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THE FOOD SAFETY AND FOOD SECURITY NEXUS IN THE URBANIZING GLOBAL SOUTH

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Abstract

Socioeconomic and structural changes in the global food system, driven by rapid urbanization in the Global South, shape the nature and scale of food safety problems as well as the strategies designed to cope with them. These changes create new challenges for ensuring food security, given that food safety is an essential dimension of food security. By reviewing existing studies, this paper summarizes three key types of contaminant (microbiological, chemical, and physical) that compromise food safety. With analyses of three cases (avian flu, genetic modification contamination, and melamine-tainted milk) in the Global South, the paper explores how food safety is being driven and shaped by socioeconomic restructuring, particularly market liberalization in the food sector. The paper then provides an overview of various initiatives being taken by consumers, grassroots organizations, governments, and the food industry to address food safety challenges. It calls for a more holistic understanding of food safety that connects food safety and urban public health, and recognizes food safety as a social and cultural issue connected with the food safety impacts of structural changes in food systems.

Keywords

food safety, food security, Global South, urbanization, socioeconomic restructuring

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Introduction

Accelerating urbanization in the Global South is posing new challenges for food security and safety. How foods are grown and processed has fundamentally changed with the industrialization of urban diets in the Global North, and increasingly the Global South. The rapid introduction of new agricultural and food processing technologies raises new food safety issues that current regulatory processes are ill-designed to understand, much less address (Brown 2013, Collins and Lappe 2015, IPES-Food 2017, Krimsky 2015, UNCTAD 2013). While maintaining a sufficient food supply in cities is an ongoing challenge, new threats to food safety are undermining food security.

Food safety is traditionally thought of as an umbrella term for the prevention of food-related injury or illness from chemical, physical, and microbiological contaminants (Hanning et al. 2012). Its significant role in food security is reflected in the definition developed at the World Food Summit in 1996 which asserts that food security exists when "all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life." This paper first introduces various core food safety concepts, and then discusses three prominent food safety scandals as case studies through which the food safety-security nexus in the Global South is explored. The purpose of the paper is to draw connections between food safety and food security as they relate to structural changes in food systems. The paper ends with examples of formal and informal responses that address urban food safety and security challenges.

The Food Safety-Security Nexus

The FAO identifies four main pillars of food security: (a) physical availability of food; (b) economic and physical access to food; (c) food utilization; and (d) temporal stability of the other three dimensions. Food safety is an inherent component of all pillars (FAO 2008). While maintaining sufficient food production and supply is the primary agenda of agri-food policies in most countries in the Global South, food safety and food security are also public health issues (Chattu 2015). Understanding the food safety-security nexus in a way that is inclusive of all people requires a food systems perspective that fosters characterizations of long-term (and not just episode-specific) health outcomes.

Food security in policy circles has historically emphasized the supply side of the food equation. The question of food security is often oversimplified to focus principally on a population's access to sufficient calories. Yet, such a focus on availability "does not assure access, and enough calories do not assure a healthy and nutritional diet" (Pinstrup-Andersen 2009: 5). This supply-side conceptualization is favoured by industry and industry-related food security research centres such as the Global Institute for Food Security whose mission is "creating technologies that will have commercial utility in advanced agricultural nations and the developing world alike" (GIFS 2019). Technological responses feed neoliberal "export farmer" narratives (Frison and IPES-Food 2016), obscuring collective, localized political, and social solutions to food security.

An overly technical conceptualization of food security has several consequences. First, it shapes food security policies as rural-focused and production-centred, sidelining emerging issues of urban food security in an increasingly urbanizing world (Crush and Riley 2017). Second, the emphasis on food availability overshadows other critical dimensions of food security, including physical and economic accessibility of food, food utilization, and the stability of both over time. Food availability does not necessarily translate into food security, especially for urban residents who typically purchase all their food and are therefore at risk of market shocks. Third, an exclusive focus on food availability prioritizes technological over political solutions for food safety and security. For example, when policy focuses on producing greater yields per hectare without addressing the land grabs that rob peasant farmers of their land, the difficult political dimensions are ignored in favour of technological fixes that are foreign-investment friendly. A food systems perspective on the food safety-security nexus is therefore required to capture these trade-offs and make informed policy decisions. The concept of food security has recently evolved from one focused on sufficient production and supply at the national level to reflect a food-systems perspective that includes accessibility, safety, and nutrition to meet international, national, regional, municipal, household, and individual needs (Clapp 2016).

Avoiding overly technical understandings of food security is essential as the emergence of many urban food safety problems reflects socioeconomic and structural changes driven by urbanization. These changes include:

- The increasing volume of international food trade.
- Legal obligations arising from expanding international and regional bodies that affect what can be sold and where.
- The increasing complexity of food ingredients and sourcing used in packaged goods.
- Agricultural intensification and industrialization (including livestock in confinement feeding operations and increased reliance on chemicals).
- Increasing travel and tourism, speeding the spread of zoonotic diseases and other food-borne illness.
- Changes in food handling practices and patterns.
- Shifts in dietary and food preparation preferences from traditional foods to packaged, processed convenience foods.
- Food processing methods such as fractionation and microwaves, and new food and agricultural technologies.
- Increasing bacterial resistance to antibiotics.
- Changes in human/animal interactions, increasing zoonotic disease risk (WHO 2006: 3).

These trends shape the nature and scale of food safety problems as well as the strategies designed to cope with them.

Types of Food Safety Contaminants

Food safety challenges faced in the Global South are both similar and different to those in the Global North during its industrialization and urbanization periods. Recently, concern about food safety in the Global South has shifted from micro-biological contaminant risks associated with a lack of modern technologies (e.g. clean running water in processing facilities) towards risks connected to the uptake of modern technologies (IPES-Food 2017, Krimsky and Gillam 2018). There are three key categories of food safety contaminants: (a) microbiological, (b) chemical, and (c) physical (Table 1). In a food systems view, the industrialization of urban food systems contributes to long-term health impacts through exposure to processing additives, pollutants, and pesticides. A fourth category of food safety contaminants is therefore required when examining the food safety-security nexus: i.e. (d) diet-related non-communicable diseases (NCDs).

Microbial contamination includes acute food poisoning and is caused by improper handling, preparation, and storage methods of food. The Global South experiences various microbiological food safety problems. Infectious diseases are implicated as a food safety-security nexus issue, especially emerging infectious diseases such as Severe Acute Respiratory Syndrome (SARS), bacterial food borne illnesses, H1N1 (swine flu), avian flu, and the like (IPES-Food 2017, Waltner-Toews 2017). Many of these emerging infectious diseases are zoonotic in nature, meaning they cross from animal species to humans through the food value chain. Outbreaks caused by zoonotic diseases represent

TABLE 1: Categories of Food Safety Contaminants

Food safety issue	Food safety compromised by	Trends driving food safety issue (WHO 2006)
Microbiological contaminants		
Food poisoning and microbiological issues	• Meat from diseased animals • Spoiled food; improper food preparation • Unsafe food in restaurants, street vendors or supermarkets • Unhygienic canteens; toxic plants • Zoonotic diseases	• Increasing volume of international trade • Increasing complexity of food types and sourcing • Agricultural intensification and industrialization (including livestock) • Increasing travel and tourism • Changes in food handling practices and patterns • New food processing methods • Increasing bacterial resistance to antibiotics as a result of overuse in agriculture • Changes in human/animal interactions increases zoonotic disease risk
Chemical and genetic contaminants		
Pesticides, chemical additives	• Pesticide use and residue exposure • Poor regulatory and enforcement environments in Global South put profits before public health • Chemical additives and processing aids permitted in food production • Inadequate regulation and lack of data	• Agricultural intensification and industrialization (including livestock) • Increasing volume of international trade • Application of novel technology ahead of society's capacity for oversight
Novel foods and genetic contamination	• Genetic contamination of seed stocks (drift from genetic engineering) • Creation of novel allergenic proteins • Unintended consequences as a result of genetic manipulation processes	• New food and agricultural technologies • Legal obligations arising from expanding international and regional bodies • Most countries see products of genetic engineering as requiring only a risk assessment considered "novel foods" in Canada – a category created to address chemical additives and structural alterations to foods new to the diet
Physical contaminants		
Food adulteration and fake foods; physical contamination	• Ingredient substitution to cut costs; includes non-food ingredients and food ingredients that are not what is on the label • Use of non-food substances in food production and processing • Intentional mislabelling of a food — allergenicity and inherent plant/animal toxicity for humans	• Increasing volume of international trade • Increasing complexity of food types and sourcing • New food and agricultural technologies

Source: The authors, informed by WHO (2006), Rosel and Grace (2015), Eckerstrorfer et al (2019), Si (2015

the majority of recently emerging infectious diseases recorded in humans and so are a likely source of new pandemics (Lee-Gammage et al 2018).

The second category of food safety contaminants relates to chemicals and food additives. Environmental contaminants connected to industrial agriculture are at the centre of the food safety-security nexus. Pollution generated from industrialization contaminates soils and water bodies, with heavy metals that lead to brain damage, nervous system damage, organ failure, and cancers (IPES-Food 2017: 28), affecting people in both urban and rural settings. Livestock agriculture contributes to the concentration of arsenic, zinc, and copper in water systems (Mateo-Sagasta et al 2017), while wastewater from regions with mining and smelting operations used in agriculture also results in dangerous lead, cadmium, and mercury levels (e.g. IPES-Food 2017). Food additives, some of which are illegal, are another kind of chemical contamination that subjects processed food to safety risks.

Genetically engineered food is also seen by some researchers as a food safety risk. Genetic engineering (GE) with chemical contamination is included in Table 1 as it is governed by novel food regulations in most countries intended to address chemical/structural changes to foods as a result of new technologies (Eckerstorfer et al 2019, Heinemann et al 2013). Food safety concerns associated with GE food include unpredictable allergenic effects from the new proteins produced by transgenes and changes in metabolism due to the presence of new enzymes (Bawa and Anilakumar 2013, IPES-Food 2017, UNCTAD 2013). The food safety risks of GE centre on three issues: (a) the unpredictability of the natural environment in which products of GE interact; (b) the inability to adequately observe, confine or control the expression of products of GE once out of the lab; and (c) the lack of compulsion for corporations to self-monitor the effects of products of GE in the marketplace (McAfee 2008: 154).

The third key category of food safety contamination relates to physical contaminants in food, including both the accidental inclusion of objects and the purposeful adulteration of food – such as the use of non-food or illegal ingredients in food processing. Fraud is committed in a variety of ways by food producers or processors seeking economic gains. The complex and lengthy supply chains associated with a consolidated, globalized food system create safety issues due to (a) the varying capacity of suppliers to engage food safety protocols, and (b) the capability of jurisdictions to monitor and enforce food safety guidelines effectively (Holdaway and Husein 2014). Besides adulteration, food fraud also includes counterfeiting, mislabelling, diversion, over-running, simulation, tampering, and theft (Kendall et al 2019). Fraudulent food generates various public health risks that could be more risky to food security than traditional food safety threats due to the unknown nature and health consequences of many adulterants (Spink and Moyer 2011).

Food safety is not only an issue of agriculture but also an urban public health concern. Given the persistence and complexity of food safety problems, a more holistic framing of food safety is required. This connects food safety and urban public health through various disciplines and perspectives, including agriculture, food science and technology, manufacturing, processing, microbiology, epidemiology, and human and veterinary medicine. Such a perspective is modelled on the UN's "One Health" initiative, in which the silos separating plant health, livestock health, ecosystems health, and human health are approached as one inter-related health system (Craddock and Hinchcliffe 2015, Waltner-Toews 2017).

Food safety involves more than what can harm a person within days of eating a given food product. Contemporary changes in quality, digestibility, and nutritional composition that result from food processing are unprecedented in the human diet. City dwellers are eating and drinking products made from ingredients that have never been in traditional diets (with unknown impacts on health and wellness), displacing whole foods that have sustained cultures for millennia. Brazil's most recent food guide is an attempt to reverse this trend, highlighting whole foods over processed foods (FAO 2019). When applying a systems view, diet-related NCDs – including diabetes, cancers, and heart disease – are recognized as food safety issues driven by the industrialization of urban food systems. Globalized food corporations have power over food environments, placing downward pressure on nutritional quality and ingredient variety, while shaping what is affordable and acceptable to consumers (Clapp and Scrinis 2016).

Changes in urban dietary patterns in the Global South, such as adoption of ready-to-eat foods and fast-food outlets from the Global North, are reshaping traditional diets and leading to a rise in adult onset diabetes and heart disease in countries including Brazil and India (Hu 2011). A food systems view of food safety includes recognizing the impacts of changing dietary patterns on long term health outcomes and NCDs. When governments allow certain junk foods to be sold to children, for example, there are food safety impacts on children's heart health as they become adults, in addition to the e.coli risk when they eat the food as children. Approaching industrial foods that lead to NCDs as a contaminant could radically alter the urban food safety conversation. Other NCDs, such as chronic kidney disease and Non-Hodgkin's Lymphoma, have been linked to the chemicals used in industrial food production (Benbrook 2019).

Case Studies of the Nexus

Case Study 1: Avian Flu and Industrialization of Asia's Food Systems

Avian flu is a strain of influenza that reflects the underlying connections between food safety and the industrialization of urban food systems. Research shows that 60% of all known human infectious diseases are transmitted between humans and other animals, known as "zoonotic" diseases (Waltner-Toews 2017). Avian flu is a zoonotic disease caused by pathogens capable of transferring between animals and humans. As people move into cities, the potential for avian flu pandemics increase. Flu viruses have for millennia lived non-disruptively in the guts of birds. Pigs and humans are newer to the flu, with researchers suggesting it is perhaps only in the last 500 years that humans and pigs have been susceptible (Farndon 2005, Wu et al 2015). The domestication and enclosure of animals and people in intensified conditions have created the the conditions for zoonotic diseases to jump species. The problem is exacerbated in the Global South as regulations and infrastructure may be inadequate to address the issues raised by intensive livestock practices, including waste handling and water quality issues (IPES-Food 2017: 26, GRAIN 2006).

The first alarming avian flu outbreak was reported in China in 1997, and took only a few years to sweep across Asia in the early 2000s. Several countries – beginning with Bangladesh and Indonesia – experienced heavy H1N1 outbreaks among their poultry populations. Reports of illnesses in humans surfaced throughout 2003 and 2004 (WHO 2013). The outbreak was driven by a combination of (a) habitat loss driving animals (migrating birds) into closer proximity to human settlements (and into closer proximity to domesticated birds that live within those human settlements); and (b) the industrialization of Asia's poultry sector over the past few decades, creating conditions for speedy transmission. Large poultry populations are closely tied to urbanization. In the 30 years, coinciding with rapid rural-urban migration in Thailand, Indonesia, and Vietnam, chicken production exploded, from roughly 300,000 metric tonnes (mt) of meat in 1971 to 2,440,000 mt in 2001. China's production of chicken tripled to nine million mt per year in the 1990s as an increasingly urban population bought more meat (GRAIN 2006). This growth hinged on the rapid industrialization of Asia's poultry sectors, removing birds from the countryside and raising them in Confined Animal Feeding Operations (CAFOs) near cities. Typically populated with genetically uniform animals, CAFOs concentrate waste, creating suitable environments for pathogens to spread, adapt, and rapidly reproduce. Housing conditions and feed practices exacerbate pathogen risks (GRAIN 2006, Saenz et al 2006). Yet it was wet markets, which are decentralized, often rudimentary, centres of trade for small, independent producers, that were singled out as sources of outbreaks. The avian flu outbreak resulted in mass culling and the country went from being self-sufficient in poultry products in 2005 to being a net importer in 2006 (GRAIN 2006).

Opportunistically, US chicken giant Tyson, supply chain giant Cargill, and Marfig of Brazil are among major global powers acquiring Chinese farms and running vertically integrated operations built on the CAFO model. These corporations have crushed competition and control the lion's share of global markets. For regulators unable to cope with food illness outbreaks, the promise of greater traceability brought by these corporations implies fewer food safety issues (Pi et al 2014), although the evidence shows that the industrial food system does not live up to this promise. For example, the prevalence of and perceived threat of food allergies and food intolerances are on the rise and connected to molecular changes associated with industrial food processing (IPES-Food 2017: 36-37).

Surveillance, containment, vaccines, and drug treatments are the four main methods for addressing influenza outbreaks. If prevention is to work, it must begin within 30 days of the first infection or else an outbreak is much more challenging to contain (Farndon 2005, Gostin and Berkman 2007). Yet, across the globe, outbreaks are quieted or hidden by executives of large livestock companies through fear that consumer demand for livestock products will drop (Farndon 2005, Pi et al 2014). Afraid of losing market share, Thailand and Cambodia mismanaged their outbreaks early on. One processor alone ramped up slaughter from 90,000 to 130,000 chickens per day and a flu epidemic raged for months while millions of chickens – sick when slaughtered – were shipped overseas to export markets (Ear 2011, Farndon 2005: 88). Informal and formal markets were disrupted as trade in backyard chickens and provisioning were affected alongside the commercial trade. Despite the fact that cooking meat prevents the possibility of avian flu transmission between birds and people, perception of risk then led to the culling and disposal of millions of otherwise edible birds, causing economic hardship for producers and increasing food insecurity. In the 2003-2004 outbreaks, Vietnam alone lost 17.5% of its poultry population, reducing GDP between 0.3% and 1.8%, and causing food security issues for a population already at risk (McLeod et al. 2005).

In sum, rapid urbanization contributed to this pandemic as livestock populations and human settlements have simultaneously increased in size and proximity. Urban food security is further compromised by compartmentalizing food production, taking birds out of small-scale, household level, and wet market management systems where they provide pest control, fertilization, and occasional eggs and meat for peri-urban and urban communities. Consolidation of power has prioritized export poultry sectors in some countries in the Global South at the expense of ecological and community health, leaving urban consumers vulnerable to market shocks (Zinsstag 2012).

Case Study 2: GMO Contamination of Traditional Corn in Mexico

Increasing urbanization has prompted efforts to produce food with greater efficiency to meet urban demand. Genetic engineering proponents suggest that technology allows for greater yield on less land; an attractive prospect for urban centres in the Global South seeking sustainable food systems and affordable food. The case of maize transgene contamination came to the world's attention in 2001 (ETC Group 2002). Mesoamerica is the centre of origin of genetic diversity for maize – and farmers in the region have a unique historical and cultural relationship with the crop. The global maize trade has its origins in the cultivars from what is now Mexico and Central America, including important wild phenotypes with various relationships with domesticated cultivars. When GMO maize was introduced into the global marketplace, farmers, researchers, and governments interested in maintaining the genetic integrity of Mexico's maize heritage expressed concerns about the potential for transgenic drift to undermine the genetic integrity of the seed bank of Mesoamerican farmers, and thus negatively affect food security (Quist and Chapela 2001, Rowell 2004). Such disruption of genetic integrity can also be seen as a food safety issue (Kay et al. 1999). Local seed guardians and researchers were concerned about food safety implications, and the lack of data on the impacts of genetically engineered maize on plant, ecosystem, and human health; as well as the incursions on culturally distinct ways of valuing food safety and security.

Despite a moratorium on genetically engineered maize in Mexico at the time, Quist and Chapela (2001) showed that transgenes originating in engineered maize developed in the United States had made their way into Mexican maize. Whether through intentional planting (as some critics suggested), or through accidental cross-contamination as a result of seeds being imported to Mexico, genetic pollution in a biologically sensitive and biodiverse geographical context raised concerns about food security (Rowell 2004). If genetic diversity is compromised, the ability of a plant family to adapt to changing climate (and the pests and diseases that a changing climate introduces) is compromised, in turn affecting food security.

Some researchers were optimistic that the use of "substantial equivalence" would protect food supplies. Substantial equivalence is the belief that the plants or animals produced through genetic engineering are similar enough to their non-engineered parents to be treated the same way. Substantial equivalence could be used to identify similarities and differences between existing and novel foods that could be subject to further toxicological investigation (Kuiper et al 2001). Because no international standards exist for those follow-up toxicological inquiries, and the research provided to regulators for approvals is inaccessible to researchers, confidence in the substantial equivalence approach to keep the food system safe is fairly low among researchers critical of genetic engineering in agriculture (Collins and Lappe 2015).

Regulators in the United States take a politically convenient approach to GMO safety built upon the conceptual bifurcation of nature and society. What proponents call a "science-based" strategy for regulation relies on the questionable assumptions that (a) the effects of genetic engineering can be observed, confined, and controlled effectively outside the lab; (b) corporations can safely self-monitor the effects during production and in the marketplace of their genetically-engineered products; and (c) the risks and benefits of transgenic crops can be assessed independently of the specific ecological and social contexts in which they are cultivated (Collins and Lappe, 2015 Krimsky 2015, McAfee 2008). Promoters of biotechnology and government agencies assume a level of rigour in verification and safety testing that critics have called into question (Altieri and Rosset 1999, Krimsky and Gillam 2018, Leu, 2014). A fuller discussion of the risks and concerns of applying genetic engineering to food systems can be found in Antoniou et al (2012) and Krimsky (2014).

The issue of genetic contamination of Mexican maize varieties highlights the role governments ought to play in overseeing the responsible introduction of novel foods, providing reasonable assurances that novel foods are safe for human consumption, and that novel agricultural inputs avoid negative ecological and social costs. The food industry has been successful in creating a system of self-regulation, as well as having biotechnology treated in law as substantially equivalent to food produced through sexual selection or hybridization. This reflects the ongoing consolidation of corporate power in the global food system, but provides very little evidence about the long-term impacts of GE. In practice, the presence of GMOs is regarded by many as a direct threat to food security by impacting biodiversity, political autonomy, and cultural identity (McAfee 2008).

Case Study 3: Melamine in Food

The 2008 melamine milk scandal in China was caused by non-food chemical additives in food to boost the level of protein content in milk, baby formula, and other food products. Melamine is a chemical compound with various industrial uses, including the production of laminates, glue, and flame retardants. When added to baby formula, 300,000 children fell ill and six died. While much of the attention in the news cycle focused on baby formula contamination, all milk products were affected, and the scandal continued for two years after the discovery of tainted products despite restructuring and recalls.

By March 2009, the government had disbanded Sanlu, the state-owned dairy first exposed as producing the tainted baby formula, forcing the company into bankruptcy. This dealt a further blow to parents seeking compensation, as Sanlu's assets were handed over to another corporation. Parents saw this as an effort to exonerate government officials and undermine their efforts to seek compensation for increased healthcare costs (Yang 2014). While there was a great deal of anger directed at national dairy firms, most ire was reserved for government. Citizens were critical of regulatory oversight of business, government accountability, and the political system generally, as evidenced by Wiebo netizen commentary which focused on the implications of the scandal for social order and governance rather than on the actual health issues the scandal raised (Yuan et al 2015). The consequences of the scandal have been far-reaching. It led the Chinese government to restructure the dairy sector, issue the Food Safety Law, and completely reconfigure its food safety governance system (Holdaway and Husein 2014). The scandal also led to a strong push from the Chinese state to scale up and consolidate the sector in the belief that industrialization would solve the food safety threat (Sharma and Zhang 2014).

Food safety concerns have also driven Chinese consumers to prefer high tech, heavily processed, and packaged branded products over localized, traditional diary networks. Yet, the melamine scandal is closely related to the industrialization of the urban food system. Rapid urbanization and the proliferation of supermarkets has resulted in a preference for branded processed milk products over the home delivery networks that dominated China in the 1980s and 1990s. Supermarkets have become China's largest retailing format: in 2012, they commanded three-quarters of the total sales of modern retailers, and 46% of total grocery retail (AAFC 2014). The new branded products are marketed through supermarkets and convenience store chains that benefit from consumer belief that supermarkets carry brands based on product quality and value. The consequence is loss of faith in local food systems (Fuller et al 2006) and hastened food system industrialization as more people abandon traditional foods and markets. However, the melamine milk scandal had such a large impact precisely because of the industrialization of the dairy sector. It was not only a consequence of the national distribution network of these monopoly enterprises, but also the standardized requirements of protein content in milk.

The scandal is linked to urbanization in other ways. Rapid urbanization drives demand for the cheap food upon which urban centres rely for their existence, creating economic incentives to cut corners in food production (Collins and Lappe 2015). This is one of the many ways in which "health impacts in food systems cannot be seen in isolation from socio-economic drivers" (IPES-Food 2017: 70). Increased urbanization is a driver in the "westernization" or industrialization of diets in the Global South. Rising incomes contribute to rising consumption of dairy products, which are not traditionally part of Chinese diets (Fuller et al 2006). The consolidation of global food systems contributes to rising costs for small-scale producers and their compliance with industrial food safety standards (Frison and IPES-Food 2016). Cheap food comes with hidden costs. The demand within industrialized food systems for cheap food means that corners are cut and quality compromised for producers to turn a profit.

Market Liberalization, Structural Change and the Food Safety-Security Nexus

The three case studies demonstrate that the market liberalization of recent decades in the Global South has critical implications for food safety and food security. Liberalized markets have resulted in aggregation, supermarketization, and consolidation; all structural changes that affect food safety. With market liberalization has come increased industry self-regulation (Clapp 2016, Frison and IPES-Food 2016). In practice, this means a redistribution of responsibility from the public to the private sector (IPES-Food 2017). The liability-centred approach puts the orderly conduct of food systems business as the primary food safety goal and not the maximization of public health (Martin 2014). Aggregation means the pooling of supply by global food giants (Elder and Dauvergne 2015), which makes tracing the source of a food safety outbreak difficult. Supermarketization represents a process of rapid transition from independent, decentralized, street-based food procurement to the same mass retail environments that dominate the Global North.

Research suggests that food-borne illnesses are more likely to spread into numerous products across large geographic areas in the consolidated and integrated food processing industry (IPES-Food 2017, Waltner-Toews 2008). Consolidation within the food industry has the dual prospect of addressing some food safety concerns while introducing others. On the one hand, it can introduce consistent systems and traceability regimes that help raise food safety standards in the Global South to meet the requirements of importing countries. On the other hand, consolidation in the distribution and aggregation of supply chains increases the risk that contamination events are vast rather than localized.

With the expansion of the global food chain to include suppliers in countries whose food safety regimes and inspection processes are outside the control of multinational food companies, demand has been generated for international standards to be established by governance bodies such as the WHO and FAO (Holdaway and Husein 2014). Industry-led certification systems have been established to facilitate trade according to these global standards. The Hazard Analysis and Critical Control Points (HACCP) certification system and various international safety organization designations, for example, increase traceability and improve record keeping. These safety standards require investment, which is best met in consolidated food chains as the high costs of meeting international food safety standards are very difficult for independent smallholders.

This industry exercise in traceability contrasts with alternative food networks and the informal markets that have long constituted food systems in the Global South; characterized as they are by direct relationships between food producers and consumers. With poor traceability being a feature of the commodity-focused global food system, discovering the cause of a given outbreak can be both time consuming and economically devastating to businesses along the supply chain. When food safety issues do arise in deeply consolidated food systems, the impact of a food safety issue on both population health and on food security is exacerbated in time, space, and scope (Klein and Xiu 2010). Consolidation within the food industry also changes the urban food environment. The growth of supermarkets has meant a corresponding rise in the consumption of ultra-processed foods, livestock and dairy products, sugary foods, soy products, and alcohol. At the same time, the consumption of grains, tubers, vegetables and pulses or grain legumes has fallen (Holdaway and Husein 2014). These dietary changes have led in turn to a rise in NCDs.

Addressing Food Safety Challenges

Various initiatives are being taken to address food safety challenges. The everyday actions of consumers to cope with increased food safety risks are one example. These include selecting produce or packaged foods with care, washing and preparing food in ways that reduce risks, and seeking shorter value chains (Roesel and Grace 2015). Civil society organizations and the FAO have championed a gender lens on food safety and security in the Global South (FAO 2010). Roesel and Grace (2015) argue that this is necessary because women are much more reliant than men on informal food networks for livelihoods.

At global trade talks, large corporations use their lobbying power to influence food safety regulations in favour of their globalized model of production, often enforcing rules across the sector regardless of risk or scale. Outcome-based regulation has the goal of improved food safety in contrast to the prescriptive regulation that currently dominates industrial food systems. A one-size-fits-all approach ensures that small-scale, traditional butchers and dairy processors cannot compete due to the costs of implementation of regulations designed for high-volume processors (Martin 2014). This impacts on food producers and the citizens who rely on informal food networks for sustenance. For small producers, loss of an entire flock may take them years to recover, as was the case for small commercial operators in Vietnam following the 2003 avian flu outbreak. For many, that meant not only food insecurity but insolvency (McLeod et al 2005). Food security is ultimately compromised in this approach to food safety as backyard poultry and wet markets for live birds were banned as a response to the avian flu crisis (Yuan et al 2015).

Communities and industry alike have responded to food safety issues by agitating for new policies to combat urban food safety challenges, including better enforcement of existing food safety laws and regulations as well as the creation of new ones. Formal approaches to food safety include adoption of local, regional or international food safety standards. Institutional capacity to respond in the Global South is uneven at best and non-existent in many regions. Despite the advantages of preventing and controlling zoonotic diseases over treating humans after infection, poor households are responsible for both the preventative care of livestock and the treatment when family members become ill. A study examining pastoral communities' health expenditures in Kenya, where outbreaks of endemic zoonoses are frequent, found that under-investment in preventative care creates a feedback loop of poverty, driven by disease and impacting food security, nutrition, and health (Grace et al 2017).

While institutions affect the ways a society perceives food safety (as evidenced by the increasingly important role international industry standards play in food safety governance and policy), food safety scandals shape those institutions. The melamine scandal in 2008, for example, triggered a series of institutional changes in China at the policy level, such as the new Food Safety Law in 2009 and the establishment of the National Food Safety Commission in 2010 (Jia and Jukes 2013). These institutional changes affected how business was done, as well as the businesses themselves, with the dairy industry undergoing massive restructuring in response to the crisis, effectively intensifying food system industrialization based on the questionable assumption that such an effort would lead to greater food safety (Zinsstag 2012). Scaling up or intensifying industrialization are common responses to urban food safety and security threats, despite evidence that industrialization may, in fact, be putting food security and food safety at greater risk.

Governments have a role to play in addressing the urban food safety-security nexus in the Global South. For example, national governments create export policies that favour agribusiness without assessing the unintended effects of these policies on NCDs (Altieri and Rosset 1999). Some researchers suggest incorporating sustainability principles into national dietary guidelines as one of many composite approaches required to achieve food safety and food security goals (Nishida 2016). Enhancement of North-South cooperation through research agencies as well as aid agencies may be a pre-condition for the type of deep cooperation that is required. Further, technological fixes alone will not address food safety breakdowns that lead to food security issues. One view is that further engagement of civil society and development of international treaties are required to address the crippling issues of resource depletion, climate breakdown, and poor governance. The effects of these three issues on health can best be mitigated by governments at the national level working collaboratively with each other, with civil society, and with health professionals at the international level (Zinsstag 2012).

Integrating appropriate forms of food production with human settlements becomes an increasingly necessary step in addressing the nexus by reversing some aspects of centralization. Agroecological rather than industrial approaches to food systems in urban and peri-urban settings may provide an avenue to address this challenge (Frison and IPES-Food 2016). Agroecology addresses some of the conditions that contribute to pandemics related to food safety, and encourages investment and renewed commitment to workable, sustaining food economies. This management approach reduces food safety risks from chemical residues in food.

In cities of the Global South, alternative food networks provide new approaches to rebuilding the trust between consumers and producers undermined by food safety scandals (Si 2017). These civil society responses to food safety also forge larger alliances with other sustainable development initiatives such as the New Rural Reconstruction Movement in China (Si and Scott 2016). With more than half of the Sustainable Development Goals (SDGs) relating directly or indirectly to food systems (Picchioni et al 2016), building coalitions among stakeholders and government champions of the SDGs could provide some much needed political will to address the complex and often conflicting needs of a growing urban population in the Global South.

Conclusion

Food safety is an inherent component of urban food security. Having access to safe food is one of the prerequisites for maintaining food security at the regional, household, and individual level. Yet structural changes such as globalization, urbanization, supermarketization, and consolidation are reshaping food supply chains in the Global South, creating conditions for the emergence and evolution of the food safety problems associated with industrialization, food processing, and distancing previously seen in the Global North. These structural changes make food safety problems in urban centres in the Global South increasingly complex, in the context of (a) the lack of regulatory and other capacity to address food safety problems; and (b) the lack of power of marginalized communities. Further, these changes impact on the transmission of traditional knowledge that informs food safety practices, from food preparation to resource management (Roesel and Grace 2015). As a result, addressing food safety challenges involves the efforts of multiple actors, such as consumers' everyday coping strategies, the enforcement of policies, and the both formal and informal initiatives.

The key findings from the analysis in this paper include the following:

- Food safety is currently disconnected from food security goals and requires "joined up" policy.
- Small producers are pushed out of the food system as they are unable to implement new food safety regulations that favour industrial systems and economies of scale. This results in the consolidation of power and increased food security vulnerability in the face of inevitable market shocks.
- Food security and food safety research needs to consider social and cultural dimensions (not simply technical aspects) to identify food safety problems and solutions.
- Future food security may depend on broad genetic diversity distinct from acts of lab-based biotechnology.
- Rapid urbanization leads to consolidation in the food sector and larger producers gaining more market share, exacerbating the scope and scale of food safety issues when an outbreak or safety issue arises.
- Without public engagement and sacrifice, governments and industry may not respond to crises.
- The desire to deliver cheap food at all costs represents a food security concern driven by market economies and the globalized and integrated food system helmed by a handful of multinational companies (Clapp 2016). When disconnected from food safety, this leads to poor decision-making that prioritizes economics over people.

Food safety is a critical dimension of urban food security analysis and needs to be part of the food security research and policy agenda. Expanding research to address food safety becomes increasingly important when we consider the implications of food scandals that break trust in the food system generally, and in food governance institutions in particular. We need to think beyond technical notions of urban food safety that focus on business risk reduction. Without addressing the emerging food safety issues connected to food system industrialization, urban food security will remain an elusive goal.

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