



Investing in rural people

Food safety, trade, standards and the integration of smallholders into value chains

A review of the literature

by

John Humphrey

School of Business, Management and Economics

University of Sussex

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A stylized illustration of several wheat stalks in a teal color, positioned in the bottom left corner of the page.

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Abstract

Current transformations in food consumption and food trade have allowed greatly increased food exports from developing countries and also shifted the composition of exports towards high-value foods that offer better opportunities for smallholder farmers to improve their livelihoods. Transformations in the domestic markets of developing countries are also changing the composition of food consumed and opening up opportunities there. Nevertheless, food safety crises and changing food safety requirements are widely considered as potentially limiting the opportunities for smallholder farmers to enter these expanding markets. In particular, a shift in food safety philosophy towards the introduction of risk-based preventive controls on farms appears to pose a threat to smallholder farmers by creating new requirements for knowledge about food safety, additional investment in equipment and food safety systems, and more intensive linkages between producers and the buyers of their products.

Food safety challenges vary considerably across markets and across products. Markets – developed country export markets, regional markets and developing country domestic markets – are changing rapidly and present different opportunities and threats from food safety risks and also the controls introduced to contain them. The food products for which food safety challenges are most prominent are cereals and nuts susceptible to aflatoxin contamination, and high-value fresh products such as fresh fruit and vegetables, meat and dairy. The use of risk-based preventive controls to address challenges is being extended not only through the extension of border controls, but also through private standards and through domestic controls in developing countries and food importing countries. Increasingly, the pressure is for the food safety systems of exporting countries to demonstrate their capacities to offer levels of food safety protection equivalent to those achieved in destination markets.

Responding to these food safety challenges involves developing country governments making strategic choices about establishing a range of domestic standards and facilitating the upgrading of capabilities by smallholder farmers and their inclusion into a range of different markets. With respect to enabling smallholder farmers to gain knowledge about new food safety requirements, invest in food safety systems and increase the confidence of buyers, the well-established mechanisms for supporting smallholder inclusion in markets can make a substantial contribution to limiting exclusion.

Introduction

The purpose of this literature review is to identify the extent to which food safety is an issue that requires more attention in programmes designed to reduce rural poverty and inequality. Many such programmes are designed to improve the performance of smallholder agriculture as a means of raising the incomes of poor people, but concerns have been raised about the impact of food safety measures on the excess of such farmers to markets. This issue is frequently framed in terms of “exclusion”. Smallholder farmers fail to benefit from market opportunities because they are unable to sell their produce to a range of markets where food safety is an increasingly important issue.

Improving the livelihoods of smallholder farmers depends to a substantial extent on improving access to markets for their crops. New opportunities are emerging for these farmers as a result of changes in both global and domestic markets. Over the past few decades, trade in agricultural products has increased substantially, and particularly so for high-value crops. At the same time, rising incomes and urbanization in developing countries and emerging markets have increased opportunities within domestic markets. However, food safety is now a major concern for both consumers and governments in developed and developing countries. If smallholder farmers are unable to meet food safety challenges, then they risk exclusion from these growing markets and the loss of opportunities to grow and sell their products. In the context of the 2030 Agenda for Sustainable Development, with its goals on access to food, consumption, food security and sustainable urbanization, it is important to understand the challenges facing smallholder farmers in the area of food safety, the implications this has for their ability to take advantage of the new opportunities, and the ways in which changes in policy can improve access of smallholder farmers to these markets.

Part of the concern with the impact of food safety requirements arises from perceptions that these requirements are becoming more demanding and that compliance might be particularly problematic for smallholder farmers. The argument is set out clearly by Narrod et al. (2009: 8, emphasis added):

Food safety has received heightened attention in both developed and less developed countries in recent times. This stems from the increased demand for safe food by households with rapidly rising incomes, technological improvements in measuring contaminants, and increased media and consumer attention on the risks of food borne illnesses. In response, many food retailers and food service firms, particularly in developing countries, have adopted private protocols relating to pesticide residues, field and pack house operations, and traceability. Likewise, governments in both developed and less developed countries have responded with voluntary and occasionally mandatory food safety programmes....The costs associated with compliance can potentially exclude small farmers who face four distinct problems: (1) how to produce safe food; (2) how to be recognized as producing safe food; (3) how to identify cost-effective technologies for reducing risk; and (4) how to be competitive with larger producers.

The evidence on exclusion is, however, not unequivocal. In their analysis of export opportunities for fruit and vegetable producers in Morocco, Ait Hou et al. (2015: 190) suggest that the evidence on levels of exclusion is “mixed”:

Increasing attention has been given to the impact of food safety standards on agrifood trade and notably on developing countries' export performance....A major concern is that food safety (especially private) standards lead to the exclusion of the poorest farmers, who are unable to comply with stringent requirements due to a lack of technical and financial capacity....However, the evidence on the impact of food safety standards on farmers is mixed and several studies show 'inclusion effects' and opportunities provided to small farmers by buyer-driven supply chains.

This review examines the following questions:

- How do food safety challenges vary between different food products and across different markets?
- What are the tendencies in food markets in developing countries, emerging markets and developed countries that alter food safety challenges faced by smallholder farmers?
- What is the evidence for smallholder farmer exclusion across the different types of products and markets?
- What is the evidence about policy options that might either exacerbate or mitigate the food safety challenges facing smallholder farmers?

The present literature review considers not only exports to developed countries, but also the impact of food safety issues on access of smallholder farmers to domestic and regional markets in developing countries. It includes an analysis of the impact of public regulations relating to food safety and also policy initiatives on food safety that might facilitate the access of smallholder farmers.

Following a brief description in section 2 of the methodology used to generate the literature included in the review, section 3 provides an overview of trends in food markets, changes in food safety challenges, and how these might be expected to impact on smallholder farmers. Section 4 examines the evidence of impacts on smallholder farmers of food safety challenges in developed country markets, focusing specifically on public regulations, while section 5 considers the impact of private standards on smallholder inclusion/exclusion. Section 6 explores the implications of regional integration for food safety standards and smallholder farmers. Section 7 then examines the literature on the impact on smallholder farmers of transformations in the domestic markets of developing countries and emerging markets. Section 8 considers policy measures that might mitigate the impacts discussed in the previous sections.

Methodology

This literature review does not take the form of a systematic review with clearly identified protocols for searching the literature and definitions of inclusion and exclusion criteria. It started by identifying recent literature reviews, beginning with a Google Scholar search for: "literature review', 'food safety' and 'developing countries'". The dates of the search were restricted to 2010-2015 in order to focus on the more up-to-date literature. Google Scholar (and in subsequent searches, Google) was chosen over a search based on more academic sources and refereed journals in order to cover the less formal literature. Notwithstanding this, many articles in refereed journals were generated by the searches.

The initial search identified 13 literature reviews. These reviews focused on food safety questions to varying degrees. A number of them were more concerned with sustainability standards, and there was a bias towards the analysis of the impact of private standards on smallholder farmers. Four reviews of private standards published by the International Trade Centre (Alvarez and von Hagen, 2011a; Alvarez and von Hagen, 2011b; von Hagen and Alvarez, 2011a; von Hagen and Alvarez, 2011b) fall into this category, as does a 2014 review produced by the Food and Agriculture Organization of the United Nations (FAO) (2014). At this stage the terms "small farmer" and "smallholder farmer" were not included in the search specification, with the result that not all the papers made reference to smallholder farmers. Nevertheless, some papers not focusing specifically on smallholder farmers did provide valuable information about the impact of food safety standards on trade in general. There were also literature reviews that contained extensive references to terms such as "farmer", "small farmer" and "smallholder(s)". The reviews by Beghin et al. (2015), Maertens and Swinnen (2015), and Unnevehr and Ronchi (2014) fall into this category. In addition to these searches, some further searches for literature reviews were undertaken. One search, with the terms "'developing countries", "food safety", "exclusion" and "farm size", generated some further reviews of the literature, and most notably two reviews on contract farming – Otsuka et al. (2015) and Simmons (2002) – a review of smallholder participation in high-value agriculture in West Africa by Swinnen et al. (2013), and an overview of smallholder farmers and markets in the context of globalization by Murphy (2012).

Then, further searches were implemented to generate materials relevant to particular sub themes within the overall review. Search terms included "food safety, standards and exports", "food safety, standards and domestic market" and "food safety, domestic market and developing countries". These reviews were not confined to the period after 2010. The range of papers included was extended through additional searches for issue-specific materials (for example, on regional integration), and searching back through the bibliographies of articles already captured for additional sources. Papers were excluded from the analysis if they were solely focused on developed countries, or not concerned with farming (for example, papers

focused solely on food processing), or not concerned with either public or private standards. An initial scan of the summaries of journal articles and executive summaries in reports identified those papers for which a more detailed examination would be appropriate.

The papers were then classed into the topics examined in sections 4 to 7 of this paper: public sanitary and phytosanitary (SPS) measures in export markets, private standards, regional integration, and domestic markets in developing countries. Where a paper covered more than one topic (for example, both SPS and private standards, or export and domestic markets) it was assigned to the category that appeared to be the main focus. Not all of these papers were relevant for citation within this review. In some cases, the papers did not focus on food safety or smallholder farmers, and in some areas many papers covered the same topic and did not require separate citations. In addition to this, further sources were included in the paper to illustrate particular analytical issues. Overall, the literature search produced 183 papers, of which 100 have been cited in this text, distributed across the five areas of discussion as follows:

- Literature reviews: 23 publications, 19 cited in this review.
- Public standards in export markets: 52 publications, 20 cited in this review.
- Private standard in export markets: 35 publications, 17 cited in this review.
- Regional integration: 25 publications, 14 cited in this review.
- Domestic market in developing countries: 48 publications, 30 cited in this review.

Brief statements about the content of the more frequently cited publications are contained in the appendix.

Trends in the global food industry and potential impacts on smallholder farmers

This section considers the causal chain linking food safety to smallholder farmers and the threat of exclusion. It begins with a discussion of food safety issues and the types of foods that are affected. It continues with a discussion of strategies to improve food safety, and in particular the shift towards risk-based preventive controls (see Glossary) as a means of containing food safety risks. It concludes by discussing the ways in which an increased emphasis on food safety and preventive controls might lead to the exclusion of smallholder farmers from food value chains.

Food safety

Food safety challenges vary considerably according to the type of food, but much of the literature suggests that food safety issues of particular concern to smallholder farmers are concentrated in two main areas. The first category is cereals – groundnuts (peanuts) and, to a lesser extent, maize – for which mycotoxin contamination (most notably aflatoxins) is a major issue. The well-known risks associated with both of these product categories were highlighted yet again in a recent report by the Global Panel on Agriculture and Food Systems for Nutrition, 2016: 8):

Recently, attention has focused particularly on consumers' exposure to mycotoxins which are known to be harmful to human health, causing acute poisoning and even death when contamination levels are very high as well as, over longer periods of time, liver cancer.

The second category is fresh, perishable products, such as fresh fruit and vegetables, meat and dairy, eggs and seafood. The risks associated with these products are well known, and developed countries have increased controls in response to outbreaks of foodborne illness associated with them. These products are generally categorized as high-value items,¹ whose importance in food consumption and trade has been increasing. They are important both for nutrition and for providing opportunities for increasing the incomes of smallholder farmers.

Trade in this second category has increased substantially over the past few decades. A World Bank report on food safety and standards showed that exports of these products from developing countries rose more rapidly than exports of other agricultural products. Their share of total developing country agricultural exports increased from 29 per cent in 1980/1981 to 48 per cent in 2000/2001 (World Bank, 2005: 2). Over the same period, the share of developing country agricultural exports accounted by traditional tropical agricultural products (coffee sugar, etc.) declined substantially. More recent data for sub-Saharan Africa in particular show a similar trend. In the 1970s (1970-1979), non-traditional agricultural products accounted for 11 per cent of the value of food and agricultural exports. Three decades later (2000-2009), this share had risen to 32 per cent (Jaffee et al., 2011: 8).

1. These products are also frequently referred to as “non-traditional agricultural products” or “high-value foods”. See, for example, Simmons (2002).

This change in trade patterns presents opportunities for farmers of all types in developing countries, but it also increases food safety challenges. The World Bank report cited above pointed to the difficulties in meeting the food safety standards associated with high-value agricultural products:

*Trade in [high-value] products is, however, governed by a growing array of food safety and agricultural health standards. These have been developed to address various risks including those associated with microbial pathogens, pesticides and veterinary pharmaceuticals, environmental contaminants (for example heavy metals) and naturally occurring toxins (for example mycotoxins), and the spread of plant pests and animal diseases... The steady expansion in global trade in perishable high-value foods, together with parallel increases in problems connected with that trade, have drawn attention to the major disparities between countries in national standards for food safety and agricultural health, as well as the differential capacities of public authorities and commercial supply chains to manage the potential risks associated with producing and marketing these products (World Bank, 2005: 1-3, emphasis added).*²

The food safety problems with these products emerge clearly from their high profile in SPS notifications at the World Trade Organization (WTO) referring to food safety. Other agricultural products may be subject to SPS measures, but these are likely to relate to plant and animal health rather than to human health. This review focuses specifically on food and agriculture. While fish and seafood products have a high profile in SPS notifications and are subject to extensive food safety controls, an analysis of the public and private standards and domestic and regional regulations relating to these products is beyond the scope of this review.³

These food safety challenges are not confined to export markets in high-income countries. Within developing countries, urbanization and rising incomes are changing the way food is produced, distributed and consumed. First, rising incomes increase demand for high-value food products. Consumption of these products in developing countries is growing rapidly. Second, servicing urban markets requires longer and more complex value chains, with more opportunities for food safety failures to occur. This is particularly the case for the megacities of developing countries, which rely on food drawn from many distant locations, but it should be noted that similar problems arise with the vast number of smaller towns and cities in developing countries (Reardon, 2016: 16). The importance of these factors in emerging markets has been stressed by Grace and McDermott (2015: 44). The transformations of food systems (production, distribution and consumption) in these countries have occurred at such a pace that they have outstripped the capacity of food governance systems and created food safety crises:

[Emerging economies] are characterized by rapidly growing demand for the riskiest foods (animal source foods and vegetables), rapidly intensifying agriculture to meet these demands, but lagging food governance systems. Marked by both a high absolute burden of foodborne disease and a high level of concern, these countries are what can be called the foodborne disease "hot spots".

2. Swinnen et al. (2013: 294) make a similar argument: "Food standards are particularly high for non-traditional, high-value exports (including fruits, vegetables, fish, seafood, but also meat, milk and dairy products). These standards concern perishable goods, which are consumed fresh and are much more prone to food safety risks and quality concerns by consumers".
3. Seafood products are frequently subject to sanitary and phytosanitary notifications, and countries do impose additional controls such as 100 per cent incoming inspection in cases where food safety failures have been registered. An overview of public controls in this area can be found in Abadouch et al. (2005). There are also private standards operating in aquaculture, most notably the Best Aquaculture Practices standards scheme of the Global Aquaculture Alliance (see <http://bap.gaalliance.org>). GlobalGAP has also developed an aquaculture standard.

This analysis of food safety challenges in emerging markets concludes by arguing that: “Most studies of the farms and wet markets of emerging countries reveal high levels of pathogens and contaminants”.

The shift in food consumption is not confined to emerging markets and large cities. A recent study of food consumption in East and Southern Africa (Ethiopia, Malawi, Mozambique, South Africa, Uganda and Tanzania) showed the broad reach of dietary changes (Tschirley et al., 2015). Using the Living Standards Measurement Study data and household surveys across the six countries, the authors distinguish between processed and unprocessed foods and between perishables and non-perishables. The results relevant for this review are:

1. In both urban and rural areas, the share of food budgets devoted to perishable foods rises as income levels rise.
2. Most of the rise in consumption of perishables comes from highly processed perishable foods. Unprocessed and low-processed perishable food consumption rises much less as incomes rise.
3. Overall, there is a high level of consumption of processed foods across all income groups, and in both urban and rural areas. Processed foods account for 70 per cent of expenditures on purchased food.
4. Urban consumers rely more on imported food than rural consumers, but this does not change with levels of income. Overall, approximately 80-85 per cent of food expenditure is supplied by domestic production (Tschirley et al., 2015: 636-641).

These results provide a nuanced view of the transformations of food markets in sub-Saharan Africa. First, consumption of food in rural areas is also changing as incomes rise. Second, while overall consumption of perishables increases as incomes increase in both urban and rural areas, a lot of this increase is accounted for by highly processed perishable foods. This has implications for food safety. The processing of food can eliminate some food safety problems (pasteurization of milk is one example), but food processing establishments are also the origin of many foodborne illness outbreaks. The implications of this are discussed further below.

Managing food safety: preventive controls

Foodborne illness outbreaks can cause harm to large numbers of people. There is widespread recognition that food safety hazards have increased with the emergence of new pathogens (Tauxe, 1997: 425-426), and that the modernization and globalization of the food industry create the potential for more widespread and large-scale outbreaks of foodborne illnesses (Majkowski, 1997). In response, governments have turned to prevention:

An international consensus emerged, and the risk-based approach to food safety regulation was outlined by the Codex Alimentarius (Codex Alimentarius Commission, 2007) as the best practice for food safety regulation. As Hoffmann and Harder (2010) state: “A consensus has emerged among nations about the basic components of an effective food safety system based on modern science and management practices. In shorthand, the vision is of a farm-to-fork, risk-based, scientifically supported safety control system” (Unnevehr and Ronchi, 2014: 4).

Preventive controls have been used in the food industry for a number of decades. They are commonly adopted in food processing establishments, and particularly so for products considered high risk, such as meat. In the United States, new legislation for meat processing

plants introduced in 1996 “shifted emphasis from visual inspection of carcasses to control of pathogens using a system of checks at critical control points where food safety is at risk, required plant operators to conduct tests for generic *Escherichia coli* (*E. coli*), and imposed *Salmonella* performance standards” (Ollinger et al., 2004: iv). Preventive controls are well established within Codex Alimentarius Commission guidelines (see, for example, Codex Alimentarius Commission, 2013; Codex Alimentarius Commission, 2004a).

When considering the impacts of preventive controls on smallholder farmers, the critical questions are:

1. Is the range of products subject to preventive controls increasing?
2. Are such controls being applied at the farm level? If so, how are these controls extended to farm establishments?

These questions are examined in the light of changes in policy in the United States and the European Union.

In the United States, the most significant recent shift has been the extension of preventive controls to fruit and vegetables following repeated outbreaks of foodborne illness arising from microbial contamination of domestically produced leafy greens (lettuce, spinach, etc.) and other fruits and vegetables. Foodborne illness outbreaks resulted, not only to public and political dismay, but also causing severe losses to business. In particular, an outbreak in California in 2006 associated with *E. coli* O157:H7 in spinach led to over 100 people being hospitalized, a very substantial and prolonged decline in domestic spinach sales, and the threat of import bans in countries such as Canada (Calvin, 2007). The response was primarily a domestic one, but it will be shown below that there are implications for controls over imports of fresh fruit and vegetables.

The immediate result of the 2006 outbreak was the promotion by shippers in California of new preventive controls for the production of leafy greens. In collaboration with the California state government, major shippers of leafy greens introduced the California Leafy Green Products Handler Marketing Agreement (LGMA) (LGMA, 2010). This promoted good agricultural practices in areas, such as water quality, water testing, worker hygiene and animal intrusion, backed up with audit and certification of farms by the California Department of Agriculture. With the LGMA supported by shippers responsible for distributing 99 per cent of California-produced leafy greens, compliance became effectively mandatory for Californian farmers growing leafy greens. The shippers also introduced similar controls over their operations in Mexico and Canada. The State of Florida also has a scheme for controlling the safety of tomatoes (Florida Department of Agriculture and Consumer Services: Division of Fruit and Vegetables, 2011).

The United States Government took longer to react. While the federal Food and Drug Administration (FDA) referred to “an increased emphasis on prevention” as being at the heart of its plans for food safety in 2007 (U.S. Food and Drug Administration, 2007), Congress only passed the FDA Food Safety Modernization Act (FSMA) in 2010. This act instructed the FDA to develop and introduce provisions for both increased use of preventive controls in food processing establishments and new, mandatory standards for the production and harvesting of “those types of fruits and vegetables that are raw agricultural commodities for which...such standards *minimize the risk of serious adverse health consequences or death*” (United States Congress, 2010: Section 105).

The new rules regulating farm-level practices in the United States create a legal obligation for how farms should assess risks (for example, through water testing and identification of animal intrusion), but does not mandate certification. The FDA does, however, expect that the new rules will lead to the introduction of farm-level controls, such as the LGMA and the existing United States Department of Agriculture certification programmes, through a combination of awareness-raising and the adoption by retailers of these standards (U.S. Food and Drug Administration, 2013: 391-392). The FSMA also introduced a Foreign Supplier Verification Program that placed a legal obligation on importers to ensure that the food they import is safe. This might be achieved through an on-site audit of the supplier by the importer or a third party, or a documented approval by an officially recognized food safety authority in those countries whose food safety systems have been approved by the FDA. The possible impact of these measures on farm establishments in general and smallholder farmers in particular is unclear and will depend on what the United States Government considers to be acceptable controls in exporting countries and the types of control introduced by these countries, as will be discussed further below.

In the European Union (EU), the catalyst for reinforced preventive controls was the repeated food safety scares of the 1990s (see Knowles et al., 2007: 46), and the bovine spongiform encephalopathy (BSE or mad cow) crisis, which severely undermined public trust in EU safety regulations. Regulations on pesticide residues were strengthened, and prevention was central to the EU white paper on food safety in 2000 and the creation of the European Food Safety Authority (Caduff and Bernauer, 2006: 153-157).⁴

The 2002 General Food Law (the European Parliament and the Council of the European Union, 2002) set out the guiding principles for the new approach. It advocated a whole chain approach to food safety, the adoption of risk assessment, risk management and risk communications as the cornerstones of food safety, the importance of traceability and private-sector responsibility. With respect to the latter, the General Food Law states that: "A food business operator is best placed to devise a safe system for supplying food and ensuring that the food it supplies is safe; thus, it should have primary legal responsibility for ensuring food safety" (the European Parliament and the Council of the European Union, 2002: preamble, paragraph 30).

As in the case of the United States, the shift in EU thinking on food safety was primarily driven by domestic concerns – repeated foodborne illness outbreaks caused mostly by food produced in the EU. Nevertheless, the change in the EU approach has impacts not only on food at the point of import, but also on the domestic practices in exporting countries. Such impacts can arise from three mechanisms:

1. Harmonization of standards through Economic Integration Agreements (EIAs) that the EU seeks to make with developing countries.⁵ A case study of changes in domestic control resulting from such an agreement is provided by Ait Hou et al. (2015).
2. Pressure for changes in exporting country food safety systems through the inspection of domestic regulatory procedures by the EU's Food and Veterinary Office (FVO). If the FVO is not satisfied with the capacity of the competent authority in the exporting country to ensure the safety of food exports, then the threat of increased incoming inspections is one lever that can be used to encourage exporting countries to change their policies and procedures.

4. See also Vincent (2004) and Vogel (2003).

5. For a discussion of EIAs and the different ways in which they choose to harmonize standards to international standards or European standards, see Disdier et al. (2015).

3. Changes in the controls adopted by food importers. The new regulations place broad legal obligations on food business operators to ensure that food is safe. These appear to have encouraged businesses to increase controls over their supply chains – both in food processing establishments and at the farm level. These controls can take various forms. They can be expressed in the form of “buyer requirements” that are incorporated into contracts and enforced by supervision (either directly by the buyer or through contracted agents). They can also take the form of private standard schemes that establish rules and procedures and back them up with inspection and certification, as discussed by Henson and Humphrey (2009, 2010). While adoption of these standards is very uneven, even within the EU, retailers in some countries (most notably the United Kingdom, the Netherlands and Germany) have adopted third-party certified standards as part of their supply chain strategies. Such private standards have been blamed for small farmer exclusion, as will be discussed below.

As is the case with the FSMA, the direct impacts on farmers of these changes are unclear. Strict controls over imports of meat, seafood and dairy products into the EU have existed for a long time, and trade is quite limited. It is less clear how the new regulations affect trade in other products. One expert analysis of EU food hygiene regulations (the European Parliament and the Council of the European Union, 2004a, 2004b, 2004c) has argued that primary producers of fresh fruit and vegetables should be obliged to implement EU hygiene provisions in full and to keep records to establish that they have done so (Graffham, 2006: 8). In practice, importers do not appear to have to verify that this occurs, and for many products controls are limited. The practical impact of these regulations is discussed below.⁶

Food safety: impacts at the farm level

Why would these developments in food safety systems possibly lead to the exclusion of smallholder farmers from agrifood value chains? The literature review commissioned by the International Trade Centre summarizes a widespread view:

The majority of authors seem to agree that stringent quality and safety standards endanger small farmer participation in global value chains. This is because sourcing from a large number of small farmers is more difficult for companies, for several reasons: (i) higher transaction costs for monitoring conformity, (ii) need for more intensive farm extension, and (iii) need for financial resources. In general, vertical integration might benefit small producers by increasing income, productivity and product quality, providing guaranteed prices and sales, and improving access to capital. Nevertheless, evidence shows that these benefits are hypothetical as vertical integration in many cases led to the exclusion of small farmers (von Hagen and Alvarez, 2011b: 22-23).

This argument, as with many others about smallholder farmer exclusion, does not focus solely on food safety. The opening sentence of the quote mentions quality, and the three reasons given for reducing sourcing from smallholder farmers need not arise solely from food safety concerns. They might arise from concerns about productivity, consistency of quality, reliability of supply, and the general costs of managing relationships with large numbers of small-scale farmers. These considerations might apply irrespective of food safety issues.

6. The impact of such controls would be greater in the case of fishery products, including those derived from aquaculture. Food of animal origin is subject to stricter controls in the EU than food of non animal origin.

However, more stringent food safety requirements and a shift to preventive controls might undermine some of the advantages that these farms have in relation to large farms. These advantages have been summarized by Swinnen et al. (2013: 298):⁷

In some cases, small farms may have substantive cost advantages. This is particularly the case in labour-intensive, high-maintenance production activities with relatively small economies of scale. For example, Key and Runsten (1999) present evidence that production costs for small farmers in Mexican vegetable contract production were 45 percent lower than those of specialized farms owned by the processing companies. Costs were lower primarily because of imperfections in labour and land markets. Small farmers had significantly lower labour costs because of access to unremunerated family labour, for which markets are missing, and much lower costs of supervising, transporting and recruiting labour input; also pest control costs were lower due to better crop monitoring and thereby lower chemical use. Further, small farmers' yields in vegetable production were 20 percent higher than on the firm's own farms.

This comparison is between the costs to a business of sourcing from small farmers compared to producing the same product on the business's own farm.⁸ Many of the advantages would also apply in a comparison of sourcing from large farms as opposed to smallholder farms. A shift in food safety requirements might undermine the advantages of smallholder farmers in the following ways:

1. Smallholder farmers would need improved capabilities in order to meet the new requirements. Changes in capabilities might involve some or all of the following: knowledge of new farming practices (for example, integrated pest management), improved supervision of labour used on the farm and greater capacity for record-keeping and documented decision-making. To the extent that these capabilities are more likely to be less developed on small farms than on larger farms, then training costs in the transition to the new system would be greater for smallholder farmers.
2. Smallholder farmers would have more difficulty in meeting any additional financial burdens arising from the need for increased investment in safety equipment, record-keeping, etc.
3. When food safety systems are based on audit and certification, the cost per hectare for certification is likely to be greater for smallholder farms.
4. There are economies of scale in the continual oversight and monitoring typical of certification schemes for fresh fruit and vegetables. The extent of this scale disadvantage was shown by a study in Kenya undertaken shortly after the EurepGAP standard (later rebranded as GlobalGAP) was widely implemented. It found substantial differences in monitoring costs according to size of farm – the time spent on monitoring was 3.5 hours per week per acre for smallholder farmers in farmer groups,⁹ compared with only 0.1 hour per week per acre for large contracted farmers (Mithöfer et al., 2007: 5).
5. With farm-level performance becoming more demanding and requiring more oversight, the costs of contract farming schemes rise.
6. The potential losses (financial and reputational) to buyers would also increase with the increased stringency of food safety standards, making buyers more sensitive to differences in capabilities between different sourcing options and looking for models that appear to facilitate control.

7. A strong case about the advantages of integrating smallholders into contract farming schemes is also made by Prowse (2012: 23).

8. A similar line analysis by Simmons (2002) considers the choice between own-farm production and contract farming using smallholders. These issues are also discussed by Otsuka et al. (2015).

9. These farmer groups would have been organized at this time under option 2 (group certification) for GlobalGAP, which was known as EurepGAP before a rebranding in 2008.

These challenges have been discussed by Jaffee et al. (2011), who provide a conceptual model for considering the impact of standards compliance on smallholder participation. In this model, smallholder farmers have to meet three conditions in order to be included in buyers' supply chains; they must: (i) be able to meet the contractual terms required by the buyer; (ii) give the buyer the confidence that they will in fact be willing and able to meet these terms; and (iii) be competitive with other sourcing options (Jaffee et al., 2011: 20-22). The six points above relating to changing food safety requirements could potentially undermine the position of smallholder farmers on all three conditions.

These factors do not necessarily lead to the exclusion of smallholder farmers. First, smallholder farmers may provide advantages with respect to diversification. Second, businesses may find that alternatives to sourcing from smallholder farmers are limited, particularly if land tenure systems do not make land easily available to large businesses. The impact of these factors will be discussed below.

Finally, while much of this discussion about changing food safety requirements and the exclusion of smallholder farmers has been conducted in the context of international trade and the requirements of advanced economies, many of the same issues arise within domestic economies. Discussions about the modernization of food retailing and the emergence of supermarkets in many developing countries focus on many of the same issues. As will be discussed further below, food safety is an increasingly salient issue, particularly but not exclusively in emerging markets.

Food safety and exports to developed economies

This section will focus on public food safety measures and their impact on trade. There is an extensive literature on non-tariff measures (NTMs), the main focus of which is their impact on trade and welfare, with a limited reference to sectoral impacts, and even a more limited reference to smallholder farmers.¹⁰ The words “farmer”, “smallholder” and “small producer” rarely appeared in the papers on NTMs and trade. This also means that there were no mentions of small-scale farmers or smallholder farmers. Among the papers reviewed that had no more than a single mention of the terms “farmer” or “small producer(s)” were Anders and Caswell (2009), Disdier et al. (2015), Aloui and Kenny (2004), Melo et al. (2013) and Fernandes et al. (2014). These papers contained few or no mentions of the terms “exclusion” and “inclusion” in the context of access to export markets. The discussion of public food safety measures will mostly focus on two categories of products: groundnuts (and particularly the issue of aflatoxin contamination) and fresh fruit and vegetables, even though other products are cited in the literature on SPS restrictions, including fisheries and seafood.

Aflatoxins

Aflatoxin contamination and the impact of SPS measures have been analysed extensively. Aflatoxin contamination is a serious problem, even though the most serious health effects are in developing countries, and particularly in countries in sub-Saharan Africa “where dietary diversity is low and reliance on staples, particularly maize, is high” (Grace and McDermott, 2015: 44). Papers published on this issue in the past 10-15 years include Otsuki et al. (2001), Diop et al. (2005), Xiong and Beghin (2012), Achterbosch (2005) and Diaz Rios and Jaffee (2008).

One catalyst for this level of attention was the introduction by the EU in 2002 of maximum residue levels for aflatoxins that were more stringent than the Codex guidelines (Codex Alimentarius Commission, 2003) that were being discussed at the same time. A groundbreaking paper by Otsuki et al. (2001) made predictions about the likely impact of the forthcoming EU regulations, arguing that exports from Africa would be very severely damaged while the benefits to the EU in terms of increased food safety and reductions in illness and death would be absolutely minimal. This influential paper encouraged others to view the new EU regulations as unreasonable and motivated by protectionism rather than a genuine concern about food safety. Jabati, for example, cited the EU aflatoxin standard as one of a set of case studies that “demonstrate some of the protectionist measures used by developed countries to disguise trade restrictions” and stated that “the EU has clearly been able to take advantage of an SPS loophole” (Jabati 2003: 100).

10. This does not mean that there are no such impacts. For example, a finding that Economic Integration Agreements between developed and developing countries appears to undermine exports from the developing country to other developing countries (Disdier et al., 2015) could mean that small farmer opportunities in South-South trade are reduced, but the studies of trade flows would not show if smallholder farmers were disproportionately affected by such measures.

Subsequent analysis of the threat from EU restrictions has suggested that the predictions of Otsuki et al. were incorrect. Diaz Rios and Jaffee (2008: 5) argue that the precipitous decline in exports of groundnuts from sub-Saharan Africa substantially predated the change in EU standards, while Xiong and Beghin (2012: 607) argue that their use of state-of-the-art approaches to investigating the trade impact of more stringent residue limits on exports of groundnuts shows that “the harmonisation and tightening of aflatoxin regulations within the EU has no significant effect on African groundnut exports, either in terms of the trade volumes, or the propensity to trade”.

Adopting a similar position to that taken by Diaz Rios and Jaffee, the authors Xiong and Beghin attribute the decline in exports to supply constraints in Africa.

But this still leaves scope for such regulations to have an impact on smallholder farmers. Diaz Rios and Jaffee analyse how SPS measures have potential impacts on exporting countries in general, and smallholder farmers in particular. The first impact of SPS issues relates to border rejections. Aflatoxin contamination figures prominently in SPS notifications made to the WTO,¹¹ and according to Diaz Rios and Jaffee, mycotoxins accounted for 30 per cent of all notifications reported by the EU’s Rapid Alert System for Food and Feed (Diaz Rios and Jaffee, 2008: 36). Nevertheless, these authors argue that the direct losses to exporting countries from border rejections are low relative to the volume of trade, and in the period 2004-2005, less than 1 per cent of total imports into the EU were intercepted because of non-compliance, and only 3-5 per cent of intercepted produce was destroyed (Diaz Rios and Jaffee, 2008: 40-42).¹² The data on slip border rejections have to be qualified by two observations. The first is that some countries were more severely affected by border detentions. For two countries, Malawi and Sudan, the levels of interceptions were much higher, with 21 per cent of consignments from Sudan intercepted (Diaz Rios and Jaffee, 2008: 40). Mandour’s analysis of the impact of EU regulations on exports of groundnuts from Egypt showed that, following 21 EU rapid alert notifications in 1998-1999, a temporary ban was imposed and imports from Egypt into the EU declined substantially for four years. Import levels did increase subsequently, but extra measures for improving production, handling, sorting, packaging and transport were required, and consignments required documentation with respect to official sampling and analysis (Mandour, 2006: 182-186). Furthermore, Mandour (2006: 182) argues that the EU itself was clear that large farms would find it easier than smallholder farms to follow practices designed to reduce humidity in peanuts:

The [FVO] mission indicated that the problem is more daunting for small farmers who do not follow specific methods to control the degree of humidity in peanuts. Thus they face higher risk of harvesting peanuts contaminated with aflatoxin. On the other hand, the agricultural practices followed by large farmers were highly appreciated. They have better control on the soil, water content and the degree of moisture using qualified instruments to measure it in the field.

The use of increased in-country controls prior to export leads to the second caveat with respect to low levels of rejection. Border rejections may be low because the product has already been identified as non-compliant prior to shipment. Achterbosch (2005: 167) cites data from South Africa showing that the South African public export test facility (the Perishable Products Export Control Board) found 30 per cent of 4,800 lots exceeded EU limits in 2001-2002, and some of this product may have been redirected to other markets or treated to reduce contamination.

11. See the WTO website relating to SPS notifications for a searchable database that provides information about notifications (<http://spsims.wto.org/web/pages/search/notification/Search.aspx>).

12. This result came out clearly in the analysis of border rejections in UNIDO’s 2015 Trade and Standards Compliance Report (UNIDO, 2015).

Controls applied in exporting countries could have a profound impact on smallholder farmers. Codex guidelines on aflatoxin contamination in groundnuts (Codex Alimentarius Commission, 2004b) recommend preventive controls along the value chain, including good agricultural practices at the farm level and good management practices in processing plants: “It is recommended that resources be directed to emphasizing the Good Agricultural Practices (GAPs) at the pre-harvest level and during drying and storage and Good Manufacturing Practices (GMPs) during the processing and distribution of various products. A HACCP [Hazard Analysis and Critical Control Point] system should be built on sound GAPs and GMPs” (Codex Alimentarius Commission, 2004b: 10). Similarly, Achterbosch (2005: 169) argues that controlling this problem at the source (on the farm) is central to efforts to reduce contamination:

Proper farming practices are the ‘primary line of defence’ against consumer health hazards from aflatoxin. Farming can have a substantial positive impact on the susceptibility of nuts to invasion of the plant by the fungi that produce the aflatoxin, Aspergillus flavus and Aspergillus parasiticus.

Controls adopted at the farm level can require new forms of knowledge, new investments, and systems for verifying the adoption of good practices, as was discussed earlier in this review. Decisions on the adoption of such controls could be taken by businesses or by governments. It was mentioned in the previous section that businesses involved in importing products into developed countries or retailing them there could take steps to reduce contamination – either as a means of complying with food safety obligations (for example, the general legal obligation to place safe food on the market) or as a means of meeting consumer expectations. The analysis by Diaz Rios and Jaffee (2008: 56) of the response of EU groundnut importers to aflatoxin contamination identified four strategies to reduce risk:

1. Shortening supply chains and buying directly from preferred overseas suppliers, thus eliminating intermediaries and brokers. The study suggests that countries exporting products grown by smallholder farmers were disadvantaged because of how importers chose their suppliers.
2. Tightening oversight of suppliers and insisting on implementation of good practices on farms and in processing establishments. This involves testing, the use of good manufacturing practices and HACCP, and closer supervision of producer farms.
3. Increased product testing at the border by the importers themselves.
4. Shifting processing functions to the exporting countries.¹³

Box 1: Aflatoxin control measures adopted in China

Following a visit by EU authorities to assess domestic controls, a series of measures were introduced by the Chinese authorities to achieve compliance, including the registering of processing establishments, sampling exports, setting new domestic standards for aflatoxins, and investing in conformity assessment. Control measures for the cultivation and processing of peanuts for exports were also introduced and sanctions imposed on companies whose products are identified as non-compliant by the EU.

Source: Diaz Rios and Jaffee (2008: 58-59).

13. Aflatoxin contamination can be eliminated through processing, albeit at a cost.

Governments may also choose to take action because a poor safety record might undermine exports – lowering prices and encouraging buyers to look for products elsewhere. Diaz Rios and Jaffee (2008) analysed changes in exporting country controls, including examining the case of China’s response to problems with aflatoxins in exports to the EU. The findings are summarized in Box 1. Responses appeared to concentrate on processing establishments and stricter inspection of products for export, as shown in the box. It is not clear whether the processing establishments themselves changed their procurement practices along the lines shown immediately above for the case of EU importers. In this case, a combination of improved farm-level practices and post-harvest storage and processing could be used separately or in tandem to reduce contamination.

If more stringent requirements are introduced at the farm level – by governments in exporting countries, by processors or by importers – this could lead to an exclusion of smallholder farmers, or an increased use of contract farming as a means of ensuring that the new requirements are followed on the farm. If preventive controls require more oversight of farmers and more competence from farmers, then the transaction costs of working with smallholder farmers would increase, which might favour sourcing from large-scale farms.¹⁴ If greater oversight was required by exporters, this might lead to the creation of contract farming schemes, but these are also sensitive to scale (as was argued above) and might lead to the exclusion of smallholder farmers from supply chains.

Clearly, changing the sourcing is only one part of the story. Changes are also required in laboratory capabilities, testing equipment, traceability systems, etc. (Mandour, 2006: 182-183). Food safety challenges often require a systemic response, of which smallholder farmers are one part.

Fresh fruit and vegetables

The consumption and import of fresh fruit and vegetables by developed countries have expanded rapidly in the past few decades, as can be seen in Table 1, which outlines trends in the United States. Developing countries have availed themselves of the opportunities provided by these increased levels of imports, and fresh produce exports provide opportunities for small farmers to increase their incomes. McCulloch and Ota (2002), for example, have shown how smallholder farmers producing fresh vegetables for export in Kenya gain substantially higher incomes than smallholder farmers producing other products. However, food safety concerns have led to increasing controls, both public and private, over such imports. What evidence is there that these concerns restrict the opportunities available to smallholder farmers for accessing these markets? The impact of private food safety standards on smallholder farmers is discussed in the next section. Here, the focus is on public controls, with a particular emphasis on the EU and the United States.

As was suggested in the previous section, a literal reading of EU food safety regulations might suggest that importers have a responsibility to ensure that food of non-animal origin¹⁵ imported from third countries has been produced in conditions that conform to EU food hygiene regulations (Graffham, 2006), with an obligation on EU food business operations to verify that the conditions of production in exporting countries conformed to EU regulations.

14. As was noted before, a preference for large-scale farms would depend on the availability of such farms and other factors in their attractiveness to groundnut processors.

15. The EU makes a distinction between foods of animal and non-animal origin, with much more extensive controls over production and trade for the former.

Table 1: Fresh fruit and vegetable consumption and import shares of consumption, United States (1975 and 2000)

Year	Per capita consumption (pounds, farm weight)		Import share of consumption (%)	
	2000	1975	2000	1975
Fruit				
Bananas	28.4	17.6	99.6	99.9
Apples	17.4	19.5	7.2	2.2
Grapes	7.3	3.6	44.1	5.9
Strawberries	5.0	1.8	5.8	8.9
Cantaloupe	10.8	5.2	37.4	12.4
Vegetables				
All lettuce	32.0	23.5	0.7	0.0
Onions	18.3	10.5	9.3	4.0
Tomatoes	17.6	12.0	32.9	21.9
Bell peppers	7.0	2.5	19.6	12.6
Cucumbers	6.4	2.8	41.4	21.6

Source: Calvin (2003: 79).

In practice, it is hard to believe that this is the way import controls operate. There are numerous examples of importers acting on a consignment basis – buying and selling produce about which they have limited knowledge. Evidence for the relative ease of importing fresh fruit and vegetables is provided by a comparison of the impact of EU SPS measures on exports of fish and horticulture products from Mauritius by Neeliah et al. (2013: 55-56). This found a substantial difference in the level of SPS challenges across the two sectors. Interviews with 26 exporting companies revealed that SPS measures for fish and seafood were more extensive and required greater investments on the part of processing and exporting companies. In contrast, exporters did not regard EU food hygiene regulations for fresh fruit and vegetables as particularly challenging (Neeliah et al., 2013: 60):

To export to the EU, local horticultural exporters claimed they only required a phytosanitary certificate delivered by the National Plant Protection Office. Moreover, the enforcement of phytosanitary regulations in the EU was more relaxed and did not require the horticultural products to exporters to be approved by a competent authority as was the case for fishery products.

The EU's own guidance on imports shows a marked difference in stringency applied to food of animal origin and food of non-animal origin (European Commission, 2006: 15-20). Because food of animal origin is seen as offering greater risks to human health, *preventive controls* are much more likely to be applied. However, changes in assessments of the risks arising from products could lead to changes in the levels of control required. In the United States, the FSMA has introduced new controls over the growing and harvesting of fresh produce in response to the seriousness of foodborne illness outbreaks caused by it.

As was seen in the case of the EU, the impact of new controls is not clear. It is not yet clear how the new regulations in the United States will affect farmers in developing countries. The logic of the new legislation is that controls over imported products should “provide

the same level of public health protection” as has been introduced for domestic produce (U.S. Food and Drug Administration, 2015: 74226). This is reflected in the measures that oblige food importers to verify that imported food is safe through obtaining knowledge about their suppliers. However, there are important exemptions for these requirements. The first is that the FSMA rules for domestic production exempts small farms from many of the requirements, and these exemptions appear to extend to farms exporting to the United States. Second, the rules on food imports exempt small importers. Third, export businesses that have been approved by local food safety authorities in countries “whose food safety system FDA has officially recognized as comparable or determined to be equivalent to that of the United States” (U.S. Food and Drug Administration, 2015: 74228) are deemed to meet the requirements on foreign supplier verification. The critical question is just what types of controls will be introduced by food safety authorities in exporting countries in order to gain recognition by the United States.

Past experience in this area shows that some mandatory controls can have a drastic impact on smallholder farmers. One case described in the literature is that of raspberry exports from Guatemala to the United States, documented by Calvin et al. (2003) and also by Henson and Blandon (2007). Exports of raspberries were judged to be contaminated with *cyclospora*, and these raspberries were linked to outbreaks of foodborne illness.¹⁶ After a second outbreak in 1997, the U.S. Food and Drug Administration (FDA) introduced a blanket ban on the import of raspberries from Guatemala. In order to regain access to the United States market, the Guatemala Berry Commission, supported by the Guatemalan Government, introduced the Model Plan of Excellence. This became a mandatory requirement (adopted by the Government of Guatemala) for export to the United States. The Model Plan of Excellence standard contained detailed food safety practices enforced by government inspections and FDA audits. It was successful in eliminating microbial contamination, but at the cost of a drastically reduced number of exporting firms, from 85 in the 1990s to only 3 in 2002 (Calvin, 2003: 82). Farmers of all sizes were affected. While this level of exclusion is unlikely to be repeated, how both United States and exporting countries interpret the obligations created by the FSMA will determine the extent of the challenges facing smallholder farmers.

16. The link between a particular product and the particular foodborne illness outbreak is complicated, and particularly so in cases of microbial contamination of fresh fruit and vegetables. Given the perishability of products such as raspberries, by the time evidence of an illness outbreak becomes available (if it is ever detected), the product has usually been eaten or thrown away.

Private standards

The International Organization for Standardization (ISO) defines a standard as a “document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context” (ISO, 2004: 1). The ISO recognizes that such standards can be developed by public bodies and also by businesses and other organizations and “by consortia of businesses to address a specific marketplace need”.¹⁷ Private standards are, as their name implies, standards created by private organizations or coalitions of organizations, including coalitions involving businesses, NGOs and governments.

In fact, what are referred to as private standards are in fact private standard *schemes*. As well as creating rules and guidelines aimed at influencing behaviour and establishing order, they also provide mechanisms for monitoring conformance and enforcing compliance with the rules. Such standard schemes aim to change practices and achieve outcomes in line with the goals of their promoters across a range of different performance areas. Such standards refer not only to food safety issues, but also to a range of environmental and sustainability standards that have been advanced by a variety of public and private actors. Recent reviews of this literature include a review of voluntary standards¹⁸ by FAO (2014) and a set of four reviews of private standards published by the International Trade Centre (Alvarez and von Hagen, 2011a; Alvarez and von Hagen 2011b; von Hagen and Alvarez, 2011a; von Hagen and Alvarez, 2011b). Private standard schemes can be used to pursue such goals as improving the incomes of smallholder farmers (through Fairtrade schemes), controlling environmental impact, promoting the sustainable use of forests and fishery resources, regulating labour conditions (including limiting child labour), safeguarding animal welfare, and achieving higher levels of food safety. In most cases, these private standards have been developed by businesses and coalitions in high-income countries, but they may be implemented across many countries.

The private standards that the literature considers to have the greatest impact on smallholder farmer participation in export-oriented agricultural value chains are those relating to on-farm food safety practices. They are seen as creating a barrier to smallholder farmer access to export markets. This is the position taken by Jabati (2003: 19, stress in original), who follows the quote below by referring specifically to EurepGAP, the forerunner of GlobalGAP:

*Having passed the first hurdle by satisfying government, multilateral trade rules and international minimum standards (e.g. Codex Alimentarius), the reality for many exporters is that they may still not be able to gain access to developed markets. This is because of **voluntary standards**.*¹⁹

17. Source: www.iso.org/sites/ConsumersStandards/1_standards.html.

18. It is commonly asserted that private standards and voluntary standards are the same thing. In fact, public bodies may create voluntary standards as a means of creating order in markets. Businesses are then free to adopt such standards if they find them useful. Similarly, private standards can become mandatory if they are adopted by governments (Henson and Humphrey, 2010: 1630).

19. A similar argument is advanced by Fuchs et al. (2011: 354): “Especially in developing countries, a trend toward the marginalisation of small farmers and retailers and subsequently an increase in economic inequality due to the expansion in private retail standards can be observed.”

There are two reasons why *food safety* standards are seen as particularly exclusionary. First, many standards – for example, environmental standards – aim to create premium products that will command a higher price in the market. If farmers do not or cannot meet such standards, the mainstream market is still available. Meeting food safety standards, in contrast, appears to be a baseline condition for market access, which if not met, would lead to exclusion.²⁰ Second, some widely adopted standards such as GlobalGAP have direct impacts on smallholder farmers and how they farm. Such standards introduce preventive controls, and implementing this type of standard requires knowledge, training, investment in capital equipment (for example, calibrated spraying equipment and lockable pesticide stores), the development of audit systems to establish that procedures are being complied with, and the use of third-party certification. These create challenges for small farmers relating to capabilities, knowledge of requirements, investment and economies of scale in supervision.

This discussion of smallholder farmer exclusion and private standards will focus on GlobalGAP. While the Safe Quality Food (SQF) standard also addresses farm-level practices, it has been much less studied in the literature. A Google search combining the terms “GlobalGAP” (and the alternative more accurate rendition of this name – GlobalG.A.P.) and “farmers” produced 2,500 results. A search for “SQF” and “farmers” resulted in only 270 results. Although GlobalGAP now covers a broad range of products, it was first developed specifically for fresh fruit and vegetables, and most of the literature focuses on this sector. This review is also confined to the impact of GlobalGAP on smallholder farmers producing fresh fruit and vegetables.

GlobalGAP is primarily concerned with food safety, even though some versions of the standard (which is revised every 3-4 years) also address environment, sustainability and labour issues. From the perspective of farmers, the critical elements in GlobalGAP are the control points that specify practices to be adopted on the farm. Revision 2 of GlobalGAP (then known as EurepGAP), introduced in 2005, had a total of 148 control points spread across 14 chapters. An indication of the nature of these control points is provided in Box 2. Revision 2 focused very strongly on pesticide use – a major focus of food safety controls in the European Union – and it contained 64 control points relating to crop protection products. Box 2 shows the eight control points relating specifically to the choice of pesticides to be used on the farm. Farmers would be expected to maintain documentation to show that the rules have been followed, and the third-party inspection would investigate record-keeping and practices. The documentation specifies the evidence that would be needed to support the answers given to the auditors. For example, in answer to question 8.2.7, farmers might be expected to demonstrate that they possess the relevant technical competence by providing “product technical literature” or proof of attendance at specific training courses. For question 8.2.4, “documented crop protection product application records”, the farm should be able to document that no prohibited products had been used on crops destined for sale in the EU.

The standard clearly requires documentation and well-trained farm operators. In addition to this, other requirements relate to equipment (chemical stores spraying equipment, etc.) and the use of farming practices such as integrated crop and pest management. This, combined with the responsibility placed on the exporting businesses to ensure that farms are meeting the requirements of the standard, might suggest that smallholder farmers will face exclusion. In practice, the minimum requirement for smallholder farmers would be to operate within a contract farming scheme, cooperative or produce marketing organization.

20. This is not, in fact, accurate. Adoption of private standards tends to be uneven, and so there will be outlets in markets that do not adopt them.

Box 2: Control points for choice of chemicals used in crop protection

- 8.2.1 Is the crop protection product applied appropriately for the target as recommended on the product label?
- 8.2.2 Do farmers only use crop protection products that are registered in the country of use for the target crop where such official registration scheme exists?
- 8.2.3 Is a current list kept of crop protection products that are used and approved for use on crops being grown?
- 8.2.4 Does this list take account of any changes in local and national crop protection product legislation?
- 8.2.5 Are chemicals banned in the European Union not used on crops destined for sale in the European Union?
- 8.2.6 If the choice of crop protection products is made by advisers, can they demonstrate competence?
- 8.2.7 If the choice of crop protection products is made by the farmer, can competence and knowledge be demonstrated?
- 8.2.8 Is the correct application rate of the crop protection product for the crop to be treated accurately calculated, prepared and recorded following label instructions?

Source: EurepGAP (2005: 11).

The literature on GlobalGAP is extensive, with numerous recent reviews of this literature, such as Unnevehr and Ronchi (2014), Maertens and Swinnen (2015), and Beghin et al. (2015). In recent years, there have been a number of empirical studies in various countries (Kenya, Madagascar, Peru, Senegal, Thailand, etc.), and a number of these studies have specifically addressed the question “Do private standards at the farm level exclude smallholders from export value chains?” What evidence does literature provide about whether standards schemes such as GlobalGAP lead to smallholder farmer exclusion?

The literature documents some clear cases of exclusion. One analysis of Senegal is absolutely clear about this outcome (Maertens and Swinnen, 2009), and an in-depth study of 87 firms exporting asparagus from Peru found that exporters who adopted private standards were more likely to source from their own farms than were other exporters, and that when they did outsource they were less likely to source from small farms than other exporters (Schuster and Maertens, 2013: 299). In this latter case, the study even found that of all the different private standards being used in the industry, GlobalGAP had the greatest negative impact on smallholder farmer procurement (pp. 301-302). A literature review by Maertens and Swinnen refers to similar findings on exclusion for Kenya (fresh vegetables), Madagascar (lychees) and Côte d’Ivoire (horticulture) (Maertens and Swinnen, 2015: 16).

In contrast, some authors have found clear evidence of the inclusion of smallholder farmers into export value chains that require compliance with GlobalGAP. One such example would be the study of small vegetable producers in Madagascar by Minten et al. (2009), and the

findings from a survey of African fresh produce exporters by Henson et al. (2011). This latter study indicates both continuing smallholder farmer inclusion, albeit in a limited role, and no significant differences in the use of smallholder farmers between export businesses operating with GlobalGAP certification and those operating without.

There is now an emerging consensus that explains these differences. This has been developed in the work of Reardon et al. (2009), Barrett et al. (2011) and Henson et al. (2011). They provide reasons why, in certain circumstances, exporters will continue to incorporate smallholder farmers. Reardon et al. (2009) bring into consideration the relative merits of large farms and smallholder farmers within a procurement strategy, noting that the decision is not clear-cut. In part, this is because of products; small farms have a labour and cost advantage for some types of production. At the same time, Henson et al. (2011) emphasize the role of smallholder farmers in providing an element of diversification and risk reduction for exporters that can be combined with large farm sourcing. Further, Barrett et al. (2011) point to some of the disadvantages of working with large farms for procurement of horticultural products, noting the large farms have choices about what they grow. One case cited in the literature is the switch of large farms in Zimbabwe from fresh produce to tobacco. This reduced exporters' procurement options.

At the same time, the emerging consensus also shows how some of the disadvantages suffered by smallholder farms as a result of the introduction of preventive controls can be mitigated through contract farming schemes. First, the difficulties smallholder farmers might have in bearing the costs of GlobalGAP implementation are resolved through these costs being displaced to exporters and donors. The analyses by Kersting and Wollni (2012: 456) and Graffham et al. (2007) provide clear examples of the extent to which these costs are paid by exporters and donor agencies. Second, contract farming allows exporters to take critical processes out of the hands of smallholder farmers. For example, as a strategy to reduce failures to meet targets for pesticide maximum residue levels, larger exporters would place their own technical staff with farmer groups and the staff members would make decisions about when pesticides were required and which ones to use. Some exporters also used their own spraying teams rather than leaving this critical task to the farmer groups themselves (Humphrey, 2008). These considerations are incorporated into a more general model for procurement decision-making by Barrett et al. (2011).

But if there is scope for smallholder farmer inclusion, how extensive is it? The literature provides some answers, partly because of the extensive quantitative, empirical investigations. First, the number of farmers incorporated within outgrower schemes for exports that conform to GlobalGAP appears to be quite small. In particular, the size of outgrower schemes run by particular exporters would appear to number in the hundreds, or possibly in the low thousands in any one country. Compared with the outgrower schemes run for products such as cotton, rice and soybeans, the numbers are low.

Second, the literature also provides some evidence about which types of smallholder farmers are incorporated into these value chains. Some parts of the GlobalGAP literature make direct comparisons between farmers who are included in GlobalGAP-certified value chains and those who are not. These show that the size of farm is not an important factor. Two factors

that come up frequently as significant are the level of education and the ease of access to the farm. Studies by Subervie and Vagneron (2013: 65) and Lemeilleur (2013: 172) report both of these findings, and Handschuch et al. (2013) confirm the education result. Kersting and Wollni (2012: 459) also find a positive relationship between households with more wealth and productive assets and certification to GlobalGAP in Thailand.

The recent extensive literature on private standards and their impact on smallholder farmers has resolved many of the uncertainties that arose from contrast in examples of inclusion and exclusion of smallholder farmers. It is now clear that there are certain conditions under which smallholder farmers will be continued to be incorporated into the supply chains of businesses that require certification to private food safety standards at the farm level. But, the adoption of private standards (and possibly preventive controls more generally) seems to favour own-farm production by exporters and the use of large contract farmers where these are available, with smallholder farmers used to increase flexibility or in situations where large farmers do not exist or are not attracted into producing the required products.

Regional integration, food safety standards and smallholder farmers

Regional integration and increased regional trade have been promoted extensively in recent years, and an important part of the process is the reduction of non-tariff barriers. Reducing these barriers and freeing up trade should increase specialization across countries, raise efficiency and improve competitiveness (World Economic Forum, World Bank, and African Development Bank, 2011). Other benefits should also accrue, including to improve resilience to external shocks (Will, 2012) and improved food security through the pooling of regional resources. It is also argued that regional integration will provide opportunities for smallholder farmers to increase their incomes from improved supplies of inputs and more opportunities to sell their produce without the burdens of high transport costs, poor storage facilities, arbitrary charges, border delays and complex SPS procedures (World Bank, 2012). Many reports and policy statements express the view that regional integration offers big opportunities for smallholder farmers (for example, CAADP, 2009: 2; South African Development Community, 2014), or that such opportunities would exist for smallholder farmers if trade-related constraints were removed (Odularu and Tambi, 2011: 8).

There are many references in the literature to the obstacles created by non-tariff barriers (many of these border obstacles are described in OECD, 2005). These take many different forms, and eliminating many of them would appear to help smallholder farmers as a whole, even if the increased regional trade and competition will create winners and losers.²¹ The South African Development Community document on regional agricultural policy mentions the following initiatives:

Promoting and harmonising relevant market norms that restrict regional trade in areas such as commodity grades and standards, traceability, storage, quality specifications, insurance systems, warehouse receipt systems (WRS) and environmental norms for trade (South African Development Community, 2014).

Many of these initiatives act as market-ordering devices that will facilitate exchange and reduce costs. Similarly, regional agreements on mutual recognition of standards and accreditation, harmonization of standards and transparency should reduce the costs of meeting SPS requirements. This, backed up by support for SPS institutional capacity within regions, should reduce the costs faced by businesses of all sizes in understanding, meeting and demonstrating compliance with SPS rules.

Nevertheless, doubts are expressed in the literature about standards compliance, even within regional contexts, where the “regulatory distance” (UNCTAD, 2014: 9) between practices across different countries should be less than that seen for trade between developed and developing countries. This concern is expressed by Odularu and Tambi (2011: 8):

At the same time, being an increasingly strategic trade issue, mandatory standards and technical regulations have continued to attract considerable attention from African governments because they

21. See, for example, the analysis of the distribution of benefits to different groups of farmers following the reduction of non-tariff barriers to cross-border trade in maize and beef in the East African Community (ASARECA n.d.).

pose significant challenges to all smallholder farmers and agro-processors. In making frantic efforts to access regional and international markets for agricultural commodities, African smallholder farmers are confronted with the arduous hurdles arising from SPS and food-safety issues such as the setting of standards; the costs of technical compliance; the cost of verification; and transitional arrangements.

These are the same challenges that arise in the context of international trade. Importing countries need some degree of confidence that food safety standards in exporting countries will provide an equivalent level of safety to what they seek from their domestic food safety systems. The more that the free flow of food between countries is encouraged, the more these countries will want to be satisfied that exporting countries can achieve, and are achieving, the desired level of protection. In this context, it is not sufficient that harmonization and mutual recognition established the similarity or equivalence of standards. Assurances are also required about the effectiveness of food safety controls in different countries.²²

The challenge is to achieve the goal of maintaining public health and food safety while at the same time creating an environment that does not present obstacles for smallholder farmers. The literature appears to have limited information about the extent of this challenge, and there are three reasons for this. The first is that, while the literature on issues such as private standards is extensive, the literature on the impact of regional trade agreements on smallholder farmers is more limited. Second, examining the impact on smallholder farmers of changes in trade regulations is difficult. For the products that might be most affected by food safety issues (fresh produce, fish, meat and dairy), a lot of cross-border trade is informal and unrecorded. In the case of East Africa, imports from the region are a significant part of what is available in markets, and particularly so for less perishable products such as onions and oranges (Tschirley, 2010: 2-3).

There is a third reason why the literature is limited in this area. Programmes aimed at the regionwide introduction of standards, and in particular product-specific standards, have been implemented slowly. As is noted in a report of the United Nations Conference on Trade and Development (UNCTAD, 2014: 1-2):

The experience of the European Union (EU) and the Association of South-East Asian Nations shows that the process of regional integration is very long-drawn-out and resource intensive, requires steadfast commitment throughout to deal with complex political decisions, and tends to be integral related to overall plans to establish a single internal market in the regions.

In the Association of Southeast Asian Nations (ASEAN) region, the idea of a regional GAP – ASEAN GAP – was already being discussed and designed by 2006 (ASEAN Secretariat, 2006), but it had still not been implemented as a uniform, regionwide policy by 2015. Furthermore, Nabeshima et al. (2015) show that there is a substantial heterogeneity across Southeast Asia with respect to different types of GAP schemes. Similarly, the proposal for the Common Market for Eastern and Southern Africa (COMESA) Green Pass has been discussed for a number of years. A summary of the proposal is presented in Box 3. The general principles for the system were established in 2009 (COMESA, 2009), but establishing the particular standards and procedures applicable to different commodities has taken much longer to develop. In 2012, an FAO analysis of the legal implications of the Green Pass scheme commented that “One may ask what the specific criteria and standards applicable for the Green Pass Certification are since they are not currently provided in the COMESA SPS Regulations” (Ravelomanantsoa, 2012: 22).

22. It should be noted that some of the most difficult SPS issues in the context of regional integration do not apply to human health and food safety. Much of the discussion on SPS measures relates to issues of plant and animal health. The spread of plant and animal diseases not only undermines the efficiency of domestic production in the countries affected, but also threatens access to extra-regional markets. The analysis of Scoones et al. (2010), for example, of the trade in beef in southern Africa in the context of the prevalence of foot-and-mouth disease and its implications for access to external markets.

Box 3: The COMESA Green Pass

“The COMESA Agreement on the Application of SPS measures creates the COMESA Green Pass (CGP), which is a commodity-specific certification scheme for the movement of food and agricultural products within the region. A CGP issued by a duly accredited competent authority in one COMESA member country is sufficient authority from an SPS point of view, for a commodity’s access to the market of any other Member. Additionally, it encourages the signature of Mutual Recognition Agreements between COMESA Member countries and among outside countries for the purpose of recognition of the CGP. The competent authority (CA) in charge of issuing a CGP should be the official Government Agency responsible for animal health, plant health or food safety matters in each Member States. They should certify, monitor and keep a database of certified companies. A SPS Certification Technical Panel (within the COMESA SPS Unit) should support and monitor the CAs accredited to issue CGPs. The successful implementation of the CGP will have the potential to impact significantly on agricultural trade among the signatories since it reduces the transactional costs of export procedures.”

Source: Fulponi et al. (2011: 36).

There is some evidence that regional harmonization can introduce regulations that are unhelpful for small farmers. Will (2012) cites an example of a regional initiative that appears to be unhelpful for smallholder farmers – the proposed East African Community (EAC) dairy standard, which is presented in Box 4. In this case, regional regulations have been introduced for the dairy industry that would, if adopted, create difficulties for much of the existing small-scale dairy industry and its distribution of unpasteurized milk. As the box notes, the new standard is not only inappropriate for a small farmer-oriented dairy sector, but also potentially unnecessary, as the consumption habits of consumers in the region (mostly boiling milk prior to consumption) already reduces the health risk from pathogens. There may be an argument that urban markets are developing in the region and preferences for fresh milk (in the form of milkshakes and other drinks, for example), but the standard seems to be driven by broader concerns about the informal sector and small producers. These are discussed further in the next section.

A second example, also from the EAC but not directly related to food safety, is provided by the World Bank. This case, referring to quality standards for food staples, highlights how the EAC has introduced requirements for maize quality that are in some aspects more stringent than those specified by the Codex Alimentarius Commission (World Bank, 2012: 40-41). The levels of foreign matter and broken grains allowed by the 2005 East African Standards for both Grade 1 and Grade 2 maize were lower than those specified in the Codex standard. This could create a new barrier to trade, and it might prove to be more of a barrier for smallholder farmer production than for products coming from large farms.

There is, then, the potential for regional standards to be developed in a way that is unhelpful for small farmers. The challenges are likely to be found in the same narrow range of products discussed earlier in the paper. However, for the products that do present food safety risks, the critical issue is to define harmonized standards in ways that do not unduly prejudice smallholder farmers and, where controls are required, to provide support for smallholder farmers so that they can meet the new standards.

Box 4: Dairy standards in the East African Community

“In a bid to addressing health hazards, the EAC recently developed new dairy standards based on Codex Alimentarius provisions, however without adapting the international standard to the regional reality: while the Codex standard is appropriate for countries, in which milk is consumed in processed form only, the large majority of consumers in Eastern Africa consume raw milk after boiling, which reduces the health risk otherwise arising from bacterial pathogens.

The newly designed EAC standards for dairy products (for raw milk, pasteurised milk, UHT milk, powdered milk, sweetened and condensed milk, butter, yoghurt, dairy ice and ice cream) hence stipulate food safety and quality criteria that are neither oriented to the habits of East African consumers nor to the current limited compliance capacities of the predominantly small-scale oriented dairy sector or the shortcomings in the transport and logistics infrastructure. Under these circumstances it is not astonishing that the EAC standards have not yet been implemented even if they have already been adopted by some Member States and although they are supposed to be taken on by COMESA.”

Source: Fulponi et al. (2011: 36).

Food safety challenges in the domestic market

Food safety issues also arise in domestic markets. It was shown earlier in this paper that there is an increasing interest in food safety challenges within developing countries and that these challenges are evolving rapidly. Rising incomes and urbanization are driving changes in food production and consumption, even though long-standing issues such as aflatoxin contamination continue to have a huge impact on health in many countries. It was argued earlier that in emerging markets, in particular, the evolution of food systems is outstripping the capacity for food regulation, leading to increasing concerns about food safety by governments and in the minds of consumers.

These food safety challenges are not necessarily linked to small farmers. Food safety challenges in urban retail, for example, have been highlighted by Ababio and Lovatt (2015). It is also clear that government regulatory capacity in many countries is unable to provide adequate oversight of food processing establishments. Nevertheless, some food safety problems do originate on farms, and measures taken to address food safety issues may impact on smallholder farmers (even when they are not the cause of the problems).

The discussion in this section is divided into two parts. The first considers the impact on smallholder farmers of the rise of supermarkets and their increased emphasis on food safety and standards. The second examines overall changes in food safety in domestic markets and the implications for smallholder farmers. This will include a discussion of the opportunities for smallholder farmers presented by anxieties (often well justified) over food safety, as well as the challenges. This section will focus predominantly on the emerging markets and on products with known food safety challenges – grains, fresh fruit and vegetables, and meat and dairy products. It will focus on the implications for smallholder farmers, and in particular on the impact of policy measures that are taken with the intention of increasing food safety. These measures, if poorly designed and implemented, can create particular problems for smallholder farmers.

Supermarkets and smallholder farmers in developing countries

Many articles and reports have been written on the evolution of food retailing and distribution in developing countries that focus on the modernization of food supply chains and, in particular, the role of supermarkets in developing countries in the restructuring of domestic food systems (including farming) (Reardon and Berdegú, 2002; Reardon et al., 2003; Reardon et al., 2009, and many others). The argument about the increasing importance of supermarkets and their impact on smallholder farmers has been summarized succinctly by Natawijdada et al. (2007):

- Modern retailing channels are increasing their share of food retailing.
- Traditional retail procurement is based on four key principles: the use of wholesale markets, purchases through spot markets, reliance on public quality and safety standards, and sourcing by individual stores (Natawijdada et al., 2007: 19). Smallholder farmers are able to participate in this kind of market environment.

- Modern retail changes this. First, wholesale markets are replaced by reliance on small numbers of preferred suppliers who supply direct to supermarkets. Second, retailers contract directly with these preferred suppliers, bypassing wholesalers and the spot market. Third, buying decisions are centralized and applied across retail chains. Fourth, retailers introduce their own product quality and safety standards.
- This model is likely to be exclusionary for smallholder farmers because they cannot meet either the food safety and quality standards, or the associated requirements with respect to scale, consistency of supply, etc.
- The scale of the reformulation of food supply chains is considerable and will have ramifications beyond the supermarket sector.

It is not argued that all of the elements of this model have been achieved across all developing countries. There is a long transition, and retailers require time to modernize their supply chains, but it is argued that the trend is inexorable. Therefore, those who counter that many supermarkets in developing countries do not follow the four shifts outlined in the third bullet point above (for example, Humphrey, 2007; Tschirley et al., 2004) are missing the point.

It is clear that food safety is not the only driver of these changes. They are also designed to achieve standardized, consistent, year-round supply. However, this issue is so central to discussions of smallholder farmer exclusion that it will be analysed further.

The impact of these changes on smallholder farmers is referred to in numerous papers. Srimanee and Routray (2012: 657), for example, summarize the literature by saying that:

The published cases of many developing countries have reported that most of the small farmers have experienced many problems in supplying supermarkets and are excluded from supermarket procurement systems due to their lack of capital, their reliance on rain-fed production, and their inability to maintain consistent supply throughout the year.

Furthermore, the shift is not only experienced by retailers serving middle-class customers. Supermarkets are selling to low-income consumers as well as to the middle class:

In South Africa (SA), a large proportion of food was sold by street merchants and informal small-scale food stores for many decades. However, especially in the last two decades, the food retail structure in SA has changed....Today, four large domestic retail chains (Shoprite/Checkers, Pick 'n Pay, Spar and Woolworths), as well as a number [of] smaller food retail chains and gas station shops, have taken over 70% of food retail business in SA....supermarkets are now also competing broadly with small and traditional retailers at all income levels, including markets in remote rural areas and townships (Dannenbergh, 2013: 15-16).

Although supermarket penetration in South Africa may be substantially higher than in other developing country markets, the tendency is not surprising, particularly given the broad shifts in consumption patterns identified by Tschirley et al. (2015).

The link between this retailing change and exclusion of smallholder farmers has three stages. The first is that supermarkets are gaining dominance in food retailing in developing countries. The second is that supermarkets are selling foods that compete directly with those that smallholder farmers provide for food markets. The third is that supermarket procurement practices favour large farmers over small, with the result that large farm production substitutes for smallholder farmers as supermarkets gain market share. Each link in this argument can be contested.

With respect to the first stage in the argument, “modern” retailing formats have been gaining an increasing share of *total* food sales in developing countries, although progress is definitely uneven across the developing world. Tschirley (2010: 6) provides an overview that ends up being very sceptical about arguments put forward by Reardon and others. This is also the view taken by Humphrey (2007). There are shifts, but the trend is exaggerated.

The second stage relates to the types of food sold by supermarkets. Are supermarket food sales concentrated in products important for smallholder farmers? The foods that offer the best returns and best growth prospects for smallholder farmers are foods consumed fresh. Are supermarkets selling these types of food? Humphrey (2007) provides evidence from various countries to show that supermarket food sales have advanced much more quickly in processed foods than in fresh foods. Similarly, Chamhuri and Batt (2013) acknowledge that supermarkets are growing in importance in Malaysia, but they also emphasize that the rate of growth of supermarket sales of *fresh* food is slow. A survey of 295 consumers in Malaysia, focusing on choice of retail stores for purchases of fresh meat, found that two thirds of those interviewed still bought meat from “traditional” markets (p. 106). Similarly, an earlier analysis of food purchases in Hong Kong by Goldman et al. (2002) found that consumers had a preference for purchasing perishable products from wet (traditional) markets. These findings have two implications. The first is that traditional marketing channels still provide important opportunities for smallholder farmers. The second is that to the extent that supermarkets sell a lot of processed food, and consumers are increasingly buying processed foods (both perishable and non-perishable), a more detailed examination of the food processing industry and its links to smallholder farmers is required before generalizations can be made about smallholder farmer inclusion and exclusion.

The third stage of the argument concerns supermarket procurement practices. The literature summary by Srimanee and Routray cited above is contested by them. In the case of Thailand, the participation of smallholder farmers in supermarket procurement chains is continuing. The supermarkets are forced to adapt to prevailing conditions in food and agriculture in the countries in which they operate and modify their procurement strategies. They found that supermarkets used a variety of different sourcing channels and included cooperatives in their sourcing strategies, particularly for fresh fruit (Srimanee and Routray, 2012: 662).

This matches the arguments presented above in the discussion of private standards. Retailers have to adapt to the structure of the market and the availability of farm produce from different types of farms. A further example of this type of adjustment of sourcing strategies to domestic realities is provided by Moustier et al. (2010: 72-73), who point to sourcing by supermarkets in Hanoi, Viet Nam, of fresh fruit and vegetables from farmer cooperatives. Both sources stress the importance of government policy in enabling smallholder farmers to access these market segments, and this point will be discussed further in the next section.

Regulations, standards and food safety in the domestic markets of developing countries

Supermarkets are only part of the story about smallholder farmers and food safety in developing countries. Food safety issues are also clearly apparent in other parts of the food industry. The review of food safety trends by Grace and McDermott (2015), presented earlier in this review, highlighted the food safety crises in developing countries, and particularly in emerging markets. Similarly, Dinham (2003) has highlighted some of the issues relating to

pesticide residues in the domestic markets of developing countries. Food safety scandals – most notably high-profile scandals in China – increase levels of concern in both government and among citizens. Such food safety failures also affect many of the same products that were of most concern in international trade in food – fresh fruit and vegetables, meat and dairy products, fish and cereals. The main difference between domestic markets in developing countries and international trade would be that, whereas international trade in food of animal origin (particularly meat and dairy) is quite restricted by SPS measures relating to human and animal health, such products are widely traded and consumed in developing countries. As with the discussion of food safety in international trade, tendencies towards smallholder farmer exclusion depend very much on how issues are framed and the types of policies that are introduced to reduce incidences of food safety failures and foodborne illness.

The similarities are seen in the case of aflatoxin contamination of peanut butter in South Africa. Studies have shown high levels of aflatoxins in peanut butter in South Africa, a problem made more severe by the fact that this product was being promoted as part of nutrition programmes, including for children (Achterbosch, 2005). A survey of products available and in retail outlets showed that contamination was widespread – one third of sampled jars of peanut butter sold by commercial brands in supermarkets contained aflatoxin levels above the legal limit (Achterbosch, 2005: 167). Achterbosch then considers the recommendations made by the food authorities in South Africa to the Joint Expert Committee on Food Additives of the Codex Alimentarius Commission. These included measures to be taken on farms (good agricultural practices), in primary processing, and further processing. The potential for smallholder exclusion lies in how improved practices are monitored and enforced. Food businesses further down the value chain will be under pressure to reduce the levels of aflatoxins in their products, and as a result they may move to contract farming or sourcing from large farms as part of their risk reduction strategies. The driver of such strategies is not necessarily the capacity (or lack of it) of smallholder farmers, but the ease with which the performance of these farmers can be incentivized and monitored by the purchaser.

Policy choices and the impacts of the way in which food safety problems and small farmer capabilities are framed in policy discourses matter a lot. Their impacts on smallholder farmers, can be seen in developments in the meat and dairy industries. Consumption of dairy products has been promoted by governments in developing countries. For example, the dairy sector in Kenya has been actively promoted by donors such as USAID (Henson et al., 2012). It is seen to have benefits for both rural producers and for consumers. Nevertheless, food of animal origin poses some safety challenges, and in the case of Kenya, the response to these challenges can be exclusionary. An effort to improve the safety of milk has involved outlawing street hawkers of unpasteurized milk, who source their supplies predominantly from small-scale milk producers. The aim is to channel production through the formal sector milk processing businesses that pasteurize their products. It is possible, but not certain, that this will lead to a marginalization of the smallest producers unless steps are taken to integrate small producers into these more formalized value chains. The need for such preventive measures was questioned earlier in this review (see Box 4).

These issues also come out very clearly in China, which exemplifies many of the trends in food production and consumption, food safety and policy responses discussed in this review. Consumption of high-value foods has increased, and the government has promoted production and consumption of these products – for example, the expansion of the dairy industry was part

of a government policy to promote healthy food and invigorate the national population (Snell, 2014). At the same time, there have also been serious food safety issues arising from meat and dairy products. Gale and Hu (2011: 483) begin their analysis of food safety in China with the observation that “The steady series of food safety incidents since the 1990s has damaged the reputation of Chinese products on the markets and shaken the confidence of Chinese consumers in their food supply”. Similarly, Lam et al. (2013) provide an account of food safety shortcomings and their impacts on health in China, noting that “In a 2011 survey, food safety was ranked first in the top five safety issues that worried the Chinese population, surpassing public safety, traffic safety, health safety, and environmental safety”. Huang et al. (2012: 23) refer to problems encountered by Chinese food products in export markets, and they follow this up with the observation that “In fact, food sold within China is far more hazardous than that exported. Despite the demand for improved food quality, the reality is that some food sold is of rather poor quality”.

The framing of the problem and the search for solutions has favoured a shift towards greater top-down control and the concentration of farm activities into larger units. Various authors have attributed China’s poor food safety record to the fragmentation of the agricultural sector in the country and the predominance of small farms:

The small-scale of fresh produce and livestock operations in China and the fact that they are relatively scattered across producing areas contribute to the abuse of agricultural chemicals and noncompliance with regulations. For example, 92 percent of swine producers have an annual production with only one to five pigs (Dong and Jensen, 2004: 6).

The response to these problems has been to reinforce the top-down organization of the industry, which involves attracting investment into agriculture and introducing “capital, advanced technology, and management and marketing skills to improve product quality, increase exports, and assist in the transition from traditional to modern agricultural operations” (Dong and Jensen, 2004: 8). In this view, the transformation should be led by large food processing companies (the dragon-head enterprises). These businesses are linked to the opportunity for “better food safety control” by Dong and Jensen (2004: 8). Small farmers are seen as the problem. The smallest pig-raising households need to be replaced by larger, commercially oriented units controlled very closely by the dragon-head enterprises.²³

But, is large-scale farming superior from the point of view of food safety? Schneider and Sharma (2014: 32) outline the government’s belief that a shift to what they refer to as an “industrial livestock production model” led by the “dragon-head enterprises” will result in safer pork:

Though there has been a great variance in the way specialized farms operate, the government’s push to standardize these farms toward a specific industrial model means that more and more of them could be classified as CAFOs [concentrated animal feeding operations]. The government sees CAFOs as the solution to food safety problems and is thus encouraging specialized farms to become more factory-like in the hopes that greater bio-exclusion and standardized methods of feeding, vaccination and rearing will reduce biosafety threats (Schneider and Sharma, 2014: 19-20).

The authors contest this argument, suggesting that this model not only greatly disadvantages small producers, but also replicates the United States approach to factory farming “that has led to drastic environmental, public health and animal welfare problems” (Schneider and Sharma, 2014: 32).

23. Murphy (2012: 7-11) provides an overview of how different conceptions about smallholder farmers and their role in food production have changed over time. These conceptions are important in setting the assumptions that are brought into discussions about the potential for working with smallholder farmers and their relative advantages and disadvantages compared with other farmers.

Schneider and Sharma do not engage directly with the claim that the dragon-head model developed in China improves food safety. Their reference to public health problems relates to the impact of concentrated animal feeding operations on local communities rather than to food safety, but the extent to which this model can achieve food safety is placed in doubt by events in the dairy industry.

The Chinese government has strongly promoted the dairy industry, and the framing of the issue has been similar to that in the pork sector – backwardness and tradition (linked with lack of safety) versus progress and modernity. Huang et al. (2012: 25) describe the reorganization of the dairy sector and the incorporation of small-scale producers into “centralized complexes” – larger units that are (in theory) subject to greater control and organization by the leading companies and more capable of producing both efficiently *and* safely:

Importantly, this type of centralised complex is expected to facilitate supervision of the standards of food safety and quality....One of the main goals of the policy response was to change the production structure of China's dairy industry to make it more modern and better able to adopt new technologies that could produce high quality milk....The new policy aimed to increase the size of dairy farms and reduce the dependence of the sector on small back-yard farms.

The melamine scandal in 2007 was a severe setback for the industry and the government, but it reinforced the restructuring process. One diagnosis of the cause of the intentional contamination of milk with melamine attributed it to the fragmentation of the dairy sector and lack of control over smallholder farmers. This then justified a strategy of imposing greater controls over small producers and the further reorganization and concentration of the sector.

The opposite case has been made by Snell (2014) – that the dragon-head enterprises themselves were a major part of the problem and that the underlying problem was a collapse of food safety governance arising from a combination of the pressures to rapidly increase milk production, the push to restructuring, and close ties between provincial governments and dragon-head enterprises. In a detailed analysis of the role of two leading Chinese dairy companies in the melamine crisis, Snell shows how some leading companies were aware of the adulteration problem and partly promoted it by their own strategies with respect to competing for raw milk and prioritizing the expansion of milk sales without giving sufficient consideration to how raw milk supplies were to be obtained (Snell, 2014). Furthermore, Snell’s analysis goes on to show how earlier plans to reorganize the dairy industry and to increase the supervision of smallholder farmers using the centralized complexes model failed systematically because of false reporting of achievements by local officials and collusion between provincial officials and some of the dragon-head companies. Reported achievements in terms of building new dairy complexes and modernizing production were systematically falsified. All of this suggests that at the time of the crisis and subsequently the party and the state in China were incapable of implementing and regulating the milk production model that had been advocated.

There are other models for organizing milk production that seek to involve smallholder farmers in a more positive way, even though there are numerous other examples of the tendency towards concentration, as shown in Gutman’s analysis of Argentina (2002) and that of Farina (2002) for Brazil. As an alternative, Pérez-Aleman (2012: 12345) cites the case of Nicaragua as an example of a milk sector that overcame serious challenges with the help of the government and donors and introduced new standards along the chain that enabled smallholder farmers to produce safe products and be incorporated into both domestic and even export markets.

There are also extensive smallholder farmer dairy schemes in South Asia, where smallholder farmers are organized in cooperatives or in schemes managed by large milk processors, both locally owned and transnational. Nestlé is an example of the latter, with extensive operations in South Asia, while BRAC in Bangladesh and AMUL in India are examples of domestic dairy operations incorporating large numbers of smallholder farmers. A paper by Vandeplass et al. (2011: 22) examining the incorporation of small dairy farmers into value chains managed by cooperatives and by Nestlé in the Punjab region of India concluded by observing:

Contrary to what is sometimes claimed in the literature and by advocacy groups in India, we do not find that multinational channels exclude small farmers and we find little differences between procurement systems of cooperatives and the multinational. While our analysis suggests that small dairy farms are more likely to supply the dairy cooperative than the informal or the multinational channel, the differences in size of supplying farms are small, illustrating the overall backyard structure of the sector in India.

However, authors do raise the caveat that milk safety standards in India are still weakly developed and that increased safety requirements might change this picture.

Food safety as an opportunity: fresh vegetables

So far, the review has focused on how food safety has been presented as a challenge for smallholder farmers and the ways in which they might be disadvantaged by particular framings of food safety issues. This is the perspective offered by much of the literature. However, consumers' food safety concerns can also be an opportunity for smallholder farmers. Many consumers in developing countries appear to have concerns about the safety of the foods available to them in markets. Vinning and Chinh (2008), drawing on work by Paule Moustier and others, suggest that consumers in Viet Nam, for example, are highly concerned about the safety of fresh fruit and vegetables, particularly those consumed raw. They also feel that the information required to make decisions about whether food is safe was lacking because products generally lacked indications of origin and certification.

In such situations, some consumers, particularly higher-income consumers, are likely to favour products that have some indication of quality. There are a number of ways that this might be achieved. The first is through the construction of "short" value chains. A short food value chain is one in which there are a small number of linkages between the consumer and the producer. Such chains are further enhanced by transparency about where food comes from and durable links between producers and retailers. While such a model has some characteristics in common with the supermarket sourcing strategies described earlier in this review, it can provide opportunities for smallholder farmers. Specialized, and often small scale, retail operations can make a virtue of working with small groups of farmers to provide food whose origin is known.²⁴ The literature on Viet Nam provides a number of examples of such chains that have been constructed to increase consumer confidence (see, for example, Simmons and Scott, 2007). Second, public bodies can introduce schemes to provide assurances that products are safe. Again, in Viet Nam, the Plant Protection Department of the Ministry of Agriculture promoted safe vegetables by encouraging farmers to adopt improved agricultural practices and backing up the scheme with testing for pesticide residues (Simmons and Scott, 2007).

The third option is to promote certification. While examples of potentially exclusionary certification schemes have been discussed earlier in this review, this is not the only way to implement certification. There is literature on the organic sector in Viet Nam and South Africa,

24. This is a model used by smallholder farmers in Europe.

for example, that points to smallholder farmer production of organic produce (Dam n.d.; Manderson, 2015), and perhaps the most interesting element of these two cases is the fact that both point to the use of the Participatory Guarantee System (PGS) as a means of certifying products as organic. It has also been introduced in other countries. The international model for organic certification relies on third-party certification and rigorous adherence to organic standards (Manderson, 2015: 14). The PGS system takes a different approach:

Participatory guarantee systems (PGS) are locally focused quality assurance systems. They assess producers based on active participation of stakeholders, including consumers, and are built on a foundation of trust, social networks and knowledge exchange.

This is less demanding than international organic standards. While this may produce a lower level of confidence in products, it may be sufficient to reassure consumers in developing countries worried about unsafe food and provide a way into demonstrating food safety for smallholder farmers that would not have the resources to go down the certified, international organic route.

Conclusion: Measures to promote smallholder farmer inclusion in the context of food safety challenges

One of the core objectives of IFAD is to reduce rural poverty and to do so by supporting smallholder farmers. The 2011-2015 Strategic Framework defines IFAD's overarching goal as "Enabling poor rural people to improve their food security and nutrition, raise their incomes and strengthen their resilience", and an important part of this process is to "enable small-scale farmers to thrive in agricultural markets" (IFAD, 2011: 28). An examination of the literature on food safety contributes to a broader discussion on the challenges that need to be overcome if small-scale farmers are indeed going to thrive.

This paper has outlined food safety challenges facing developing country food producers (and the food industry more generally) in domestic, regional and international markets. It has highlighted the importance of food safety challenges in these markets and the growing concerns of consumers and policymakers about how to make food safer. While most of the food safety challenges arising from agricultural practices (as opposed to issues arising in food processing and in food services retailing) are concentrated in a limited number of food products – fresh fruit and vegetables, fish, meat, and dairy and cereals susceptible to aflatoxin contamination – this group includes those which offer expanding markets and prospects for raising the incomes of smallholder farmers. For this reason, it is not surprising that discussions of food safety frequently consider the possible impact of food safety measures on the ability of smallholder farmers to access markets:

Compliance with food safety standards, whether national or international, can be costly for small producers and may restrict their access to higher value markets which have the potential to improve income and reduce poverty (Global Panel on Agriculture and Food Systems for Nutrition, 2016: 9).

Food safety compliance challenges can impact on smallholder farmers through a variety of different effects. They can lead to border rejections, or increased export controls on countries with a record of compliance failures. They can be expressed in the form of conditions placed by importing countries on how products are produced and how compliance is to be established, as was shown by the analysis of increased use of preventive controls by the European Union and the United States and the obligations these countries place on the competent authorities in exporting countries. They are seen in enhanced domestic controls implemented by exporting countries, as was described in the case of aflatoxin controls in China (among others). Finally, it was shown that smallholder farmers can be affected by the ways in which businesses respond both to consumer pressure and to the obligations placed on them by public authorities to ensure that the food they place on the domestic market (whether imported or produced domestically) is safe.

In spite of these challenges, food safety also presents opportunities. For smallholder farmers who can produce food safely and provide the necessary assurances that their products are safe, there are expanding markets. At the same time, increased concerns about food safety in developing countries, and most notably the emerging markets, present opportunities for

those smallholder farmers who are incorporated into chains that provide assurances about food safety to consumers – whether this be through links to consumer outlets that focus on safety, compliance with public regulations, or direct sales to consumers.

How these challenges are met and how the opportunities are grasped by smallholder farmers depends to a large extent on public policy, and public-private initiatives. The policy responses fall into three main areas: (i) food safety compliance regimes; (ii) strategic choices about standards and regulations; and (iii) supporting smallholder farmers.

Food safety compliance regimes

Many discussions about food safety in developing countries emphasize the importance of building the institutional infrastructure for SPS compliance. This is discussed in many places, including the United Nations Industrial Development Organization (UNIDO) Trade and Standards Compliance Report 2015 (UNIDO, 2015). This matters not only for exports from developing countries to developed countries, but also for regional trade and domestic controls. While the focus of many initiatives has been on building up the capacity of governments to develop the systems and capabilities required to meet SPS requirements in export markets (partly because Aid for Trade finance has been used for such initiatives), both national food safety concerns and regional integration oblige governments to develop and apply food safety regulations in ways that are transparent and effective and that achieve the overall goal of increasing food safety without imposing unnecessary burdens on food business operators.

The measures to be taken to achieve these goals are discussed extensively in policy documents on regional integration (see, for example, South African Development Community, 2014; Will, 2012; UNCTAD, 2014). They include developing the hard standards infrastructure (national standards institutes, accredited testing laboratories, national certification capacity, inspection services, accreditation systems, etc.), and capacity within public agencies to create and implement rule-based systems for managing regional trade. A review of the literature on SPS capacities in East Africa can be found in Henson (n.d.).

Improving domestic and regional capacities in this way is an important task. It should reduce the costs of compliance and also make compliance easier to understand and easier to achieve. Nevertheless, it is only a first step that has to be complemented by further measures to support compliance by smallholder farmers.

Strategic choices on food safety

One of the clear messages that comes out of the literature analysed in this review is that the impacts on smallholder farmers of food safety challenges are significantly influenced by the responses of public and private organizations to these challenges. One priority for the government is to avoid promoting policies that make the situation for small farmers more difficult. The review showed clearly that some possible exclusionary tendencies arose from policy responses to food safety issues. This was seen in the framing of debates in China around food safety and small-scale farming and, potentially, in the management of the tension between food safety and freer trade in the context of regional trade agreements.

In other words, there is considerable scope for improving policy and regulatory frameworks at all levels so that food safety policy does not unjustly identify smallholder farmers as the cause of what are generally broader and more systemic food safety problems.

On the more positive side, four strategic choices are considered here:

1. Should governments replicate international standards or create domestic/regional ones?
2. Should governments promote or implement the single food safety standards, or provide a number of different options, particularly for smallholder farmers?
3. How much should public agencies promote the entry of smallholder farmers into export markets that have stringent food safety standards?
4. How much should policies to promote the inclusion of smallholder farmers focus on the farmers themselves or on the environment in which they operate?

The first strategic choice relates to the adoption of international standards. For export-oriented industries, there is little choice. In export markets, producing countries are “standards takers”. If they do not meet the requirements of the export market, then they will be excluded from it. One strategic question is whether this export requirement is then introduced into the domestic market. The incentive to do so is that food producers and processors then have a single standard across both domestic and export markets, which reduces barriers to export. The danger with this strategy is that it might impose food safety requirements that are not only onerous but also unrealistic and ineffective in the context of (some) developing country production systems.

This leads onto the second strategic question, which is whether one or multiple food safety standards should be promoted. Jaffee et al. (2011: 46) make the argument that there are strong reasons to present farmers (of all sizes) with an upgrading path that allows them to improve their capabilities step by step. In particular, they argue it is a mistake to attempt to shift farmers rapidly from situations in which there are no or few compliance requirements to attempting to comply with the most exacting market standards.

The case of Thailand provides an example of multiple standards and upgrading perhaps between them. The government promoted good agricultural practice (GAP) schemes aimed at farms that were targeting different final markets. A recent paper by Korpraditskul and Ratanakreetakul (2015) describes the importance of GlobalGAP for farmers (including smallholder farmers) in Thailand, but also notes the role of the domestic alternative, Thai Q GAP. The use of different standards is combined with programmes to support smallholder farmers and enable them to improve food safety and quality. It is, however, not clear in the literature to what extent of adoption of these standards by smallholder farmers has been achieved and whether it provides a genuinely lower-cost route to improving food safety and providing assurances to retailers and consumers.

The idea that it is possible to specify more than one standard or more than one level of acceptable food safety is not confined to the public sector. Businesses also differentiate between different levels of standards conformance. The Global Markets Programme, sponsored by the Global Food Safety Initiative, provides for three levels of compliance. While the top level is equivalent to private standards such as Safe Quality Food, there are also basic and intermediate levels that provide a pathway towards improvement for less capable businesses and farmers. Such an approach recognizes that smallholder farmers and small businesses are at different levels of capabilities and that the important thing is to improve performance,

and this can be incentivized through rewarding different levels of performance along the way. While the Global Markets Programme has until now been predominantly focused on small businesses, a module directed towards farmers was being redesigned in 2015.²⁵

The third strategic question, and one which particularly relates to smallholder farmers, is the extent to which governments should actively promote the participation of farmers in markets that have particularly exacting food safety standards. Governments and donor agencies have attempted to do this in the past. A study by Humphrey (2008) of donor interventions in Kenya in the period shortly after EurepGAP (later rebranded as GlobalGAP) became a requirement for supplying supermarket customers in the country's main fresh produce export markets – the United Kingdom and the Netherlands – found that donors were very active in supporting smallholder farmers and facilitating the process of certification. In spite of the exacting nature of the challenge, some donor agencies either saw EurepGAP as, in effect, compulsory right across Europe (a common misunderstanding at the time) or regarded the market opportunity as attractive enough to justify the costs and difficulties of compliance.

There are three reasons for not adopting this strategy. First, it was far from clear in the Kenya case that there was any additionality in terms of smallholder farmer participation in fresh vegetable exports chains requiring EurepGAP certification. Exporters certainly accepted public support for their contract farming schemes, but there is no evidence that this chains the numbers of farmers contracted. Second, this is not an effective strategy for improving the livelihoods of the poorest socio-economic categories, including women, youth and indigenous people (as indicated in the targeting criteria outlined in the Portfolio Performance Review, IFAD, 2014).²⁶ As was shown in the discussion of private standards, the smallholder farmers incorporated into these export value chains tend to be those with greater assets, higher levels of education, and farms better served by transport infrastructure. Third, the number of farmers incorporated into value chains requiring private food safety standards appears to be small. The number of beneficiaries would be low compared to the opportunities for enhancing livelihoods of small farmers in commodities such as cotton, cocoa and tea. A similar argument might be made about the strategy of promoting incorporation of smallholder farmers into the supply chains of supermarkets in developing countries. However, more information is required about the scale of supermarket sourcing within developing countries in the extent to which public action is required to facilitate it.

Instead, it makes more sense to focus on those market segments where the overall challenge of conformance to food safety standards can be reduced by:

1. Focusing on products where food safety challenges are low. There are many such products.
2. Targeting less challenging markets. As was noted by Jaffee et al. (2011), smallholder farmers should not be encouraged to move rapidly up the scale of compliance challenges.
3. Focusing on food processing. Much of food processing introduces either a point of inspection (for example, at the point of entry to the processing establishment) or a “kill step” (such as pasteurization of milk) that eliminates the food safety problem. The more these steps are effective, the less need there is to control what has happened upstream in the chain. Opportunities for poor farmers and disadvantaged groups were evident, for example, in the dairy industry in South Asia, and it was noted earlier that consumption of processed foods in developing countries is rising rapidly.

25. For more information, see www.mygfsi.com/market-access/global-markets-programme/overview.html.

26. This also comes out clearly in the discussion of gender inequalities in the 2011-2015 Strategic Framework (IFAD, 2011: 12).

The fourth strategic question relates to the framing of the issue of standards compliance and smallholder farmer inclusion/exclusion. If the problem is posed in terms of “Can smallholder farmers meet food safety standards?”, then it puts the focus on small farmers. But, the capacity of a productive system to meet food safety requirements depends upon many different actors. This is one of the central arguments of Day’s analysis of strengthening developing countries’ SPS capacity (Day, 2013: 8-12). While food producers and processors will definitely play a central role, suppliers of inputs, buyers and regulators also have important roles to play. There may be alternative ways of reaching the same overall objective. For example, a problem with excessive pesticide residues might be addressed through training of small farmers, but it might equally be mitigated through changes in the packaging of pesticides, how they are marketed to farmers, and the withdrawal of certain products from the market. Rather than focusing on smallholder farmer capabilities alone, it will pay to examine how the food system as a whole functions, to understand the incentives and rewards to various actors along the food chain, and to introduce more resilient control mechanisms. Understanding food system outcomes as a consequence of how the different actors in the food system work, or fail to work, together is also central to the next issue, which is the different ways in which support can be delivered to smallholder farmers.

Supporting smallholder farmers

The literature is in agreement about the need to provide support for smallholder farmers, given the disadvantages they face with respect to scale, finance and capabilities. Many of these challenges are not specific to food safety; they have acted as a constraint on smallholder farmers for a long time. In the case of finance, for example, the need for the support to meet expenditures relating to food safety improvements would present similar challenges to investments in irrigation or storage or improving quality, while the challenges involved in introducing good agricultural practices to achieve food safety would not necessarily be very different from introducing new practices for quality, productivity or growing new varieties of crops. There are, however, issues relating to the impact of preventive controls and the need for demonstrating compliance that present new challenges.

There are many ways in which smallholder farmers can be supported. The analysis of the challenges of meeting standards put forward by Jaffee et al. (2011), discussed above predominantly in the context of meeting international SPS requirements, pointed to various ways in which smallholder farmer disadvantages can be offset. These include training programmes (which can be provided by governments, development agencies or even business organizations), subsidies to reduce the cost to farmers (and potential purchasers of the product) of capital investment, and certification. The potential for such subsidies is greatest when the costs are one-off, start-up costs. The literature on GlobalGAP, in particular, provides many indications of initiatives in this area (Asfaw et al., 2007; Graffham et al., 2007; Mithöfer et al., 2007). Governments have also developed programmes designed to both enable smallholder farmers to meet more stringent food safety standards and integrate them into marketing channels. The analysis of fruit and vegetable marketing channels in Thailand by Srimanee and Routray (2012) points to the importance of interventions by the government in the domestic sphere to promote food safety and to enable smallholder farmers to both improve the overall safety of food available in Thailand and gain access to modernizing retail channels. By providing both accessible routes to improving compliance that can be taken

up by farmers and providing help to move along these routes, public institutions play an important role in enabling farmers to access these markets. These interventions are a good example of providing upgrading paths for smallholder farmers.

A second important area of support is the development of collective action. Smallholder farmer organizations have an important role to play in facilitating smallholder farmer conformance to food safety standards. Such organizations can also play a critical role in opening up new market opportunities based on food safety reputation and collective commitments to good agricultural practices. The literature shows conclusively that the costs and capability requirements of preventive standards are considerable for independent smallholder farmers, but lessened through the development of collective organizations among farmers.

Among the many papers that discuss this question is the one by Narrod et al. (2009). Part of this paper specifically focuses on collective action as a means of meeting food safety challenges, and one part of this analysis, taken from the paper, is presented in Box 5. This shows the scope for collective action at different points in the agricultural production cycle. The issues that can be addressed by collective action are highlighted in italics. The box draws attention to the way in which collective action can reduce the costs of obtaining information about markets, help to establish a reputation as reliable producers,²⁷ allow for resource-pooling, and enable the group to achieve economies of scale that would be unavailable to individual producers. The box also makes reference to the critical factor of maintaining a group monitoring system. The cases examined by Narrod et al. (2009) refer specifically to the production of high-value products for export (with cases of green beans from Kenya and grapes from India), and the GlobalGAP standard has specific arrangements for group certification that include the development and monitoring of quality management systems for farmer groups (see, for example, GLOBALG.A.P., 2012; Ouma, 2007). Even without such provisions, collective organization has to be backed up by collective discipline so that food safety standards are maintained.

Box 5: Food safety standards and the role of collective action	
Supply chain process	Role played by collective action ^a
Pre-harvest	<ul style="list-style-type: none"> • <i>Procurement of information about markets and the process of contract formation</i> • <i>Dissemination of information relating to food safety standards</i> • Undertaking lumpy investments
Production	<ul style="list-style-type: none"> • Procurement of cheaper inputs through bulk buying • Accessing extension services • <i>Establishment of traceability systems</i> • <i>Maintaining a group monitoring system</i>
Post-harvest and marketing	<ul style="list-style-type: none"> • Collective marketing leading to reduced costs • <i>Grading and certification</i> • <i>Collaboration with marketing experts</i> • <i>Maintaining a group monitoring system</i>
<p>Source: Narrod et al. (2009: 10). ^a Italics denote the roles played by collective action that specifically relate to food safety standards.</p>	

27. Establishing a reputation as a reliable producer is linked to the argument made earlier about buyers having confidence about smallholder farmers being willing and able to meet the contractual conditions (Jaffee et al., 2011). Narrod et al. (2009) argue that this is more easily done by groups of farmers rather than individuals.

Farmer organizations, particularly cooperatives, can be viewed as a form of horizontal cooperation. Food safety issues are also addressed widely through forms of vertical cooperation or combinations of both vertical and horizontal cooperation. For example, intermediary organizations such as produce marketing organizations can also fulfil many of the functions discussed above by Narrod et al. In addition, as is discussed extensively in the literature, contract farming and the formation of outgrow groups provide vertical linkages that put farmers in a situation where they may be provided with inputs, training and technical assistance, as well as intensive monitoring of performance and clear limitations on their freedom of action. Within this context, there is also scope for changing the capability requirements for meeting food safety standards through reorganizing the division of labour between smallholder farmers and other actors in the food system. For example, fresh produce exporters who are particularly concerned about pesticide residues may choose to take pesticide spraying out of the hands of smallholder farmers and rely on their own staff or on specialist service providers.

All of these approaches to promoting collective action can be supported by public action. Such action can provide resources and technical assistance for the formation of independent farmer groups, as well as a regulatory framework that facilitates their good functioning, and the literature provides many examples of government support for vertical coordination. There is widespread evidence that small farmers can be enabled to compete even in challenging markets if the right types of linkages are put in place. Nevertheless, the literature also provides many examples of the failures of collective action, both horizontal and vertical, as a result of both failures in coordination in control (not preventing free riding, for example), conflicting aims and unequal rewards. These issues are discussed extensively in a much broader literature on collective action that goes far beyond food safety.

Appendix 1: Summary of main characteristics of most cited papers

This appendix provides a brief summary of the papers that are most cited in the literature review. It is intended to enable readers to identify the materials that are most pertinent to their own interests. It is divided into the five categories used to structure the report: literature reviews, public standards, private standards for export markets, regional integration, and domestic markets in developing countries.

Literature reviews

Paper	Summary
Ababio, P.F. and Lovatt, P. (2015). A Review on Food Safety and Food Hygiene Studies in Ghana. <i>Food Control</i> , 47: 92-97.	A desktop literature review on food safety and hygiene in Ghana that focuses predominantly on food vending establishments and street vendors in Accra. It highlights a range of food safety problems.
Beghin, J., Maertens, M. and Swinnen, J. 2015. <i>Non-Tariff Measures and Standards in Trade and Global Value Chains</i> . Bioeconomics Working Paper Series 2015/02. Leuven: LICOS Centre for Institutions and Economic Performance.	An assessment of the literature on public and private quality standards and their impact on food markets, international trade and global supply chains. There are extensive discussions of food safety and the impact of the standards on small farmers.
FAO. 2014. <i>Impact of International Voluntary Standards on Smallholder Market Participation in Developing Countries – A Review of the Literature</i> . Agribusiness and Food Industries Series 3. Rome: FAO.	This literature review focuses specifically on voluntary (private) standards. It analyses 101 studies relating to 19 voluntary standards. It shows that the vast majority of the evidence comes from just three standards – GlobalGAP, Fairtrade and organic – and that there are continuing large knowledge gaps about the impact of voluntary standards.
Maertens, M. and Swinnen, J. 2015. <i>Agricultural Trade and Development: A Value Chain Perspective</i> . WTO Staff Working Paper ERSD-2015-04. Geneva: WTO.	The review provides a broad overview of key questions relating to recent transformations in agricultural trade, including the proliferation of public and private standards and increased vertical coordination in value chains. It includes a review of the literature on smallholder farmers and standards.

<p>Murphy, S. 2012. <i>Changing Perspectives: Small-Scale Farmers, Markets and Globalisation</i>. London/The Hague: IIED/Hivos.</p>	<p>This paper analyses debates about smallholder farmers from the perspective of evolving views about small-scale farming. It provides an analysis of four different narratives about small-scale farmers in the context of globalization.</p>
<p>Otsuka, K., Nakano, Y. and Takahashi, K. 2015. <i>Contract Farming in Developed and Developing Countries</i>. Tokyo: National Graduate Institute for Policy Studies.</p>	<p>The review focuses specifically on contract farming, with an emphasis on developing countries. It argues that contract farming has positive and significant effects on production efficiency and income from contracted crops, even after allowing for selection effects.</p>
<p>Pérez-Aleman, P. 2012. <i>Global Standards and Local Knowledge Building: Upgrading Small Producers in Developing Countries</i>. Proceedings of the National Academy of Sciences, 109.31: 12344-49</p>	<p>The review starts from the assertion that a lot is known about the impact of standards on developing country producers, but much less is known about how standards link to knowledge and institution-building. This is essential for responding to the challenges of standards. The paper emphasizes the importance of institutional change and indigenous efforts to improve local production systems.</p>
<p>Prowse, M. 2012. Contract Farming in Developing Countries – A Review. <i>A Savoir</i>, 12. Paris: Agence Française de Développement.</p>	<p>A review of contract farming covering 100 papers published since 2007. Following an extensive discussion of conceptual and theoretical perspectives, it examines five hypotheses about contract farming through a comparison of 35 “successful” cases of contract farming with 9 “failed” cases. It emphasizes the importance of producer organizations and the efforts of governments and neutral third parties in achieving successful outcomes.</p>
<p>Swinnen, J., Colen, L. and Maertens, M. 2013. Constraints to Smallholder Participation in High-Value Agriculture in West Africa. In A. Elbehri, ed. <i>Rebuilding West Africa’s Food Potential</i>. Rome: FAO/IFAD, 289-313.</p>	<p>This paper looks specifically at smallholder participation in high-value agriculture in West Africa. As well as analysing trends, it provides a range of policy recommendations for increasing the participation of small farmers and improving outcomes.</p>
<p>Unnevehr, L. and Ronchi, L. 2014. <i>Food Safety in Developing Markets: Research Findings and Research Gaps</i>. IFPRI Discussion Paper 1376. Washington, D.C.: IFPRI.</p>	<p>This short paper focuses specifically on food safety. It draws attention to the recent extensive empirical literature on standards and schemes to support small farmers, but argues that the literature is biased towards horticultural exports to the EU (as does the FAO paper above).</p>

Public standards in export markets

Paper	Summary
<p>Calvin, L. 2003. Produce, Food Safety, and International Trade: Response to U.S. Foodborne Illness Outbreaks Associated with Imported Produce. In J. Buzby, ed. <i>International Trade and Food Safety: Economic Theory and Case Studies</i>. Washington, D.C.: United States Department of Agriculture, Economics Research Service, 74-96. Available at www.ers.usda.gov/Publications/AER828 (accessed July 2012).</p>	<p>This paper examines the response of authorities in the United States to foodborne illness outbreaks arising from imports of fresh produce. It identifies cases where products have been excluded from the United States market or where specific requirements to demonstrate levels of safety have been introduced – sometimes by governments, but also by retailers. It shows that a failure to resolve food safety problems quickly can have a serious impact on exporting industries and levels of trade.</p>
<p>Diaz Rios, L. and Jaffee, S. 2008. <i>Barrier, Catalyst, or Distraction? Standards, Competitiveness, and Africa's Groundnut Exports to Europe</i>. Agricultural and Rural Development Discussion Paper 39. Washington, D.C.: World Bank.</p>	<p>This report provides a comprehensive analysis of the groundnut industry and the impact of aflatoxin regulations on exports. It argues that food safety regulations are rarely an absolute barrier to trade, but that such regulations do exacerbate the underlying strengths and weaknesses of particular production and distribution systems. It is argued that Africa's poor performance in the groundnut trade cannot be attributed to EU regulations. However, the paper also shows how countries that have maintained access to the EU market have done so through the adoption of domestic controls that might disadvantage smallholder farmers.</p>
<p>Dong, F. and Jensen, H. 2004. <i>The Challenges of Conforming to Sanitary and Phytosanitary Measures for China's Agricultural Exports</i>. MATRIC Working Paper 04-MWP 8. Ames, Iowa: Iowa State University.</p>	<p>This report outlines some of the challenges facing China in the area of SPS compliance. It examines measures being taken in China to increase compliance, including the promotion of leading large-scale enterprises to promote agricultural modernization.</p>
<p>Henson, S. (n.d.) <i>Review of Case Studies and Evaluations of Sanitary and Phytosanitary Capacity: Kenya, Tanzania and Uganda</i>. Report prepared for the Standards and Trade Development Facility. Guelph: University of Guelph.</p>	<p>This paper assesses the capacity of governments in East Africa to comply with SPS requirements. It examines both public and private-sector capacity in this area, and suggests that SPS capacity is a moving target and that failure to keep up with the evolution of SPS standards in export markets is a serious problem.</p>

<p>Jaffee, S., Henson, S. and Diaz Rios, L. 2011. <i>Making the Grade: Smallholder Farmers, Emerging Standards, and Development Assistance Programs in Africa. A Research Program Synthesis</i>. Report 62324-AFR. Washington, D.C.: World Bank.</p>	<p>Market access is the central question for this report, with a particular focus on the position of smallholder farmers. Reporting on a broad-based research programme, the paper emphasizes the heterogeneity of markets and the different requirements across each of six identifiable market segments. It argues that there are upgrading parts between these market segments, and that smallholder farmers should not be catapulted to rapidly try to meet the requirements of the most demanding segments.</p>
<p>Mandour, D. 2006. <i>Impact of EU Health and Environmental Standards on Egyptian Agro-Food Exports</i>. PhD thesis: Ruhr-Universität Bochum, Fakultät für Wirtschaftswissenschaft, Germany.</p>	<p>This PhD thesis examines the impact of European health and environmental standards on Egyptian agro-food exports. The case studies on the impacts of EU SPS regulations on potato and groundnut exports from Egypt provide much information about how responses to these regulations by the national authorities and by EU importers can lead to smallholder farmer exclusion.</p>
<p>Neeliah, S., Neeliah, H. and Goburdhun, D. 2013. Assessing the Relevance of EU SPS Measures on the Food Export Sector: Evidence from a Developing Agri-Food Exporting Country. <i>Food Policy</i>, 41: 53-62.</p>	<p>EU SPS measures and their impact on fisheries and horticulture products in Mauritius is the subject of this journal article. It highlights the difference in stringency between the requirements for fish and seafood products versus horticulture. The article concludes that SPS requirements were not a significant barrier to exports to the EU.</p>
<p>OECD. 2005. <i>Analysis of Non-Tariff Barriers of Concern to Developing Countries</i>. OECD Trade Policy Paper 16. Paris: OECD Publishing.</p>	<p>This report provides a comprehensive overview of the non-tariff barriers affecting developing countries; it discusses how these non-tariff barriers are managed by the WTO dispute settlement procedure.</p>
<p>Scoones, I., Bishi, A., Mapitse, N., Moerane, R., Penrith, M.L., Sibanda, R., Thomson, G. and Wolmer, W. 2010. Foot-and-Mouth Disease and Market Access: Challenges for the Beef Industry in Southern Africa. <i>Pastoralism</i>, 1.2: 135-64.</p>	<p>Foot-and-mouth disease in southern Africa is a major challenge for beef exporters. This paper argues that existing models of foot-and-mouth disease control could be replaced by others, and it examines a number of scenarios. It challenges the current disease control model.</p>

<p>Xiong, B. and Beghin, J. 2012. Does European Aflatoxin Regulation Hurt Groundnut Exporters from Africa? <i>European Review of Agricultural Economics</i>, 39.4: 589-609.</p>	<p>This paper also focuses on EU aflatoxin regulations. It uses an econometric model to reach the conclusion that there is no evidence that the EU maximum residue limits had a significant negative trade impact on groundnut exports from Africa. Trade is more limited by domestic supply issues than access to the EU market.</p>
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Private standards in export markets

Paper	Summary
<p>Ait Hou, M., Grazia, C. and Malorgio, G. 2015. Food Safety Standards and International Supply Chain Organisation: A Case Study of the Moroccan Fruit and Vegetable Exports. <i>Food Control</i>, 55: 190-99.</p>	<p>A case study of food safety standards in the fresh fruit and vegetable exports sector in Morocco. Although the domestic food regulations have evolved towards harmonization with European requirements, the paper shows a segmentation of the industry, with integrated producer-exporters more likely to export to European supermarkets, while cooperatives export more to wholesale markets.</p>
<p>Aloui, O. and Kenny, L. 2004. <i>The Cost of Compliance with SPS Standards for Moroccan Exports: A Case Study</i>. Agriculture and Rural Development Discussion Paper 47843. Washington, D.C.: World Bank.</p>	<p>This paper also focuses on fresh fruit and vegetable exports from Morocco. It considers the response to SPS measures in the European market, including private standards applied on farms and in food processing establishments. It identifies costs associated with achieving compliance, but also considers the overall benefits of compliance.</p>
<p>Barrett, C.B., Bachke, M.E., Bellemare, M.F., Michelson, H.C., Narayanan, S. and Walker, T.F. 2011. Smallholder Participation in Contract Farming: Comparative Evidence from Five Countries. <i>World Development</i>, 40.4: 715-30.</p>	<p>This paper provides a conceptual framework for understanding contracting between smallholders and modern agribusiness firms and creates a model for procurement decision-making. This elucidates the circumstances under which smallholder farmers are incorporated, or not incorporated, into these value chains. This framework is then tested through a comparative analysis of smallholder participation in modern value chains in five countries.</p>

<p>Graffham, A., Karehu, E. and MacGregor, J. 2007. Impact of EurepGAP on Smallscale Vegetable Growers in Kenya. <i>Fresh Insights</i>, 6. Greenwich: Natural Resources Institute.</p>	<p>This extensive report focuses on the specific issue of smallholder compliance with EurepGAP (later renamed GlobalGAP). Based on a survey of 11 exporters in Kenya, it provides a detailed analysis of the costs of implementing this private standard and the extent to which it was financed by exporters, donors, government and farmers themselves.</p>
<p>Handschuch, C., Wollni, M. and Villalobos, P. 2013. Adoption of Food Safety and Quality Standards among Chilean Raspberry Producers: Do Smallholders Benefit? <i>Food Policy</i>, 40: 64-73.</p>	<p>This paper also looks at the impact on smallholders of the adoption of food safety and quality standards – in this case, in Chile. Based on a survey of 226 smallholder raspberry producers, it compares farming skills and farm performance between certified and non-certified farms. An econometric model is used to identify the factors that influence the adoption of voluntary standards. The benefits of adoption are analysed.</p>
<p>Humphrey, J. 2008. <i>Private Standards, Small Farmers and Donor Policy: EUREPGAP in Kenya</i>. IDS Working Paper 308. Brighton: Institute of Development Studies.</p>	<p>This paper examines the adoption of EurepGAP in Kenya from the perspective of how donors interpreted the challenge and intervened to facilitate the access of smallholder farmers. It argues that donors did not fully understand the way the standard operated or why it was required.</p>
<p>Kersting, S. and Wollni, M. 2012. New Institutional Arrangements and Standard Adoption: Evidence from Small-Scale Fruit and Vegetable Farmers in Thailand. <i>Food Policy</i>, 37: 452-62.</p>	<p>Focusing on the smallholder adoption of GlobalGAP and the use of group certification in Thailand, the paper reports on a survey of 231 producers, certified and non-certified, and institutional arrangements for group certification. As with similar studies, it finds that exporters bear a substantial part of the costs of certification of small farmers.</p>
<p>Narro, C., Okello, D.R., Avendaño, B., Rich, K. and Thorat, A. 2009. Public-Private Partnerships and Collective Action in High Value Fruit and Vegetable Supply Chains. <i>Food Policy</i>, 34.1: 8-15.</p>	<p>This paper sets out the logic of the argument for why more stringent food safety requirements might be exclusionary for smallholder farmers, but then identifies the institutional arrangements that might promote participation. It examines two export cases – green beans in Kenya and grapes in India. It concludes that smallholder farmers can meet the challenges of more stringent food safety standards if the right institutional frameworks are in place, and it also emphasizes the importance of linkages with agents that operate within the target markets.</p>

Regional integration

Paper	Summary
ASARECA (n.d.). <i>Impact of Non-Tariff Barriers on Cross-Border Trade in Eastern Africa</i> . Entebbe: ASARECA.	Based on a survey of 504 businesses in the East African Community, this short summary report focuses on obstacles to trade as perceived by businesses in the region. It focuses specifically on trade in maize and beef cattle and examines the practical obstacles to trading across borders in the region.
ASEAN Secretariat. 2006. <i>ASEAN GAP: Good Agricultural Practices for Production of Fresh Fruit and Vegetables in the ASEAN Region</i> . Jakarta: ASEAN Secretariat.	This document sets out a framework for ASEAN GAP. It identifies the issues to be covered in each of the modules.
CAADP. 2009. <i>Raising Competitiveness and Seizing Opportunities in Domestic, Regional, and International Markets</i> . Pillar 2, Area A: NEPAD.	Produced by the Comprehensive Africa Agricultural Development Programme, this short note sets out a framework for improving trade and market access. It identifies challenges in promoting regional trade and identifies opportunities.
COMESA. 2009. <i>Regulations on the Application of Sanitary and Phytosanitary Measures</i> .	This document contains the COMESA regulations on the application of SPS measures. It contains information about the National Green Pass Authority that member states may set up.
OECD. 2005. <i>Analysis of Non-Tariff Barriers of Concern to Developing Countries</i> . OECD Trade Policy Paper 16. Paris: OECD Publishing.	The document provides a detailed account of non-tariff barriers facing developing country exporters both in developed countries and in South-South trade. This is generated by a literature review, and through an analysis of notifications and trade dispute records (both at the WTO and in regional dispute settlement mechanisms).
Tschirley, D. 2010. <i>Opportunities and Constraints to Increased Fresh Produce Trade in East and Southern Africa</i> . 4th Video Conference under AAACP-funded series of high-value agriculture seminars.	This report examines regional horticultural trade in East and Southern Africa. It shows substantial trade in a number of crops, particularly less perishable ones, and suggests that rapid urbanization and income growth are promoting (often informal) regional trade. Substantial improvements in the operation of wholesale markets and regulatory frameworks are required, as well as improved data on trade flows.

<p>UNCTAD. 2014. <i>Non-Tariff Measures and Regional Integration in the Southern African Development Community</i>. Geneva: UNCTAD.</p>	<p>This report provides an overview of non-tariff measures within the South African Development Community. It is designed to help strategy development and provide preparatory work for deepening regional integration. It provides suggestions for short-, medium- and long-term policies for reducing non-tariff measures.</p>
<p>Will, M. 2012. <i>Harmonisation and Mutual Recognition of Regulations and Standards for Food Safety and Quality in Regional Economic Communities</i>. Bonn and Eschborn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).</p>	<p>This substantial report focuses specifically on food safety standards and agricultural trade in the East African Community and the Common Market for Eastern and Southern Africa (COMESA). Focusing on five commodities across six countries, it provides detailed empirical analysis of both non-tariff measures and the impact of harmonization and mutual recognition agreements on producers.</p>
<p>World Bank. 2012. <i>Africa Can Help Feed Africa: Removing Barriers to Regional Trade in Food Staples</i>. Washington, D.C.: World Bank.</p>	<p>This report focuses on trade in staples in Africa. One chapter focuses specifically on regional food trade and argues strongly that trade barriers within Africa are undermining agricultural productivity by preventing movement of both inputs and outputs. It is particularly critical of trade policies, which are presented as obstructing trade and reducing the benefits that it can bring.</p>

Domestic markets in developing countries

Paper	Summary
<p>Achterbosch, T. 2005. Food Safety Standards in a Developing Country Context: The Case of South African Groundnuts. <i>Cahiers Options Méditerranéennes</i>, 64: 165-78.</p>	<p>This study of aflatoxin controls for groundnuts in South Africa examines the legislation and proposals for controls. It concludes that without policies to promote capabilities, resource-poor farmers will not implement the proposed good agricultural practices that are designed to reduce levels of aflatoxin contamination.</p>

<p>Chamhuri, N. and Batt, P. 2013. Exploring the Factors Influencing Consumers' Choice of Retail Store When Purchasing Fresh Meat in Malaysia. <i>International Food and Agribusiness Management Review</i>, 16.3: 99-123.</p>	<p>Based on a survey of 250 shoppers in Malaysia, this paper considers consumer choice between modern and traditional market outlets when purchasing fresh meat. The study shows a preference for purchases from traditional markets. Cleanliness and a pleasant environment tends to favour purchases from supermarkets, but consumers are still not sure about Halal certification and prefer to buy from trusted (traditional) vendors.</p>
<p>Dannenbergh, P. 2013. The Rise of Supermarkets and Challenges for Small-Scale Farmers in South Africa. <i>Economia Agro-Alimentare</i>, 3.</p>	<p>Supermarkets have expanded rapidly in South Africa, reaching poor consumers and rural areas. This paper explores the difficulties facing small farmers as they try to meet the requirements of modern retail outlets.</p>
<p>Gale, H.F. and Hu, D. 2011. Food Safety Pressures Push Integration in China's Agricultural Sector. <i>American Journal of Agricultural Economics</i>, 94.2: 483-88.</p>	<p>Focusing on food safety in China, this paper argues that problems should be addressed by promoting large-scale food manufacturers and retailers. The fragmentation of land ownership in China is seen as a contributing factor to food safety crises. However, the paper notes the limitations of vertical control and the scope for collusion between public officials and private companies.</p>
<p>Grace, D. and McDermott, J. 2015. Food Safety: Reducing and Managing Food Scars. In International Food Policy Research Institute, ed. <i>2014-2015 Global Food Policy Report</i>. Washington, D.C.: International Food Policy Research Institute, 41-50.</p>	<p>This chapter in IFPRI'S 2014-2015 Global Food Policy Report focuses on food safety, with a particular emphasis on issues in emerging markets. It points to the importance of risk-based approaches, but also argues in favour of working with the informal sector to improve safety rather than create exclusionary policies.</p>
<p>Manderson, A. 2015. <i>Supporting Smallholder Farmers to Enter the South African Organic Sector</i>. Stellenbosch: Southern Africa Food Lab.</p>	<p>Focusing on the promotion of the organic sector in South Africa, this paper examines the institutional framework, identifies barriers, and puts forward a series of measures that would facilitate the access of smallholder farmers to this sector.</p>

<p>Moustier, P., Tam, P.T.G., Anh, D.T., Binh, V.T. and Loc, N.T.T. 2010. The Role of Farmer Organisations Supplying Supermarkets with Quality Food in Vietnam. <i>Food Policy</i>, 35.1: 69-78.</p>	<p>This paper investigates the role of farmer organizations in enabling small farmers to gain access to supermarket supply chains. It highlights the importance of public support for farmer organizations and the benefits to farmers from involvement with such organizations and in supplying supermarkets.</p>
<p>Natawidada, R., Reardon, T., Shetty, S., Noor, T.I., Perdana, T., Rasmikayati, E., Bachri, S. and Hernandez, R. 2007. <i>Horticultural Producers and Supermarket Development in Indonesia</i>. Report 38543-ID. Jakarta: World Bank Office.</p>	<p>This substantial report on horticultural producers and supermarkets in Indonesia adopts the perspective that the modernization of retail is proceeding rapidly in developing countries. It highlights the use of non-traditional supply channels by supermarkets and also the high level of imported fresh fruit and vegetables sold by these outlets. It suggests that wholesale markets are also in the process of transformation.</p>
<p>Reardon, T., Timmer, P., Barrett, C. and Berdegué, J. 2003. The Rise of Supermarkets in Africa, Asia, and Latin America. <i>American Journal of Agricultural Economics</i>, 85.5: 1140-46.</p>	<p>This is one of the key texts on the rise of supermarkets in developing countries. It summarizes the argument that supermarkets are transforming production systems across a broad range of countries.</p>
<p>Reardon, T., Barrett, C., Berdegué, J. and Swinnen, J. 2009. Agri-Food Industry Transformation and Small Farmers in Developing Countries. <i>World Development</i>, 37.11: 1717-27.</p>	<p>As an introduction to a journal special issue on the agrifood industry transformation and small farmers in developing countries, this paper reviews the existing literature and summarizes debates in summaries, with many of the arguments about retail transformation in developing countries.</p>
<p>Reardon, T. 2016. <i>Growing Food for Growing Cities: Transforming Food Systems in an Urbanising World</i>. Chicago: The Chicago Council on Global Affairs.</p>	<p>This lengthy report analyses the challenges of providing food to the rapidly expanding cities of the developing world. It considers the changes in food consumption taking place in large cities and makes policy recommendations specifically focused on the United States government.</p>
<p>Simmons, L. and Scott, S. 2007. Health Concerns Drive Safe Vegetable Production in Vietnam. <i>LEISA Magazine</i>, 23.3: 22-23.</p>	<p>This two-page note provides an insight into the ways in which consumer health concerns impact on smallholder farmer production even in low-income countries. It refers to experiences of farmer cooperatives in growing “safe vegetables” in Viet Nam.</p>

<p>Srimanee, Y. and Routray, J.K. 2012. The Fruit and Vegetable Marketing Chains in Thailand: Policy Impacts and Implications. <i>International Journal of Retail & Distribution Management</i>, 40.9: 656-75.</p>	<p>This paper examines the links between supermarkets and small farmers in Thailand. It pays particular attention to the role of government policy in promoting linkages and identifies a number of different ways in which these farmers are linked to modern retail.</p>
<p>Snell, S. 2014. <i>The Party-State, Business and a Half Kilo of Milk: A Study of the Dynamics of Regulation in China's Dairy Industry</i>. PhD thesis, Sussex University, Institute of Development Studies.</p>	<p>This thesis provides an in-depth study of the contamination of milk by melamine in China. It is based on extensive interviews with businesses and government officials both in Beijing and in the Inner Mongolia Autonomous Region. It identifies the origins of the crisis as lying in the deficiencies of the modernization project rather than the failures of small-scale farmers.</p>
<p>Tschirley, D., Ayieko, M., Mathenge, M. and Weber, M.T. 2004. <i>Where Do Consumers in Nairobi Purchase Their Food and Why Does This Matter? The Need for Investment to Improve Kenya's 'Traditional' Food Marketing System</i>. Policy Brief 2. Nairobi: Tegemeo Institute for Agricultural Policy and Development.</p>	<p>This policy brief summarizes the results of research on food markets in Nairobi, Kenya. It shows that supermarkets were not, at the time, important retail outlets for fresh food and were unlikely to become so. One implication is that attention should be given to improving the operation of traditional marketing channels.</p>
<p>Tschirley, D., Reardon, T., Dolislager, M. and Snyder, J. 2015. The Rise of the Middle Class in East and Southern Africa: Implications for Food System Transformation. <i>Journal of International Development</i>, 27.5: 628-46.</p>	<p>This study highlights the transformation of food consumption in eastern and southern Africa. It points to the importance of purchased food in rural as well as urban areas and the increasing importance of processed food in food expenditure.</p>
<p>Vandeplass, A., Minten, B. and Swinnen, J. 2011. <i>Multinationals Versus Cooperatives: The Welfare and Efficiency Effects of Supply Chain Governance in India</i>. Leuven: University of Leuven, Centre for Institutions and Economic Performance (LICOS).</p>	<p>This report examines the dairy industry in India. Reporting on a survey of 1,000 households in 50 villages in the Punjab, the report compares the linkages that Nestlé maintains with small farmers with the linkage activities of other market channels. It finds that both cooperatives and multinational companies use these linkages to address issues of safety, quality and efficiency.</p>

Appendix 2: Glossary of terms

Many of the definitions below have been taken from a glossary provided by Will (2012). Sources of other definitions are indicated. Definitions without attribution are the responsibility of the author.

Competent authority	“The official government agency possessing jurisdiction. It is the authority which is designated at national level or accepted in third countries as responsible for performing the duties arising from food control” (Will, 2012).
Compliance	“Compliance is the judgment that a product or service meets the requirements of a specific standard” (Will, 2012). Compliance is often used with the meaning attributed below to “conformance”.
Conformance	“Conformance is defined as a product or process that is meeting the required criteria for a given standard” (Will, 2012).
Conformity assessment	“Conformity assessment is any procedure used, directly or indirectly, to determine that relevant requirements in technical regulations or standards are fulfilled. Conformity assessment procedures include testing, certification, inspection and accreditation” (Will, 2012).
Enforcement	“Enforcement refers to approaches responding to non-compliance and sanctions to withdraw recognition if corrective action is not taken” (Will, 2012).
Food safety and quality	“Food safety refers to all those hazards, whether chronic or acute, that may make food injurious to the health of the consumer. It is not negotiable. Quality includes all other attributes that influence a product’s value to the consumer. This includes negative attributes such as spoilage, contamination with filth, discoloration, off-odours and positive attributes such as the origin, colour, flavour, texture and processing method of the food” (Will, 2012).

Food safety hazard	“Any chemical, biological or physical substance or property that can cause [a food product] to become an unacceptable health risk to consumers” (ASEAN Secretariat, 2006).
Good agricultural practice	“Practices used to prevent or reduce the risk of hazards occurring during production, harvesting and postharvest handling” (ASEAN Secretariat, 2006).
Integrated pest management	“A system for managing pests that integrates multiple strategies to minimise the use of chemical pesticides, such as encouraging beneficial insects and microorganisms to flourish, good crop hygiene and plant health, regular monitoring of crops for pests, using biological control agents and soft pesticides, and selective use of chemical pesticides” (ASEAN Secretariat, 2006).
Maximum residue levels	“A maximum residue level (MRL) is the highest level of a pesticide residue that is legally tolerated in or on food or feed when pesticides are applied correctly (Good Agricultural Practice)” European Commission, 2006. (https://ec.europa.eu/food/plant/pesticides/max_residue_levels_en)
Mutual recognition agreement (MRA)	An MRA is the formal recognition that “the inspection and certification system of one country is equivalent to that of the partner country. Recognising that the certification system provides the same level of protection, controls in the importing country can be reduced” (Will, 2012).
Non-tariff barriers	Non-tariff barriers are restrictions acting as obstacles to trade, appearing as rules, regulations or laws that have a negative impact on trade (Will, 2012).
Non-tariff measures	“Non-Tariff Measures are policy measures, other than ordinary customs tariffs, that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices or both. Some of these measures may constitute non-tariff barriers” (Will, 2012).
Private voluntary standards	“Private trade and industry standards are developed by individual firms (corporate standards) or by networks and business associations (collective standards, usually pre-competitive); examples: GlobalGAP, KenyaGAP, Tesco Nature’s Choice, Ethiopian Horticulture Producers and Exporters Association (EHPEA) Code of Practice for Sustainable Flower Production, etc.” (Will 2012). However, private standards may be made mandatory if they are adopted by governments, and public bodies may also create voluntary standards that businesses are free to adopt, but not required to do so.

Risks and hazards	Hazards are the result of the intrinsic characteristics of a product. Risk arises from exposure to hazards and is calculated according to both the nature of the hazard and the level of exposure that the affected parties are likely to suffer.
Risk assessment	“Risk assessment refers to the scientific evaluation of known or potential adverse health effects resulting from human exposure to food-borne hazards. The risk assessment process provides an estimate of the probability and severity of illnesses attributable to a particular hazard related to food” (Will, 2012).
Risk-based preventive controls	Control measures based on risk assessment that identify and reduce or eliminate food hazards prior to products entering the food chain.
Sanitary and phytosanitary measures	“Sanitary and Phytosanitary Measures (SPS) refer to (i) the protection of human or animal health against risks in food or feed; (ii) the protection of human, animal or plant health against risks from pests or diseases of plants or animals; and (iii) the protection of the territory of a country against other damage from the entry, establishment or spread of pests. SPS can be seen as a subcategory of technical regulations since they may also take the form of regulations or standards, laying down product-related requirements” (Will, 2012).
Standards	“Standards are documents established by consensus and approved by a recognized body that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods. Standards are voluntary by nature...they may serve as benchmarks for national (mandatory) regulations or for national (voluntary) standards” (Will, 2012).
Standards schemes	Arrangements that combine a standard (see above) and an enforcement mechanism (see above).
(Third-party) certification	“Certification is a procedure by which a party gives written assurance that a product, process or service conforms to specified requirements” (Will, 2012). Third-party certification occurs when the party providing the assurance is neither a party to the transaction nor the owner of the standard that defines the specification.

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