hawker centres were 20 years old and in poor physical condition. In 2001, the government allocated Singapore dollars (SGD) 420 million to undertake infrastructure improvements under the Hawker Centre Upgrading Program. Some centres were completely rebuilt and most acquired central freezers and cleaning areas. By 2014, 109 centres had been upgraded, accommodating some 6,000 vendors. With the development of additional town centres in the city-state, another 20 hawker centres have been or are in the process of being built.

Today, hawker centres continue to have loyal local customers and to be well integrated into community life, while some have become significant tourist attractions²⁸. Surveys among Singaporeans continue to show that hawker centres are the preferred out-of-home eating site for most consumers. Improvements have occurred over time in vendor hygiene conditions and practices. While in 2006, 77% of the licensees earned an 'A' or 'B' rating, this proportion rose to 99% by the end of 2018. The process of formalizing and upgrading street food vending has been both extended and multi-stage, yet it ultimately has been highly successful.

The third example is contemporary. Since 2020, India has been implementing a Scheme for the Formalization of Micro Food Processing Enterprises. This program combines common infrastructure, skills training, advisory services and subsidies to defray certain investments. During its first year of implementation, some 3,500 applications were approved and more than 50 'common incubation centres' were created. This formalization scheme is a small part of a much wider strategy now being

28) Singapore's hawker centres fall under the responsibility of the country's National Environment Authority (NEA). NEA sees its mission as being 'to develop and maintain hawker centres as vibrant, communal spaces, offering a wide variety of affordable food, in a clean and hygienic environment'. Here, the NEA's role covers overseeing stakeholders, developing and implementing policies for the hawker sector, maintaining the infrastructure of centres and developing new centres in line with population growth and shifts. The NEA also manages the assignment of tenancies, setting rents, issuance of licences and public relations. This unified responsibility within a single agency has proven to be effective.

Surveys among Singaporeans continue to show that hawker centres are the preferred out-of-home eating site for most consumers. Improvements have occurred over time in vendor hygiene conditions and practices

applied to India to 'engage and enable' a broad range of stakeholders to 'ensure safe and wholesome food for human consumption'.

Led by the Food Safety and Standards Authority for India (FSSAI), the 'Eat Right India' program combines attention to food safety and healthy eating. It applies a graded approach to upgrading by different types of enterprises (Nemur et al. 2019). For large food businesses, FSSAI applies a traditional regulatory approach involving regular inspections, product testing and sanctions in the event of non-compliance. Among small and medium enterprises, efforts focus primarily on capacity building and hygiene ratings to promote self-compliance (Kathuria et al. 2020). Among micro and informal businesses, FSSAI applies a cluster approach, working with groups or associations of operators, or those which are co-located to improve common infrastructure, provide training etc. Vis-à-vis the last two categories of players, FSSAI sees its role more as helping to raise practice standards rather than sanction non-compliance. It recognizes the impossibility of applying a traditional regulatory approach to India's nearly 13 million traditional grocers/kiosk operators and an even greater number of community market vendors. While the broad vision and a set of guidelines are provided from central agencies, most of the action is expected to occur, and to be financed, at the state and municipal levels. India's attempt to mainstream informal food vendors and businesses in the country's vision for safer food and healthier diets is progressive and probably represents a unique example within low- and middle-income countries. Other countries have passed

distinctive legislation to protect the rights of informal business operators and have come up with a few specific interventions targeting them, but most lack a holistic vision for the support and evolution of this (large) segment of their food systems. ◆



Wheat flour for sale in Quelimane Market, Mozambique - ILRI/Stevie Mann ▲



7. Tackling capacity and incentive-related deficits



In this section, we examine the record of interventions which can be construed as addressing either capacity or incentive-related constraints in relation to the informal food sector.

7.1. Enhancing the internal capacity of informal sector enterprises

As outlined earlier, numerous studies have highlighted how enterprises, and handlers therein, within the informal sector of low- and middle-income countries have low awareness of food safety and predominantly employ poor food handling practices. This research often points to the need for raising awareness on food safety, education and training of food handlers. Training of food handlers is indeed a very common intervention, although the evidence suggests that such an intervention alone rarely achieves sustained changes in behaviour or safer food. Without pairing such interventions with efforts to enhance incentives, the provision of training will, under the best of circumstances, only partially shift an enterprise or vendor from a state of L-L to a state of L-H in **Figure 2**.

There is evidence that, done right, training can enhance the knowledge and awareness of food safety risks and appropriate practices and procedures among food handlers. For example, improvements in food safety knowledge were found in studies by da Cunha et al. (2014) for street food vendors in Santos City, Brazil; Bas et al. (2006) for food handlers in hospitals in Turkey; Al-Shabib et al. (2016) for food handlers at a university in Saudi Arabia; Campbell (2011) for street food vendors in Johannesburg, South Africa; and Choudhury et al. (2011) for street food vendors in Assam, India. Multiple studies have also found that food safety training can positively affect the attitudes of trainees about safe food handling practices. For example, in a study of street food vendors in Haiti, Samapundo et al. (2016) found that training had a significant positive effect on food safety appreciation and a propensity to take actions to manage food safety.

Improved knowledge, however, does not always translate into safer food practices that are maintained over time. Some studies find statistically significant changes in behaviour (for a review, see Kwoba et al. 2023), yet these tend to be minor, partial, or time-bound, demonstrating the limitations of training alone²⁹. For example, Singh et al. (2016), in a study of street food vendors in India, shows that training resulted in only partial behavioural change and that this was insufficient for vendors to meet minimum food safety standards. In a study of hospital food workers in Turkey (Acikel et al. 2008), self-reported jewellery and watch wearing declined after training but other behaviours went unchanged. Importantly, the frequency of colonies of enteric pathogens growing on the hands of vendors was unchanged after training. Other studies have shown no significant change in the behaviour of food handlers because of training alone. A review of 253 such studies, mostly conducted in low- and middle-income countries, found that in more than half of the cases training resulted in 'no proper translation of knowledge' into attitudes or practices (Zanin et al. 2017). The overall conclusion of this review was that transformative behavioural change was rare. Insfran-Rivarola et al. (2020) reach a similar conclusion in their systematic review of documented experience.

The unsurprising conclusion is that training is a necessary but insufficient condition for behavioural change among food handlers. However, significant and sustained behavioural change requires much more than providing knowledge and even practical know-how, as well as

Training of food handlers is indeed a very common intervention, although the evidence suggests that such an intervention alone rarely achieves sustained changes in behaviour or safer food

29) It should be noted that, while several studies have undertaken 'before and after' assessments of knowledge and/or practices of informal food handlers, few examine longer-term sustainability by revisiting the subjects of the interventions at an appreciable time in the future.

incentives to make such changes. Insights from the behavioural sciences, including social psychology, marketing and behavioural economics, have potential relevance for designing food safety training programs and other interventions that are effective at changing the behaviour of food handlers (see, for example, Hoffman et al. 2019). Unfortunately, however, interventions directed at enhancing food safety practices in low- and middle-income countries still rarely address both incentives and the capacity to make and sustain enhanced food safety controls.

There are many other realms of economic activity in developing countries in which micro or other informal businesses play prominent roles (see **Box 2**). For some, concerns for human and/or environmental health arise from the knowledge and practices of these entities and the inability of public agencies to effectively monitor their actions and enforce applicable regulations. Useful lessons might be drawn from interventions in these areas for application in the domain of food safety.

Box 2. Fostering behavioural changes: insights from other sectors

Robinson and Yoshida (2016) provide an overview of selected interventions targeting informal medicine sellers in several African countries. Being more accessible and cheaper than formal providers, these businesses account for a large proportion of the medicines and treatments provided in these countries. Health concerns arise due to the limited knowledge of sellers, their potential sale of fake or poorly manufactured drugs, and the common tendency to provide customers with the drugs or treatments they request even if these may not be appropriate for the patient's condition. As with food safety, there are serious information asymmetries associated with the informal sale of medicines and a need for customers to rely upon personal trust for making purchase and use decisions.

Most of the interventions reviewed by Robinson and Yoshida (2016) include training on health and other matters. While evaluations of such training have drawn mixed conclusions, sustained changes in vendor behaviour were uncommon where training was a one-time event and, importantly, where this was not combined with other interventions. Important complementary interventions have focused on consumer awareness and on quality assurance and behavioural monitoring by peer groups. In the case of malaria drug sellers in Nigeria, community organizations played a critical role in tracking local area vendors, selecting sellers to serve as trainers and conducting follow-up visits to observe practices and apply social pressure on those not following recommendations. These

actions were re-enforced by public awareness campaigns. An evaluation of this intervention found a large positive impact on seller practices, especially with respect to recommendations of the correct dose of antimalarial drugs. In Ghana and Kenya, a different approach sought to change the status of medicine dealers from independent actors to members of a franchising network. This combined training, distribution of better quality-managed products and the branding of drug sales and other treatments. The results were uneven. The social standing of the vendors improved, yet some franchisees continued to stock non-approved drugs and purchase from other wholesalers. Franchise network owners found it difficult to cost-effectively monitor the many franchisees. The continued viability of these schemes seemed to depend upon either project grant funding or public subsidies.

A second area of experience from other sectors relates to curbing environmental pollution arising from the operations of informal businesses. In low- and middle-income countries, informal sector activity commonly includes pollution-intensive activities such as leather tanning, textile-dyeing, charcoal-making, metalworking, brickmaking and some forms of food processing. In most cases, a direct regulatory enforcement approach is not feasible due to limited fiscal and technical resources and a popular sentiment favouring economic activity over environmental protection. Blackman (2000) explores the mixed pattern of experience targeting the practices of traditional

brickmakers in four Mexican cities. Among other things, he finds: (i) that solutions must entail relatively low cost measures on the part of the producers (with higher cost measures typically requiring heavy subsidies to induce adoption); (ii) private sector-led initiatives may prove to be more successful and sustainable as they may better engage the enterprises and attract more public sympathy and other outside support than top-down bureaucratic initiatives; and (iii) enforcement of regulations depends critically on peer monitoring (facilitated by local organizations), together with citizen complaint mechanisms.

A third area relates to occupational health and safety (OHS) among micro and small enterprises. Across many countries, the available evidence points to a much higher incidence of accidents and other harmful events among employees of such enterprises, and especially those where physical (i.e. construction) or chemical hazard exposure is a significant risk. Limited knowledge, improper

equipment, weak facilities or environmental conditions, weak legal accountability and weak regulatory oversight are among the common factors contributing to this. While there is literature on OHS in low- and middle-income countries, most case studies and illustrations of good practice relate to relatively large formal enterprises. In Europe, some dedicated attention has been given to OHS problems and potential solutions among microenterprises. For example, a recent study highlighted 44 examples of 'better practices' involving training on raising awareness, leveraging value chain relationships, provision and cost-sharing of risk assessments, promoting the development of OHS business development services, leveraging the advisory and monitoring work of non-OHS intermediaries/associations and/or adapting regulatory supervision efforts to the circumstances of micro and small enterprises (European Agency for Safety and Health at Work 2017). Programs involving a combination of synergistic interventions seem to have had especially significant results.

Given the importance of economic and social incentives to change behaviour, one promising approach to improving food safety in the informal sector of low- and middle-income countries may be to involve consumers and peers in monitoring the behaviour of food handlers. One way to do this is to raise awareness among consumers and empower them to make demands of food handlers, shifting social norms surrounding a given behaviour. Efforts to raise the food safety awareness of consumers are discussed below. Some interventions have combined food handler training, the issuance of certificates to successful trainees and support for peer-to-peer monitoring. These studies (some of the better documented studies are summarized in **Table 4**) show that certificates can be useful in deterring harassment from local regulatory officials, while peer-to-peer monitoring helps to bring some continuity to improved practices. The issuance of training certificates also better enabled participants to receive trading licences from the pertinent authorities. Noteworthy here is that such

interventions occurred in the context of local regulatory systems that had at least some engagement with informal food enterprises.

In one of the studies cited in **4**, the benefits from the intervention were short-lived (Grace et al. 2019). Among butchers in Ibadan, the improved knowledge imparted by the intervention was seemingly not reinforced through subsequent support and/or regulatory action by the municipality, and the butchers themselves did not purchase replacements for the basic equipment provided to them under the project (for example, rubber boots, aprons and carts). The nearby municipal abattoir fell into further disrepair. Five years after the intervention, a larger modern abattoir with set butchery stalls was built through a public-private investment. Yet many of the trained butchers did not move to this new facility because of the higher fees charged and its distance from their traditional customers, even though the environmental conditions were more conducive to better food safety controls³⁰.

30) The study documents the subsequent events including the violent clash between officials and the butchers in 2018 when an attempt was made to forcibly shut down their operations in the vicinity of the old abattoir. Tests on meat produced by butchers still operating in that location displayed microbiological quality which was worse than pre-intervention, 10 years earlier.

Table 4. Training and certification in informal markets: selected cases

	Kenya	Ibadan, Lagos, Nigeria	Assam State, India
Value chain	Informal milk sector	Butchers	Informal milk sector
Time period	1997–2006	2009–2011	2009–2013
Number of traders	25,000–30,000	Around 900 in the market	Around 300 traders and 600 producers
Number of trainees	In 2010, 4,200 traders registered nationally In pilot areas, 85% of traders	80 directly by the project and around 420 by peer-to-peer training	265 traders and 480 producers have been trained
Consumers reached	Around 0.5–5 million	Around 360,000	Around 1.5 million
Intervention	<ul style="list-style-type: none"> · Training in hygiene and business practices · Provision of hygienic dairy cans with wide necks · A certificate was given to successful trainees and this reduced harassment by officials 	<ul style="list-style-type: none"> · Peer-to-peer training on basic hygiene · Provision of boots, hats, aprons, fly-proof netting and food-safe disinfectants; banners and promotional material · Use of butchers' associations to monitor performance and ensure compliance 	<ul style="list-style-type: none"> · In depth training needs analysis · Training of trainers · Training covered hygiene and business skills · Traders motivated by better relations with officials and positive publicity · Farmers by visible reduction in mastitis
Documented impact	<ul style="list-style-type: none"> · Improved knowledge, attitude and practices (KAP) after training · Improved milk safety after training - reduction in unacceptable coliforms from 71% to 42% · High economic benefits from the initiative - \$33.5 million a year 	<ul style="list-style-type: none"> · Reduction of unacceptable meat from 97.5% to 78.5% ($p < 0.001$) · Significant improvements in KAP after training · Cost of training is \$9 per butcher and estimated gains through diarrhoea averted was \$780 per butcher 	<ul style="list-style-type: none"> · Improved KAP after training · Significantly higher milk production after training and tendency for reduced mastitis · No apparent improvement in milk food safety
Current status	Training and certification was episodic and project-led but trained vendors have an important share of the market	The pilot was intended to investigate efficacy and acceptability and did not have a strategy for sustainability	Training and monitoring supported by government
Reference	Omoro and Baker (2011); Kaitibie et al. (2010)	Grace et al. (2012a); Grace et al. (2012b)	Lapar et al. (2014); Lindahl et al. (2018)

In the Assam milk case in **Table 4**, follow-up interviews and tests done two years after the training had concluded found that the trained farmers had achieved greater growth in production than untrained farmers, and generally were applying better hygienic practices (Lindahl et al. 2018). The training received by the farmers and the improved practices they implemented as a result probably contributed to reductions in the incidence of mastitis among their cows. However, the training did not translate into safer milk: there was no difference between the trained and untrained farmers in terms of the presence of zoonotic pathogens or antimicrobial residues in their

milk. Further, the trained farmers actually had a higher incidence of aflatoxin (and that was above legal limits) in their milk. Factors beyond producer and vendor hygiene practices, probably related to environmental conditions and the quality of animal feed, were critical in influencing the microbiological and chemical safety of the milk farmers produced. Thus, even a more comprehensive intervention such as this, which combines efforts to enhance capacity and incentivize improved food safety practices, appears insufficient in that it does not simultaneously address issues in the wider environment and upstream in the value chain.

7.2. Enhancing informal enterprise capacity through collective action

The informal sector, in general and specifically with respect to food, is frequently characterized as unorganized (and even disorganized), reflecting the multitude of small and unregistered enterprises, intense market competition and a rapid rate of enterprise turnover, given high rates of market entry and exit (Darbi et al. 2016). It is increasingly recognized, however, that there is often a significant degree of cooperation between informal enterprises, which can be both explicit or implicit (Young and Crush 2019), and that informal institutions, for example in the form of trust (Humphrey and Schmitz 1996), play a key role in the way the informal sector is organized and operates (Odera 2013). These more general observations regarding the potential for cooperation within the informal sector suggest efforts to engender organization between informal food enterprises may play a role in enhancing food safety controls.

It is increasingly recognized, however, that there is often a significant degree of cooperation between informal enterprises, which can be both explicit or implicit

In many low- and middle-income countries, operators of informal food enterprises have come together to form associations that vary widely in their organizational structure and modus operandi. For example, Bhowmik (2010) and Hummel (2017) review examples of street vendor associations in numerous countries, most commonly in Latin America but also in parts of Africa

and Asia. Many traditional food markets are governed or influenced by market committees or associations which typically set rules that may limit entry, manage the activities of members, provide a mechanism to solve disputes etc. Many of these organizations are funded through a fee paid by members.

In the literature, much of the attention is given to how well collective action works to address grievances, especially related to the exclusionary policies and practices of government. Success stories are cited where street vendor associations have effectively lobbied authorities to adopt national policies and legal protections for informal vendors and other types of informal workers. One example of this is the work of the National Association of Street Vendors of India, which successfully petitioned the government to develop a national policy on street vending in 2004, and subsequently a legal framework in 2014. Grassroots organizations in Kenya and trader syndicates in major cities of West Africa have also been effective advocates for national policies and improved or more flexible regulations when it comes to street vending.

Much less commonly cited are examples where associations of street vendors or other forms of informal food enterprise have worked with municipal governments to prioritize investments in facilities (including the establishment and/or upgrading of markets), organize training programs and/or implement modes of regulation that are more conducive to commercial viability and that facilitate upgrading, including related to food safety. Using examples from Bolivia, Hummel (2017) hypothesizes that governments will tend to provide encouragement and backing to collective entities involving informal workers in circumstances where regulatory enforcement is especially challenging. In such context, associations of informal food enterprises may play a role in mediating relations with government and inducing and monitoring compliance among its members.

Evidently, there is significant potential for associations and other forms of organization of informal food enterprises to improve food safety awareness and practices, and to co-manage, with municipal governments, efforts to enforce enhanced food safety controls (see, for example, Apassongo et al. 2016; Battre 2016). Efforts to organize the informal food sector around food safety can come from various directions; from within the sector itself, as with the creation of vendor associations (see Apassongo et al. 2016) or less formal systems of self-regulation (see Pena 2020), or as a reaction to actions by government (as in the case of Taiwan as described below). In all cases, however, the government has a role in supporting the legitimacy and role of such associations, recognizing that they not only give a more prominent voice to the needs of informal food enterprises, but also make the job of regulating these enterprises easier.



▲ *Fresh farm milk is delivered at a milk shop in Majengo, Turbo, outside of Eldoret, Kenya - ILRI/Kabir Dhanji*

Collective action has also proven to be important among informal enterprises in other sectors. For example, Yang et al. (2018) provide examples suggesting that the creation of cooperatives and associations by informal recyclers (i.e. trash pickers) has proven to be effective. The strengthening of these cooperatives and group networks can facilitate transfer of knowledge regarding proper waste handling and processing, related regulations and laws, environmental protection, sanitation, hygiene and health. Such cooperatives have served to legitimize the work as a public service. In some countries, these cooperatives have combined into larger regional or national movements. In Pune, India, the Solid Waste Collection and Handling Cooperative includes some 1,500 members servicing 200,000 households. In Brazil, Coopamare is one of the most successful cooperatives and the country has one of the largest and best-established national movements of waste pickers. Integration of the informal sector with its formal counterparts could improve waste management while also addressing serious health and livelihood challenges. Progress in this direction has been made in several Latin American countries.

7.3. Enhancing external infrastructure

In many low- and middle-income countries, traditional markets continue to play a major if not predominant role in the distribution of fresh foods. In many cases, these markets were established many years ago and, where physical buildings have been established, these are often poorly managed and maintained. Poor hygienic conditions, inadequate sanitation measures and improper waste disposal are very common features of these markets. Major cities often have hundreds of these markets, which are managed by the municipality or by sub-contracted entities; private ownership and management is much less common.

The upkeep, let alone modernization of traditional markets has been an area of neglect in the municipalities of many low- and middle-income countries. While

guidelines were issued for 'healthy traditional markets' some time ago (FAO, 2003; WHO, 2006), and numerous pilot interventions aimed at market upgrades have been implemented, the initial momentum has not been maintained. Few low- and middle-income country governments have adopted a national policy for the upgrading and modernization of traditional markets, provided guidelines for municipalities in the management of such facilities and/or earmarked necessary public resources. As a result, most efforts to upgrade markets are more ad hoc and often based on limited project interventions that target one or a few facilities in individual cities. There are minimal documented lessons learned to further guide such efforts and prevent past mistakes from being repeated.

Most efforts to upgrade markets are more ad hoc and often based on limited project interventions that target one or a few facilities in individual cities

The few examples of concerted efforts to upgrade traditional markets in low- and middle-income countries, however, provide useful case studies of the benefits that are (or are not) forthcoming, including in the management of food safety. One notable example is Indonesia. Since 2007, the Indonesian government has displayed a commitment to improving the functioning and competitiveness of traditional markets. Early upgrades were focused on Jakarta and other Javan cities. In 2015, however, the government issued national technical standards for traditional markets and, from 2016 onwards, has encouraged and partially funded upgrades of markets on other islands. Unfortunately, the effectiveness of, and lessons learned from, these efforts to upgrade traditional markets have not been well-documented.

Some researchers contend that these efforts have focused too heavily on infrastructure upgrades and relatively little on the strengthening of market management, the organization of market vendors or ensuring improved quality management functions (Purwanti 2017).

Another interesting country case study is China. Around 2000, the Chinese government initiated a drive to modernise agri-food supply and logistics, hoping to eliminate the perceived inefficiencies of the traditional market system. Its Nong Gai Chao program aimed to convert traditional markets into supermarkets in multiple large cities. In turn, the intention was that urban farmers' markets would be closed and support would be provided to leading agro-enterprises to accelerate supermarket development. The implementation of the program, however, proved to be problematic due to the high cost of conversion and the continued preference of consumers for traditional markets. Indeed, many of the converted markets experienced heavy financial losses.

In response to these problems, several major cities changed course, essentially refocusing on upgrading the shopping environment of wet markets to emulate the conditions of supermarkets. Yuan et al. (2021) document the experience of this in Nanjing where, between 2007 and 2014, substantial resources were deployed to upgrade 293 traditional markets. Plans laid out in 2017 called for the upgrading of an additional 230 wet markets. In addition to basic infrastructure upgrades, the renovations included central air-conditioning, WiFi hotspots, transaction information screens and systems for food traceability. Since 2011, every new residential building complex has been required to include a traditional market. Recent surveys of consumers still find a gap between the cleanliness and ambient conditions of the upgraded markets and supermarkets, which they otherwise utilize, yet those conditions are generally far better than those prevailing pre-renovation³¹.

Recently, the WHO issued updated guidelines for 'healthy traditional markets' highlighting key elements and operating principles as well as a logical sequencing for upgrading initiatives (WHO 2021). Comprehensive programs to upgrade large numbers of traditional markets in most low-and middle-income countries, however, are neither administratively nor financially feasible. Certainly, a national framework and attendant guidelines would be beneficial. However, this does not negate the need for cities to undertake a strategic review of traditional

31) In China, the fate of traditional markets became a major news item in the context of COVID-19 and the alleged connections with live animal sales at the Wuhan market. Although most traditional markets do not sell live animals, and especially live wildlife, awareness of the importance of these markets and the need to improve their hygienic and biosecurity conditions has grown, both among policymakers and the population at large.



▲ **Buying dried fish at Central Retail Market in Tamale, Ghana - ILRI/Jo Cadilhon**

markets to determine if and how they should remain a part of the urban food landscape. This includes identifying markets that require major and most urgent upgrades, and determining which markets need to be rezoned for other purposes, for example given their incompatibility with broader plans for transport, economic development etc. Phased upgrading strategies should go beyond physical infrastructure and utilities (including potable water, sanitation and electricity) to include institutional innovations, vendor training and hygiene certification, and programs to trace back produce and secure supplies from 'safe' sources.

Beyond organized traditional markets, informal food enterprises in low- and middle-income countries frequently operate in unorganized conditions, for example by the side of the road, where there is minimal access to utilities and there is little or no segregation of food handling from traffic, human activities etc. Achieving effective food safety controls in such contexts is nearly impossible. The management of such activities is a key challenge for urban planning in many municipalities, especially in the face of rapid urbanization. Efforts to control informal food enterprises have been most prominent in the case of street vendors, including providers of street food and sellers of fresh foods, including fruit and vegetables, meat and fish. In many countries, the economic and cultural

role of street food vending is well recognized, together with the role this plays in food security and nutrition (Cardoso et al. 2014). Yet, uncontrolled or unregulated street vending also poses challenges for city residents, workers and officials. Ultimately, a balance is needed between ensuring the rights of individuals to work and earn a livelihood, the preservation of public space for multiple uses and users, and the safeguarding of public health, whether this relates to food safety or a clean physical environment.

In many cities of low- and middle-income countries, street food vending is illegal and the primary interactions between vendors and city officials occur through periodic crackdowns or displacements. This undermines the viability of these informal enterprises, with vendors striving to avoid displacement rather than focusing on ways in which to enhance the commercial performance of their businesses, and does little to enhance their food safety controls (Apaasongo et al. 2016; Batreau 2016).

Arguably, a better solution is to recognize the legitimacy of informal food vendors and to upgrade their location and organization in a manner that balances the need for urban planning and control and their role as a source of livelihood and food for the poor. Where attempted, this has been implemented in multiple stages and involved official agencies from across multiple sectors including health, environment, urban planning, commerce and public health. As with the earlier example from Singapore, these efforts have typically involved the relocation of street food vendors to dedicated and better managed sites. We illustrate with examples from Taiwan and India.

The Taiwanese example comes from Hsinchu City. This involved two cases of registering and relocating street

The location of the market, on a public space near the traditional street vending sites, enabled the players to retain the social, commercial and cultural networks which had been developed over time



▲ *A fruit stall in Cambodia - ILRI/Steven Jaffee*

vendors to publicly built market centres (Weng and Kim 2016). One of these processes was successful, the other not. The successful case involved vendors in and around Zhu Lian Street. In 1999, the Zhu Lian vendors numbered about 500, some of whom were registered while others were simply condoned by government or were totally undocumented. More than half of these vendors were members of the Hsinchu Street Vendors' Union (HSVU), an association formed many years earlier to protect the rights of street vendors and to act as a bridge between the vendors and city government.

In the late 1990s, the decision was made to relocate street vendors into a new public market building located nearby. After the city failed to find a private concessionaire, the HSVU took on that role and undertook several investments to enable the market to better serve the needs of the vendors and their customers. A low concession fee helped to ensure the profitability of the venture for the union. Vendors were segmented based upon their willingness to contribute to the market's upgrading and the length of lease they would sign for their booths. Some vendors, instead of signing leases themselves, became sub-lessees to those with longer term leases. Some 250 vendors relocated to the market, offering customers a wide variety of competitively priced products. The location of the market, on a public space near the traditional street vending sites, enabled the players to retain the social,

commercial and cultural networks which had been developed over time. To this day, the Zhu Lian market building remains fully occupied and remains a vibrant part of commercial life in Hsinchu City.

The less successful case involved relocation from the Guan Dong Open Air Market to an indoor market. As with Zhu Lian, the new market building was located nearby and a participatory process was used in its design. In this case, however, the market was administered by a government agency which had difficulty applying existing laws in a flexible way that best incentivized vendors to relocate. While a new vendor organization was created, this lacked any track record and was unable to balance the interests of larger, well-established vendors with those of newer and unregistered ones. While collective action proved effective in the Zhu Lian case, it was less well nurtured in Guan Dong, the ultimate result being low levels of relocation and occupancy of the new market building.

A contemporary example comes from India. Since 2018, the Clean Street Food Hubs program has been promoted in major cities (Nemur et al. 2019). This program was initiated by FSSAI, which provides technical and training guidelines for the establishment and operation of clean street food hubs. The hubs themselves, however, are implemented by state and municipal governments working in partnership with private training, auditing and other organizations. The legislative basis for the initiative

The (voluntary) clustering approach, with accompanying infrastructure and services, would seem to have great potential for the upgrading of food safety controls, especially if program implementors are able to establish these hubs near where vendors were formerly operating

is the Indian Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act of 2014, which seeks to balance the protection of vendor rights to conduct business with various rules for vending locations and licensing.

Town vending committees liaise with state governments to propose street food hub sites that can accommodate up to 50 vendors. Site suitability is assessed and a gap analysis undertaken to identify infrastructure and training needs. Municipal corporations undertake the needed infrastructure upgrades (including, most importantly, access to potable water) and guarantee sanitation and waste disposal services. FSSAI-accredited trainers improve participating vendor awareness of food safety hazards and train them on safer hygiene, food preparation and other practices. Third party auditors certify vendor knowledge and the application of safer practices, leading to the overall certification of the hub. Certification needs to be renewed each year. Participating vendors are assigned a location and registration number and are given a food safety display board which indicates to consumers a series of 'golden rules' that the vendor commits to follow. This board is attached to the vendor's cart or kiosk.

The process of creating and implementing Clean Street Food Hubs has proven to be challenging for some Indian states and municipalities. While some 144 hubs had been proposed as of May 2019, by the end of 2021 only 28 had been certified and were in full implementation (FSSAI personal communication). This involves only a tiny fraction of India's urban street food vendors, who number in the 100,000s. It is too early, therefore, to gauge the impacts of the hubs and their sustainability. The scaling up of this program needs to be closely watched to better understand both the enabling and constraining factors affecting efforts in different states and municipalities and how the program is impacting vendors, consumers, and the safety of vended foods.

Arguably, the Clean Street Food Hub program, however, shows considerable promise. While the involvement of multiple stakeholders creates coordination complexities, this should contribute to the sustainability of efforts. Effectively enforcing regulations on huge numbers of street vendors operating in no fixed location is not feasible for municipalities. The (voluntary) clustering approach,

with accompanying infrastructure and services, would seem to have great potential for the upgrading of food safety controls, especially if program implementors are able to establish these hubs near where vendors were formerly operating. Forced relocations to more distant locales have proven to be a more problematic approach elsewhere³². Further, there is evidence that, within certified hubs, the knowledge of vendors is enhanced and that they generally comply with guidelines, such that standards of food hygiene are improved (Nemur et al. 2019).

7.4. Enhancing external market-based incentives

As described above, too often initiatives aimed at enhancing the safety of food in informal markets in low- and middle-income countries have focused on the training of food handlers without considering the incentives needed to bring about significant and sustained behavioural change. Where regulatory food safety systems are weak, as is the norm in most informal food market contexts in low- and middle-income countries, enterprises will only be incentivized to enhance their food safety controls if there is market-based pressure to do so. This implies that consumers are aware of the potential risk associated with the foods they buy, are sufficiently concerned about these risks, are willing and able to pay a premium for foods they judge to be safer, and have a reasonably reliable ability to distinguish less from more safe food. Thus, efforts to upgrade the food safety practices of informal food enterprises need to be implemented in contexts where there is established market demand for safer food, or themselves implement efforts to upgrade the practices of food vendors and promote consumed demand for the foods these vendors produce and sell.

Engaging consumers constructively in processes to promote improved food safety practices is challenging,

32) Two examples of this come from the mid-sized Indonesian cities of Yogyakarta and Solo (Taylor and Song 2016). In both cases, the initial media attention was quite positive, emphasizing the benefits of removing street vendors from public places. However, most vendors returned to the streets after being relocated to upgraded market sites. While the new sites offered objectively better infrastructure for food preparation and storage, for parking and for sanitation, they failed to attract and retain clientele. The reasons for this included the low connectivity between the markets and pedestrian circulation routes and the markets' low visibility from the street and poor integration with their surroundings. A further example is provided by Grace et al. (2019) that document the relocation of butchers to a modern facility in Nigeria that acted to undermine previous efforts to enhance hygiene practices through training and certification of handlers.

Even where they appreciate the food safety hazards they face, poor consumers are often reluctant to act on their concerns

and this may especially be the case vis-à-vis the informal sector whose comparative advantage often stems from its ability to provide food at a lower cost than formal sector enterprises. As reviewed above, there is minimal evidence that consumers in informal markets are aware of the food safety risks associated with the food they buy and/or are able and willing to pay more for foods they consider to be safer. The challenges with generating and maintaining market incentives for informal food enterprises to upgrade their food safety control are, therefore, all too obvious. To make things worse, even where they appreciate the food safety hazards they face, poor consumers are

often reluctant to act on their concerns; for example, by rejecting certain foods or by voicing their concerns, especially in a social market setting where they have long-standing contacts and relations with particular vendors.

Even if consumers lack specific information on the hazards in the foods they eat, this does not mean that they cannot or do not employ a range of strategies to reduce their own exposure to food safety hazards. For example, Si et al. (2018) found that some consumers in China avoid fresh produce with a 'too perfect' external appearance and pay attention to the seasonality of production to reduce their exposure to pesticide residues. They then thoroughly wash, boil or cook the produce they buy as a way of reducing their risks further. The same consumers also buy certain higher-priced foods from retail outlets that they trust. Likewise, consumers making purchases in community markets in Vietnam (Wertheim-Heck et al. 2014), Nepal (Thapa et al. 2020) and Kenya (Blackmore et al. 2022) were found to shop strategically, zeroing in on suppliers who they knew personally or cooperatives about which they had reliable information.

More formalized approaches to engage and empower consumers vis-à-vis informal food distribution are



uncommon and, where these have taken place, are typically limited to small-scale pilots and/or evaluative trials (for a review, see Hoffman et al. 2019). An exception is the Eat Right India initiative implemented by the FSSAI (see also above), which not only engages formal and informal food enterprises to improve their food safety practices, but also embraces consumers. A broad range of initiatives are being implemented to strengthen the contributions that consumers can make to better food safety outcomes. In 2017, the FSSAI launched an interactive educational on-line portal to convert 'all food purchasers into smart, alert and aware consumers' (FSSAI 2021; Nemur et al. 2020). The portal uses food safety display boards showing practices that food business operators must follow, and provides contacts for consumers to provide feedback, raise queries and make complaints. At the same time, partnership programs are being implemented to promote improved food safety in schools, workplaces, hospitals and houses of worship, and within the railway system.

More generally, an increasing number of municipalities in low- and middle-income countries (see, for example, Wang et al. 2023) are applying systems of hygiene ratings to gauge the status of food service outlets, to require that these ratings be displayed for consumers, and to link higher (or lower ratings) with reduced (or increased) regulatory inspection. Such systems have been shown to be effective in incentivizing food business to implement and maintain improved food safety practices, predominantly in high-income countries (see, for example, Jin and Leslie 2003; Wong et al. 2015), although some questions have been raised about their efficacy as a food safety indicator (Barysheva 2020; Kovacs et al. 2020).

More formalized approaches to engage and empower consumers vis-à-vis informal food distribution are uncommon and, where these have taken place, are typically limited to small-scale pilots and/or evaluative trials



▲ ***A wet market in Tien Lu District, Hung Yen Province, Vietnam - ILRI/Trong Chinh***

India is one low- and middle-income country that has implemented a hygiene rating scheme, working through state governments and involving accredited third-party auditors. The depth of implementation of the FSSAI's hygiene rating scheme, however, remains limited, with only 14,122 food establishments having been certified under the hygiene rating scheme as of March 2022 (FSSAI 2022). It is important to recognize, however, that the hygiene rating scheme is relatively new and remains voluntary. Further, there are some states that have implemented the rating system quite widely, for example Tamil Nadu and Gujarat. In Tamil Nadu, the hygiene rating system has been implemented both among larger food service establishments and small food business operators (FBOs). Among the latter are very small restaurants as well as child and mother care centres. The state of Gujarat has been strongly promoting the hygiene rating system among consumers as a way of generating their demand for this information. To date, some 2,200 establishments have been hygiene rated. To incentivize adoption, entities which get a 'five-star' rating are exempted from mandatory regulatory inspection for a period of two years.

Voluntary certification schemes are another market mechanism that provide a potential signal to consumers when a product has been produced and delivered with more rigorous food safety controls. At the same time, the act of labelling foods that comply with such schemes can act to induce consumer awareness of, and interest in, the safety of food. While there are numerous examples of such schemes in industrialized countries (although relatively few involve on-pack labelling aimed at consumers) (Henson and Humphry 2013), and select middle-income countries in Asia (for example China), they are virtually non-existent in the context of the informal food sector. Further, evidence suggests that it is higher-income and

One area where municipalities in low- and middle-income countries can potentially have significant impacts on food safety is food provision in institutional settings

better educated consumers who are more receptive to such labels (see, for example, Ortega and Tschirley 2017) and that consumer acceptance of these labels can vary widely according to trust in the underlying organization (see, for example, Ortega et al. 2011; Bai et al. 2013; Otieno and Nyikal 2017). A challenge here is that, in many contexts, it is consumer organizations that are most trusted for the information that they provide. These are weak or absent, however, in most low- and middle-income countries and where they are active their focus is generally not related to consumer protection in informal markets.

One area where municipalities in low- and middle-income countries can potentially have significant impacts on food safety is food provision in institutional settings³³. Such settings usually fall under the direct control of the municipality, such that these institutions can be mandated to act, negating the need for market-based incentives altogether. Also, institutional catering often provides food to vulnerable groups of the population, including younger children, seniors and those who are sick. One example is school restaurants and canteens. However, while an appreciable number of low- and middle-income countries have regulations pertaining to food safety for school meal programs (Global Child Nutrition Foundation 2019), it is evident that food safety standards can be wanting. Indeed, there appears to be

minimal consideration of food safety in the design and implementation of school feeding programs in many parts of the world (on Africa, for example, see Wineman et al. 2022).

Beyond regulations, that apparently are largely unenforced, most efforts to promote enhanced food safety in school restaurants and canteens tend to focus on the upgrading of facilities (for example, basins for hand washing, installation of refrigerators and provision of utensils)³⁴. There are, however, examples of more innovative approaches. For example, in India, to address poor hygiene practices in schools (see, for example, Sembiah et al. 2019), the FSSAI has issued guidelines for the safe preparation of food in schools that include detailed instructions on food handling practices, checklists and posters (FSSAI 2021). In Vietnam, the city of Hanoi requires that all public schools, implement the Improving Self-Management Capacity for Food Safety in School Canteens model³⁵. Further, inspection teams have been established to undertake regular inspections of all school canteens. In Ho Chi Minh City, a pilot project involving six schools has engaged with teachers to raise awareness of food safety and required these schools to only procure food from suppliers that are certified to an approved food safety standard such as ISO 22000, VietGAP or GlobalGAP³⁶. Non-governmental organizations have also become involved, working with parent-teacher associations to promote and monitor food safety practices in schools. For example, in the city of Solo, Rikolto has collaborated on the establishment of a Healthy School Canteen Standard that covers food safety³⁷.

It is evident from the examples provided above that a range of actions can (and have been) taken to augment market-based incentives for the enhancement of food safety controls where regulatory systems are weak. At the same time, these examples illustrate how such initiatives remain scarce in low- and middle-income countries, most notably in the context of informal food markets. Instead of seeing this as a negative, however, perhaps this is appropriate? Indeed, it is difficult to see how initiatives to boost market-based incentives for improved food safety controls can do much more than 'scratch the surface' when price is the predominant mode of competition and consumers have bigger priorities than the safety of the food they eat. ◆

33) This is recognized, for example by the WHO: <https://apps.who.int/iris/bitstream/handle/10665/344391/sea-rc74-11-eng.pdf?sequence=1&isAllowed=y>

34) In Latin Americas and the Caribbean, for example, see: <https://www.fao.org/in-action/program-brazil-fao/news/ver/ru/c/1396889/>

35) <https://hanoitimes.vn/hanoi-promotes-food-safety-in-school-kitchens-322271.html>

36) <https://en.vietnamplus.vn/hcm-city-strengthens-food-safety-measures-at-schools/152597.vnp>

37) <https://open.enabel.be/en/VNM/1071/801/u/workshop-on-food-safety-in-danang.html>



8. Ways forward

Increasingly, food safety is recognized not only as a major public issue, but also of great development significance for low- and middle-income countries.

The significant, although inadequate, investments by bilateral and multilateral donors, and by national governments is testament to this. Much of this investment, however, has been misdirected. There is a tendency to see the food safety problem as one of gaps in capacity of national government agencies to identify and diagnose FBD and to regulate the agri-food sector. While important, this is far from the epicentre of the key problem. In most low- and middle-income countries, most food still originates in the informal sector, which remains predominantly beyond the reach of the regulatory focus and capacity of the state.

There is some evidence that key international players in the food safety landscape are waking up to this problem, at least in recognizing the continuing role of the informal

sector in the supply of food and needing to be tackled if the incidence of FBD is to be reduced. For example, the WHO Global Strategy for Food Safety 2022-2030 (WHO 2022), in its Strategic Objective 1.4 on 'strengthen compliance, verification and enforcement', states:

'Additionally, traditional food markets and informal street food settings should also be included under the scope of food controls to ensure these settings have adequate hygiene and sanitation infrastructures and measures in place to meet food safety and public health requirements.'

Further, Strategic Objective 4.4 on 'facilitate communication, capacity-building and engagement with food business operators and foster a food safety culture', states:



'In countries with traditional food markets and informal street food settings, special programs need to be developed to communicate and engage with market traders and food stall holders on the importance of hygiene and sanitation in food processing and preparation.'

In the whole document, however, the informal sector comes across almost as an afterthought. Thus, across its 72 pages, the word 'informal' occurs only five times. Likewise, in FAO's Strategic Priorities on Food Safety document (FAO 2022), 'informal' is only mentioned three times, and in only two of the 59 paragraphs in the document. Importantly, no attempt is made to articulate guidance for effectively operationalizing, in the context of the informal sector, the WHO's core paradigm that the safety of food is a 'shared responsibility' among business, government and consumers. This represents something of a blind spot in the overall strategy and is inconsistent with other strategic work supported by the WHO, which advises a step-wise, sequential approach to building food safety capacity via a continuous process of development, upgrading, learning, integrating, adjustment and refinement (WHO 2018).

Table 5 below proposes a more sequential approach, as countries and localities gravitate from low to lower-middle to upper middle-income status, with attention at all levels given to the three partners in the 'shared responsibility' venture, albeit with distinctions in the specific nature of the interventions. Note that the items in brown relate to improving incentives and those in green pertain to strengthening internal or external capacity. For all cells in **Table 5**, importantly, the interventions tackle both incentives and capacity. In the case of low-income countries where many interventions are untested and prevailing incentives and capacity are weak, there is a focus on pilot and/or demonstration programs. In the case of lower middle-income countries, however, there is more of a focus on upscaling and more comprehensive interventions. Also, there are greater efforts to engender incentives for the upgrading of food safety controls through regulatory action and enhancing consumer awareness.

Both the WHO and FAO documents adopt a very traditional approach to the informal sector, essentially

trying to fit it into a strategy that focuses almost entirely on capacity within central government and strategies (like regulation and private standards) that are most suited to the formal sector³⁸. A key contention of this paper is that **the most appropriate locus of action for efforts to enhance food safety controls in the informal sector of low- and middle-income countries is at the municipal level, where a prominent role must be played by governments and by decentralized units of national ministries**. While recognizing that national legislation may be needed to empower municipalities to implement food safety controls within their jurisdiction, and to unlock the needed resources, the predominant focus of efforts to build food safety capacity specifically needs to be at the local level. **The top-down focus of efforts to build food safety capacity in low- and middle-income countries has largely failed when it comes to the informal sector.**

While the locus of most interventions will need to be at municipal and other sub-national levels, central ministries and national-level food safety still have important facilitative roles. For example, the legal jurisdiction and mandates for sub-national entities must be made clear. This may require legal, regulatory and/or administrative reforms. Central agencies can also greatly assist municipalities by providing guidelines in various areas, including on community market upgrade designs, approaches for incremental vendor clustering and/or formalization, food safety risk surveillance, inspection and enforcement, and approaches to consumer communications and engagement. Training curricula related to food safety extension can be provided. And, to support smaller cities, resource transfers may be needed from the central government to enable certain investments or programs to be implemented.

Food safety is an issue of science and technology, but also of behaviour. For this reason, emphasis has been put in this paper on the intersections between incentives and capacity in escaping from the low-level food safety trap seen in the informal sector of low- and middle-income countries. The safety of food is a consequence of the actions taken along food value chains from production through to consumption. Operators, including in the informal sector, must know what they need to do to ensure the food they supply is safe, and have the capacity to do these things, but also to be incentivized to take these actions. Too often, the focus of interventions is on the capacity side of the equation only (for example,

38) The WHO has established guidelines for promoting safe and healthy food in traditional markets in Europe (WHO 2021). However, these adopt a very traditional regulatory approach to 'traditional markets', which may be at least partially populated by informal sectors. Thus, there is a major focus on regulation and risk-based inspection and enforcement, as well as improvement of basic infrastructure and the training of food handlers. Arguably, these guidelines are not applicable to the context of low and lower middle-income countries.

Efforts to enhance food safety controls in the informal sector of low- and middle-income countries need to be integrated with complimentary areas of action by municipalities, including those targeting food insecurity

training of food handlers) and/or the efforts made to enhance incentives miss the informal sector altogether (for example, upgrading of national regulatory systems). **Substantive and sustained improvements in food safety within the informal sector will only happen when both incentives and capacity to implement enhanced food safety controls are shifted in tandem.**

Significant actions needed to improve the safety of food in informal markets lay outside the typical purview of food safety controls and related capacity-building efforts. These include access to potable water and sanitation, business registration, urban planning and infrastructure of public markets. For this reason, **efforts to enhance food safety controls in the informal sector of low- and middle-income countries need to be integrated with complimentary areas of action by municipalities, including those targeting food insecurity** (Moragues-Faus and J. Battersby 2021). In most cases, the most effective and sustainable interventions will not be dedicated 'food safety' ones, but, rather, multisectoral interventions pursuing multiple goals. This has been the direction of interventions in India, combining attention to better nutrition and improved safety, and linking those agendas with interventions to increase access to improved water and sanitation services (Morse et al. 2020). This approach needs to be adapted and replicated elsewhere. At the municipal level in low- and middle-

income countries, this calls for firmly mainstreaming food safety into urban planning and into approaches to deliver improved municipal services. Food safety must become an area of focus not only for the few individuals who happen to have the occupational designation of 'food safety officer', but also for planners and officers working on matters related to transport, land use zoning, commerce, water and sanitation, and overall public health³⁹.

In discourse on the informal sector in low- and middle-income countries, both in general and with respect to food safety, there is a tendency to treat enterprises as if they are all the same. Nothing could be further from the truth. There are stark differences, for example, in the size and characteristics of the informal sector between low-income, lower middle-income and upper middle-income countries. Further, above we distinguish three key sub-sectors of the informal sector that differ substantively in their structural characteristics, operating conditions and market engagements, and the level of food safety risk they are likely to pose. Ubiquitous solutions to the food safety problems of informal food markets are unlikely to be effective. Rather, there is a **need to recognize the distinct challenges and opportunities that distinct sub-sectors of the informal sector present, and to design food safety interventions accordingly**. Table 5 provides some examples. While primary attention in the literature has focused on street vendors, perhaps due to their visibility and to the frequent conflicts which occur between them and local authorities, the scope for targeted and effective interventions is probably much stronger vis-à-vis community market vendors and micro/small-scale food processors that have a fixed location. The upgrading of food safety premises and practices amongst mobile players, including street food vendors, is likely to be very challenging, except where a well-planned and transparent clustering program can be implemented.

Recognizing that food safety is as much a behavioural as a scientific and technical issue when it comes to the actions of those who produce, process and handle food, the scale and nature of incentives need to be at the centre of the engagement between (municipal) government and informal sector enterprises. Strict enforcement is unlikely to be effective; indeed, this has been recognized even in the context of the formal sector of industrialized countries, as the case of the UK discussed above illustrates. Rather, **an approach of gradual and continuous enhancements in food hygiene practices is more likely to secure the**

39) Skinner and Haysom (2016), Crush and Riley (2019) and Giroux et al. 2021 highlight that informal food channels are generally not integrated into urban policy. Also, see the papers in Cabannes and Marocchino (2018) for a broader coverage of ways of integrating food-related matters into urban planning.

Table 5. Interventions to improve food safety controls in the informal sector of low- and middle-income countries by sub-sector

	Country income		
	Low-income	Lower middle-income	Upper middle-income
Traditional retail vendors	<ul style="list-style-type: none"> Assess physical structures and environmental conditions in main public markets and initiate priority upgrades Baseline assessment of consumer perceptions of the safety of fresh produce in community markets Pilot awareness-raising and training programs in conjunction with the selected market upgrades Pilot/demonstrate low-cost technologies (for hazard detection, food storage) using grants Leverage informal networks/market leaders to promote increased awareness 	<ul style="list-style-type: none"> Apply a city-wide strategic approach to public markets, determining needs for upgrading, re-zoning, re-location and implementing changes and investments at scale Assessment of consumer strategies to mitigate risks in fresh produce from community markets and their willingness to pay for food safety Awareness-raising, training and market programs to be conducted in conjunction with all market upgrade initiatives Mainstream adoption of proven low-cost technologies including via microfinance and by reducing constraints on their availability Leverage the work of formal (vendor) associations to include interventions related to food safety Implement schemes to promote procurement/traceability of 'safe' fresh produce by market vendor groups from organized farmers 	<ul style="list-style-type: none"> In modernized public markets, apply hygiene, traceability requirements, waste disposal and other standards like those applied in formal food retail Leverage the work of formal consumer organizations to both promote the business of upgrading community markets and provide a whistleblowing function for problems still observed
Traditional food processors	<ul style="list-style-type: none"> Sample survey to determine baseline status, create a risk profiling scheme and define guidelines for incremental improvement Awareness-raising and training programs focused on entities involving the most severe food safety risks Pilot/demonstrate low-cost technologies (for hazard detection, food treatment, effective cleaning) Pilot innovative and extension-based approaches to inspection and regulation 	<ul style="list-style-type: none"> Develop a registry of businesses and in 'high risk' segments, inspect performance against guidelines Apply carrots (labels) and sticks (fines) based upon findings Incorporate food safety upgrades as part of mainstream micro and small enterprise support programs Mainstream adoption of proven low-cost technologies via microfinance and business development services Pilot linkage schemes with formal enterprises (ie supermarkets, food service) Use public procurement to accredit suppliers and incentivize upgrades 	<ul style="list-style-type: none"> Enforce regulation, including the shutdown of micro/small enterprises which have repeat violations (of food safety, environmental or other regulations) Facilitate graduation, consolidation and exit Graduates should join pertinent industry associations Mainstream application of some form of HACCP to the remaining micro and small enterprises Extend a national system for food traceability and food recall to include small enterprises
Informal food service vendors	<ul style="list-style-type: none"> Awareness-raising and training programs focused on vendors of especially risky foods Pilot/demonstrate low-cost technologies (for hazard detection, food storage, food preparation) Periodic awareness campaigns for consumers regarding pertinent risks associated with food service 	<ul style="list-style-type: none"> Develop a registry of operators to include those active in the central business district and near public institutions Mainstream adoption of low-cost technologies Attach performance standards to awareness-raising and training programs, together with carrots (labels) and sticks (fines) Periodic awareness campaigns for consumers regarding pertinent risks associated with food service Inclusion of consumers in food safety report/whistleblowing schemes Pilot alternative approaches to food service clustering through zoning, public food courts etc 	<ul style="list-style-type: none"> Complete clustering process involving most vendors to function in designated/zoned areas, food courts etc

ongoing viability of the informal food sector, which is recognized to be critical for the food security of the urban poor in low- and middle-income countries, and sustained improvements in food safety. Achieving this in practice, however, likely requires a wholesale change in the role and ethos of municipal enforcement. Officials engaged in the inspection of informal food enterprises need to be positioned more as extension officers than the food safety police. Municipalities must see financial

penalties as a last resort, rather than a source of much-needed revenue.

Concentrating interventions on individuals is neither likely to be feasible at any reasonable scale nor especially effective in bringing about sustainable changes. Whether the issue is inducing behavioural changes of informal market players, attempting to enforce regulatory provisions, or implementing a process of incremental

An approach of gradual and continuous enhancements in food hygiene practices is more likely to secure the ongoing viability of the informal food sector, which is recognized to be critical for the food security of the urban poor in low- and middle-income countries, and sustained improvements in food safety

formalization, it may be essential to mobilize and utilize collective action among groups, associations or clusters of (informal) food market actors. Researchers and practitioners have drawn attention to the merits of collective action in circumstances of potential conflict between informal players and governments, but it seems essential to **better engage formal or informal groups of actors in the design and implementation of multi-sectoral programs and as a means of providing social pressures on players, to compensate for both market failures and the limited reach of governments.**

When it comes to consumers, there are obvious public health benefits from greater awareness and knowledge of the risks associated with food. Thus, ongoing campaigns aimed at highlighting critical behaviours, on the part of commercial food handlers and consumers themselves, are important. We should not expect, however, dramatic, and sustained changes in the food choices and behaviours of poor consumers, whose main motivation is feeding their family on a minimal income. Rather, such changes will be a slow and gradual process requiring sustained efforts by municipal and national governments. Also, **do not expect market-based incentives to play a very significant role in inducing large and sustained changes in the operations of informal food enterprises.** Economists argue persuasively that markets fail in many ways when

it comes to foodborne health risks, and that regulatory action is almost always needed to secure a minimal level of food safety. Further, historic experiences from today's industrialized countries show how it took actions by governments to deal fundamentally with pervasive poor food handling practices.

As noted earlier, the Eat Right India program not only engages formal and informal food enterprises but also embraces consumers. Although not explicitly stated as such, this approach represents a coordinated and multi-pronged attempt to operationalize the WHO's framework that sees food safety as a 'shared responsibility' between government, consumers and business, and applies this in a way which cuts across both the formal and informal segments of the food system. The mainstreaming of informal food vendors and businesses as part of the country's vision for safer food and healthier diets is progressive, and arguably represents a unique example amongst low- and middle-income countries. Certainly, other countries have passed distinctive legislation to protect the rights of informal business operators and have implemented some specific interventions targeting the informal sector, but most lack a holistic vision for the support and evolution of this critical segment of their food systems. How India's experiment plays out warrants careful attention, especially considering the relatively diverse administrative and operating conditions which are encountered when implementing such programs. In the coming years, we will want to understand better what works and what does not in effectively operationalizing the 'shared responsibility' ethos in markets and channels involving large numbers of small and micro informal enterprises.

While it would certainly be desirable for other low- and middle-income countries to adopt an approach that is comparable to that of India, it is likely unrealistic to expect many such countries to have the capacity and/or political will to implement a national holistic strategy which mainstreams informal food enterprises. Perhaps a more realistic approach is to **strengthen the food safety dimensions within the emerging visions being articulated for 'healthy and sustainable cities' to ensure that food safety is mainstreamed within approaches and structures for urban food governance.** Further, in so doing, to maximize synergies across multiple public policy objectives and their implementing institutions through urban food policies, programs and investments. In other words, it may be more practical to **tackle the factors contributing to unsafe food in the informal sector, not as a trickle-down dimension of national food safety strategy, but as one of the prominent inter-connected features of urban food systems in transition.** Approached in this way, the solution set might very well start with and/

To strengthen the food safety dimensions within the emerging visions being articulated for 'healthy and sustainable cities' to ensure that food safety is mainstreamed within approaches and structures for urban food governance

or extend beyond traditional 'food safety measures', including multi-purpose infrastructure, institutions and relationships.

In some cases, making progress will also require a mindset shift on the part of municipal leaders and technical field and enforcement officers. Some may recognize the role of informal food markets in current livelihoods, but not their contributions to food security, urban resilience and the overall urban economy. Alternatively, they may see all the latter contributions as temporary, to be fulfilled by more modern players and institutions in the near future. Their perspectives of the sector may be primarily negative, with its 'disorganized' nature inconsistent with visions for a more modern city. A multi-stakeholder dialogue may be needed to lay out a more inclusive vision for pursuing a healthy and sustainable urban food system. More fertile soil on which to pursue multisectoral programs which tackle both food safety and other closely related challenges may be among those cities which are already participating in national or interventional networks of cities endeavouring to mainstream food matters into urban planning and governance.

This call for integrated and incentive-based, multisectoral



Guidelines are needed to garner the attention and direct the efforts of municipalities with respect to food safety in this context of their overall responsibilities when it comes to urban planning and management

approaches, focused on municipal governments and nurturing collective action, however, represents a major challenge for low- and middle-income countries. This is not the predominant approach to the enhancement of food safety controls in these countries, either by national governments or by the bilateral and multilateral donors assisting them. Admittedly, we do see examples of more innovative approaches, such as in India as discussed above, but these remain the exception rather than the rule. Implementing such approaches for many countries will likely be challenging. Municipal governments, especially in low and lower middle-income countries, have limited capacities and tend to implement policies and programs within operational silos, as and when resources are available. Engagement between national and municipal governments also tends to be limited, at best. **Guidelines are needed to garner the attention and direct the**

efforts of municipalities with respect to food safety in this context of their overall responsibilities when it comes to urban planning and management.

With respect to the research agenda moving forward, attention needs to focus on piloting and evaluating integrated interventions directed at specific sub-sectors of the informal sector. Experimentation of individual parts of the jigsaw puzzle, be it training, consumer awareness-raising and assessment of willingness to pay or certification schemes, for example, do little to test the practicability and/or impact of such interventions. This will require that researchers engage with municipal governments and that real on-the-ground interventions across multiple facets of the food safety problem are implemented. In undertaking such investigations, attention must be given to the ways in which both the incentives and capacity of informal food enterprises are enhanced and likely to be maintained beyond the timeframe of the intervention itself.

In sum, the 'new directions' for tackling food safety risks in the informal sector of low- and middle-income countries involves: (i) a different, more localized locus of interventions; (ii) interventions which are multi-sectoral and less commonly dedicated solely to food safety; (iii) efforts to simultaneously address capacity and incentive-related deficits; (iv) giving greater priority to sub-sets of players who are rarely the primary targets of interventions, and to applications of collective action amongst them; (v) transforming most local regulatory agents into enabling, if not advisory, agents; (vi) differentiating the approach taken and the priorities adopted depending upon core structural and other dimensions of the setting; and (vii) ultimately, searching for ways to operationalize the concept of 'shared responsibility' in the context of the informal and traditional sector. ◆

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▲ From left to right, top to bottom: A milk vendor tests a jug of fresh milk at his shop in Majengo, on the outskirts of Eldoret Town, Kenya - ILRI/Kabir Dhanji - Peppers for sale in Muang Phu Khoun Market, Laos - ILRI/Susan MacMillan - Eggs sold by street vendors just outside Nghia Tan Market in Hanoi, Vietnam - ILRI/Chi Nguyen - Selling pork in a traditional Vietnamese market - ILRI/HUPH/Ngan Tran

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