Systematic review

# What is the evidence of the impact of agricultural trade liberalisation on food security in developing countries?

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# Contents

## List of abbreviations

| | |
|---|---|
| CGE | computable general equilibrium [model] |
| DES | daily energy supply |
| FAO | Food and Agriculture Organization of the United Nations |
| GDP | gross domestic product |
| GTAP | Global Trade Analysis Project |
| MDG | Millennium Development Goal |
| NME | non-member economies |
| OECD | Organisation for Economic Co-operation and Development |
| PEM | partial equilibrium model |

## Abstract

Food security remains a crucial issue in many developing countries, especially given recent commodity price spikes, and the impact of trade reforms such as the Doha Round is the subject of debate. This systematic review focuses on the evidence for links between agricultural trade liberalisation in developing countries and food security. It involves an in-depth appraisal of 34 studies that address these issues. The evidence indicates no consistent outcome, as 13 studies suggested that agricultural trade reform has led to an improvement in food security, while 10 studies reported a decline. The remaining 11 studies indicated a more mixed outcome. We highlight a number of issues that are pertinent to linking agricultural trade reform with food security outcomes, including how food security is measured, the context in which agricultural trade liberalisation occurs and the different methods used to assess its impact on food security. The uncertainty surrounding them underpins why no unambiguous outcome emerges from the current evidence. These points are used as a means of interpreting the individual studies. We find that prices and price transmission (the relationship between two (or more) price series) play a central role in effects on food security. We suggest specific aspects of further research needed to understand the links between trade and food security.

## Executive summary

Food security is crucial for health and well-being of all, and the need to improve it is central to the first Millennium Development Goal of reducing the number who suffer from hunger. While food security has improved in some developing countries, in others increasing numbers suffer from undernourishment. Some have suggested that liberalising trade in agricultural markets could boost food security in developing countries, while others believe it may have a negative effect. The issue of the links between reducing trade barriers and food security has added significance in the context of the current World Trade Organization Doha Round negotiations and the recent commodity price spikes in world markets, in terms of predicting the implications of further trade liberalisation in a more uncertain world.

In this systematic review, we address the evidence of how agricultural trade liberalisation impacts on food security in developing countries. We outline the relevant research issues, including how food security is measured, the context in which agricultural trade liberalisation occurs and the different methods used to assess its impact on food security. It should be noted that the systematic review considers only studies that looked at the direct effects of agricultural trade liberalisation on food security. While some of the methodologies used to address this issue have the potential to assess a wider range of policy reforms that would impact on food security (particularly the use of *ex ante* computable general equilibrium models), the sole focus of this systematic review is on the links between agricultural trade reforms (national and multilateral) and food security metrics. Most empirical studies highlight that prices play a central role in effects on food security. However, there is no consistent pattern in the direction of change in food security as a result of trade liberalisation.

The systematic review was conducted according to Evidence for Policy and Practice Information and Co-ordinating Centre guidelines. This involved five key stages: (i) literature search and identification; (ii) selection of the literature with a specific focus on agricultural trade liberalisation and food security; (iii) extraction of data from key papers; (iv) development and application of a critical appraisal method to assess the quality of evidence; and (v) in-depth review and synthesis. Finally, the main lessons arising from the evidence were considered. From 1,176 articles initially identified, 34 studies were selected for final review.

The key results can be summarised as follows:

- A detailed review of the evidence led to no consistent conclusions on the impact of agricultural trade liberalisation on food security. Of 34 studies, 13 reported that food security would improve, 10 that it would decline, while the remaining 11 reported a mixed outcome with food security metrics varying across segments of the population, regions and time or with alternative food security metrics indicating different outcomes for specific countries.
- Part of the reason for the lack of clear evidence is that agricultural trade liberalisation is often introduced alongside other reforms at the macroeconomic or sector level. These wider reforms can also impact on food security metrics, making it difficult to isolate any link with agricultural trade liberalisation from other influences.

- Clear interpretation of the evidence is a challenge because a wide range of metrics are used to characterise food security outcomes, including those based on consumption, malnutrition and measures of self-sufficiency and prices.
- The 'starting point' for any reforms in developing countries is important, but seldom highlighted in studies. For example, countries may have positive or negative nominal rates of protection prior to reform, and this may affect the impact of agricultural trade liberalisation and other reforms on food security in different ways.
- Although *ex ante* partial and general equilibrium models and *ex post* econometric studies (i.e. predictive and retrospective approaches) have been applied to this issue, there is no consistent pattern to the results associated with individual techniques.
- Taken together, the diverse metrics and techniques used to measure food security outcomes following trade reform, the difficulty of isolating agricultural trade liberalisation effects from those of broader economic reforms, and the different 'starting points' in countries when trade reform occurs meant that pooling results for comparison in a conventional meta-analysis would not have given meaningful results.
- Even though no unambiguous conclusion on linkage can be drawn, the clearest lesson is the importance of the role of prices in determining the post-trade reform outcome. How prices adjust following trade reform and how these price changes impact on different groups and, in particular, the most vulnerable feature prominently in the empirical studies. As anticipated by the conceptual framework presented in this report, prices play a central role in determining how food security metrics are affected by trade (and other) policy reforms.
- As the framework and individual studies show, agricultural trade liberalisation will directly impact on prices. Although these reforms may not be the only determinant of price changes (as other reforms to macroeconomic, domestic and exchange rate policies can impact on prices too), the change in prices in large part determines the outcomes. These changes directly influence production and consumption decisions both within and across borders, and hence play a key role in determining post-reform food security. The effect of reform on prices can be examined in relation to several factors, such as the import and export status of a country, whether reforms are unilateral or multilateral (with the latter most likely to impact on world prices), across rural and urban groups within a country, and within households.
- The framework also shows that understanding price transmission is key to considering food security outcomes. Trade reform will affect prices but the relationship between, say, a change in a tariff and the change in prices faced by domestic producers and consumers will not necessarily be one-to-one. Moreover, price transmission across space (particularly in countries where infrastructure is poor or markets are not sufficiently integrated) will also affect food security outcomes. While price transmission is an important issue in addressing how agricultural trade liberalisation will impact on food security metrics, there is a gap in the evidence reviewed of the specific factors that may mediate the price transmission effect across constituent groups, space and time.

- In sum, the conceptual framework linking agricultural trade reform with food security outcomes is specific about the role of price as the key feature tying the policy change with a change in a food security metric. However, while the evidence broadly supports the role of prices as a key link in the causal chain between policy reform and changes in food security metrics, obtaining clear and unambiguous evidence on the direction and magnitude of the change in food security is more difficult. This conclusion holds whatever the methodological approaches that have been applied to this issue. With respect to the *ex post* studies, the evidence (i) does not yield a consistent effect and (ii) highlights that other factors are likely to matter (e.g. the other policy reforms that coincided with the reforms to agricultural trade policy and the initial bias in policy prior to the introduction of the reforms). *Ex ante* studies have the potential to isolate the effect of agricultural trade reforms but again the evidence indicates no consistent outcome. To some extent, this variance will be due to how the study is constructed (e.g. the classification of countries, identifying the vulnerable group likely to be affected by the price change and the food security metric employed). Taken together, there is some degree of consistency between the causal framework and the evidence-related studies over the role of prices, but the systematic review highlights that there is less consistency across the empirical studies on what the 'final' outcome on a specific food security metric is likely to be.
- This analysis identifies some future research challenges. Firstly, and most obviously, given the importance of food security, more effort needs to be applied to examining links with agricultural trade liberalisation in light of the many challenges that currently exist. Secondly, there is a need to extend the research agenda to include how trade and price volatility impact on vulnerability and risk, and how these issues may be affected by exposure to volatile commodity markets. This is particularly important given recent commodity price spikes, concerns about progressing the Doha Round negotiations and the increased awareness of the crucial significance of food security issues.

# 1 Background: rationale and policy issues

## 1.1 Rationale for the review

Trade reform has been an important feature of the policy environment facing developing countries over the last decade or so. It has both unilateral and multilateral dimensions. Many developing countries have undertaken unilateral efforts to liberalise trade involving the reduction of tariff barriers, the tariffication of non-tariff barriers and providing more uniform levels of protection when used. From a multilateral perspective, attempts to promote further trade liberalisation have been pursued by the World Trade Organization under the auspices of the Doha Round. This was labelled the 'Development Round' and negotiations have paid particular attention to the potential impact of trade policy reforms on, and the specific concerns of, developing countries. There is a particular focus on the impacts on the most vulnerable sections of society. With around 850 million facing hunger on a daily basis currently (FAO 2011), and with agricultural trade policy reform likely to directly impact on the supply of and access to food within countries, there is a clear need to fully understand how agricultural trade liberalisation will impact on food security. This is the issue that is specifically addressed in this systematic review.

Prior to detailing the review process and the results and conclusions that emerged, we comment briefly on the policy background and the research challenges that exist in determining the extent of such impacts. Food security is multi-dimensional, given the metrics used to measure food security, the other factors that can also influence food security outcomes, that agricultural trade liberalisation does not take place in the absence of other economic reforms and that different methodologies can be applied to the food security/trade liberalisation issue. For this reason, we also present a framework against which the rather disparate and relatively limited evidence can be considered.

## 1.2 Policy background

Food security remains an ongoing challenge for the international community and, more directly, for policy-makers across many developing countries. One of the key Millennium Development Goals (MDG) was – between 1990 and 2015 – to reduce by half the proportion of people who suffer from hunger. Even if achieved, approaching 600 million people would still face hunger (FAO 2011). However, progress towards meeting this MDG is off-target. The Food and Agriculture Organization of the United Nations (FAO) reports that, though the proportion of undernourished people in the world has declined by around 20 percent between 1990 and 2007–2008, the number facing under-nourishment has remained at around 850 million over the same period. Across many countries, however, the numbers facing hunger has increased, most notably across Africa and several Asian countries (FAO 2011). Even across countries that have experienced high levels of economic growth, the proportion facing hunger has varied. In China, for example, the proportion of undernourished people has fallen by 38 percent between 1990 and 2006/08 (and has met the MDG) while in India, it has increased by 26 percent over the same period (FAO 2011).

While many aspects of economic policy can impact on food security, this review focuses directly on the links between agricultural trade liberalisation and food security. The 'Development Round' Doha negotiations have led to much research and commentary about how various trade liberalisation scenarios would impact on developing countries. Much of this research addressed the impact of trade

liberalisation on aggregate welfare effects in developing countries, or the relationship between trade liberalisation and poverty. Though there are important linkages between the poverty effects and food security issues (which we note below), there has been comparatively little attention paid to specific food security aspects of trade liberalisation.

In addition, while much of this recent research assesses the potential consequences of Doha Round outcomes and focuses on multilateral trade liberalisation, unilateral trade liberalisation also impacts on food security. Despite the notable lack of progress in the Doha Round to date, experience of unilateral trade liberalisation across many developing countries can be drawn upon. Although the broader welfare effects of this trade liberalisation have been examined, little research has been directed at (i) the food security implications of these reforms and (ii) the direct effect of agricultural trade liberalisation on food security.

While the Doha Round reached its tenth anniversary in December 2011, recent events in global commodity markets add further complexity. The commodity price spike of 2006–2008 was a considerable shock on world markets, followed in 2010–2011 by even higher world prices for many commodities. The latter increases were estimated to have substantially increased poverty across developing and middle-income countries. Ivanic et al. (2011) suggest it increased the numbers falling below the extreme poverty line by 44 million. Modification of agricultural trade policies resulted, with many exporting countries imposing export taxes or export bans, while many importing countries reduced applied tariffs on imports. While recent research has emphasised that these unilateral actions contributed to fuelling the spike on world commodity markets, they were aimed at dealing with domestic food security issues (Martin and Anderson 2011). Further to these spikes, the Organisation for Economic Co-operation and Development (OECD) and FAO are forecasting higher average world agricultural prices over the medium term and that prices will also be more volatile (OECD–FAO 2011). This means that the context in which agricultural trade liberalisation is debated and negotiated at the World Trade Organization has now changed. De Schutter (2011) highlights many of these emerging issues. This adds further urgency to understanding the link between agricultural trade liberalisation and food security in developing countries.

No longer may it be as easy to sell the case that world markets will provide an adequate buffer in the face of domestic shocks and that food security can be achieved by open markets (particularly given that some of the major participants in agricultural trade pursued trade policy options that contributed to the price spike). If food security is fundamentally about ‘freedom from risk’ and ensuring that the most vulnerable have access to adequate supplies, recent events have changed the context of the trade and food security debate from when world market prices were both low (in nominal and real terms) and stable.

# 2 Research challenges

Addressing the links between trade liberalisation and food security is a complex issue, raising many challenges for researchers[1], with implications for the interpretation of the evidence that does exist, as we report below. This section outlines the issues to provide the basis for a standard framework for gauging the contribution of empirical research. The challenges cross many dimensions from the measurement of food security, to isolating the specific effect of agricultural trade liberalisation, through to fully understanding the direct mechanisms that create a causal link between the policy reform and the change in the food security metric. In addition, the experience of trade liberalisation on food security metrics can – as the evidence to date confirms – vary considerably across developing countries. There are many factors that can determine the impact of trade liberalisation in one sector on a specific outcome, as this section addresses. For example, agricultural trade liberalisation may be only one part of a package of economic reforms introduced by developing countries and there may be specific characteristics of the environment in which these reforms were undertaken (for example, the existence of safety nets, and the impact of broad trade and market reforms on other factors) that will determine the availability and access to food. Thus while many of the studies we report on below focus on particular outcomes (often on one specific indicator of food security) of agricultural trade liberalisation, obtaining consistent, clear, and direct evidence that informs on why the experience differs or on details of the mechanisms can often be difficult. We address these issues below, and they form the basis for how we report and interpret the evidence we present.

One final issue that we should highlight about the effect of agricultural trade liberalisation on food security is that trade policy may impact on other metrics that may also have a bearing on food security. For example, trade liberalisation may reduce poverty (by some metric). This will raise the purchasing power of the poorest, which will potentially improve their access to food. However, while relevant to the review undertaken here, poverty encompasses a wider range of issues and questions that are outside the focus of this review, which is on one particular range of policy interventions on a more narrowly-defined outcome. We nevertheless comment on the significance of the trade liberalisation/poverty linkages below.

## 2.1 Measuring food security

Food security is a multi-dimensional issue and the focus of food security can be defined at the global, national, regional, local or individual levels. Barrett (2002) observes that there have been three distinct phases in the analysis of food security. The early emphasis was on availability. This is essentially an aggregate dimension to food security. This was followed by highlighting the importance of access, as described in particular in the pioneering work of Sen (1981). Sen shows that even if food supplies in any geographical location are plentiful, if an individual does not have sufficient 'entitlements', hunger and malnutrition can still arise. Entitlement

[1] We use the term trade reform and trade liberalisation interchangeably. In the context of undertaking the systematic review, trade liberalisation is referred to as the 'removal of reduction in the trade practices that restrict trade, unilaterally or multilaterally, including the dismantling of tariffs (such as duties, surcharges, and export subsidies), imposition of export tariffs as well as non-tariff barriers (such as licensing regulations, quotas, and arbitrary standards)'. See Appendix 2.1.

can be determined by a wide range of factors: in this context, economic, political or social factors can influence an individual's ability – directly or indirectly – to access food and appropriate nutritional intake (Sen 1999). Finally, food security should also relate to 'stability', with the emphasis here being on the importance of risk and uncertainty. As Barrett (2002) notes, while reference to 'security' implies freedom from risk, most of the literature does not address this issue *per se*.

These distinctions are important, since one particular metric of food security may be satisfied while others are not. For example, different metrics may not necessarily be correlated: national self-sufficiency may imply some sense of 'security' from events on world markets, but may not necessarily be consistent with an increase in nutritional intake and access to food for individuals. These issues are important in two respects for interpreting the evidence below: firstly, many studies focus on a single or limited range of metrics, therefore giving only a partial insight into how food security is affected by trade liberalisation; secondly, as we note below, in the context of trade liberalisation, emphasis should be given to the stochastic nature of domestic and world markets and how trade liberalisation changes the exposure to these two sources of uncertainty. Arguably, given recent events on world markets, this latter issue will feature increasingly in current debates on food security by national governments and international institutions. Indeed, as Barrett (2002) points out, if the focus was on 'food *in*security' rather than 'food security', this would place more emphasis on the risk and uncertainty issue than has been commonplace in much of the empirical literature. In this sense, food (in)security is an *ex ante* concept, while much of the discussion and literature on food security is framed in an *ex post* context, i.e. realised outcomes.
A further distinction in the food security debate relates to temporary or chronic food (in)security. In the former, vulnerable groups can cross a threshold, say as a direct result of exogenous events (e.g. commodity price spikes). The latter relates to a more permanent problem associated with hunger and malnutrition. Food (in)security may also relate to specifically vulnerable groups defined by age, gender or locality. At an individual level, intra-household issues may also matter for food security.

Finally, food security may focus not only on overall supplies but also on nutritional issues; both the quantity and quality of food matter[2], as individuals need the right combination of nutrients for a healthy and active life. Barrett (2002) notes that there are macro and micro aspects to nutritional deficiency, where the former relates to calories, proteins and fats and the latter to iodine, iron and vitamin A deficiency. Common measures of this relate to calorie or protein intake (per capita) or other anthropometric measures.

Bearing these different dimensions in mind, we can refer to the FAO definition of food security, widely referred to in much empirical research. Specifically, food security exists:

> when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO 2002).

The challenge for empirical research is using appropriate metrics that can match up to this wide-ranging definition. In practice, and as we shall see, the food security metrics used have been partial in nature. In addition, perhaps because of

[2] Nutritional intake and quantity may of course be correlated. Abdulai and Aubert (2004) show that the intake of micronutrients is reduced when the quantity of food declines.

the fact that much trade policy research focuses at the national level, empirical studies often use aggregate measures of food security, which can of course hide wide variations of access to food within countries or across certain groups.

To highlight how this issue relates to the metrics used in empirical studies that focus on trade liberalisation, we consider the three dimensions to food security: 'availability', 'accessibility' and 'stability'. Availability may relate to the measurement of food security in a number of ways. For example, food security in a closed economy implies that domestic agriculture is sufficiently productive to provide adequate supplies of food on a consistent basis: therefore, food security may be equated with domestic supply issues. However, in an open economy, supplies of food can be obtained from world markets, reducing reliance on domestic agriculture. While the overall availability of food may be increased when countries are open to world markets, domestic supply may be lower. As a consequence, a more narrow focus on national food security may relate to self-sufficiency, where reliance on imports is reduced and exposure to exogenous changes on world markets limited.

Accessibility can also be addressed in empirical research in different ways. While aggregate supply (whether met through domestic supply or imports) is a pre-requisite for sufficient food being available, this is not necessarily to be equated with accessibility, which relates to the ability of the most vulnerable to have sufficient means to access this available supply. At a simplistic level, changes to the price of food within a country may indicate that cheaper food is available but the focus on accessibility can highlight other important dimensions of food insecurity that are not fully captured by a focus on aggregate supply. Specifically, at an individual level, having sufficient resources to purchase food is often key here and highlights a potentially close relationship between food insecurity and poverty. Again, there can be several dimensions to this, including rural–urban poverty. Even within the rural context there can be substantial variation; for example, between farm groups there can be those that remain net purchasers of food and those that have a marketable surplus. At a national level, accessibility may also relate to the ability to purchase food imports. Here the focus could be on total export earnings relative to the cost of food imports (Diaz-Bonilla et al. 2006).

Food security, therefore, has both macro and micro dimensions to it and perhaps it is not surprising that, with an emphasis on trade, most metrics have related to aggregate or national-level metrics, For example, in their categorisation of food (in)secure countries, Diaz-Bonilla et al. (2006) employ the following indicators: calories per capita per day; proteins per capita per day; food production per capita; total export earnings to food imports; and the share (proportion) of non-agricultural population. Note that the two last-named indicators also imply a general equilibrium context to the issue: it is not just what happens in the agricultural or food sector that influences food security but the ability to access food by exploiting resources in the non-agricultural sector. However, as noted above, these aggregate indicators may not reflect variation across regions, vulnerable groups or individuals. A more recent trend to highlight the micro-features of food security has been to place emphasis on household models. Some recent analysis on trade liberalisation has focused on this.

Stability has tended to feature only implicitly in indicators employed in trade studies, perhaps reflecting the relatively low and stable prices for much of the past two decades. For example, recording that trade liberalisation improves production or nutritional intake (against a background of low world prices) does not necessarily translate into relieving food insecurity when significant exogenous shocks arise. Focusing on 'self-sufficiency' implicitly suggests the creation of a

buffer against external shocks, though conventional trade policy would argue against this if resources could be better employed elsewhere in the economy (hence increasing accessibility by being able to afford more food imports).

In sum, 'food security' is a multi-dimensional issue. While the FAO definition of food security itself is not seen to be controversial, there can nevertheless be several metrics that can be used to measure how economic policy reform may impact on food security within a country. In broad terms, trade policy (and, in particular, agricultural trade liberalisation) does not focus primarily on modelling food security. When it has, it has been in the spirit of focusing on aggregate measures, which is consistent with the emphasis on aggregate outcomes that typifies conventional trade policy research. In conducting the review, our consideration of the individual papers related to whether they focused on a specific food security metric and what that food security metric was. These included: per capita daily energy supply (DES), food expenditure thresholds, malnutrition, food imports, per capita food supply, food prices, food consumption and self-sufficiency, among others. We highlight the food security metrics employed in the individual papers reviewed, and other research issues that impact on the inferences and conclusions that can be drawn.

### 2.2 Identifying the effects of agricultural trade liberalisation from general policy reform

In principle, taking a specific (or a range of) food security metric(s) for a country undertaking agricultural trade liberalisation and isolating the direct link and what happens to the food security metric should be straightforward. Taking a range of different experiences across different developing countries would give a clear idea of what the linkage is likely to be. But the review of the evidence suggests that identifying the relationship is seldom so straightforward. As the framework outline below will highlight, food security can be affected by a wide range of factors.

There are also two further considerations to note. Firstly, the experience of policy reform across many developing countries suggests that agricultural trade liberalisation seldom takes place in isolation. Secondly, in gauging the experience of reform on food security, it is important to be clear about 'starting points': i.e. prior to the trade liberalisation reforms, did government policy ensure higher or lower domestic prices relative to those on world markets?

In reviewing trade liberalisation across many developing countries, it is clear that the reform involves a package of measures aimed at trade policy, other domestic policies applied in the sector (e.g. privatisation) and macroeconomic policy reform (e.g. the exchange rate regime), often introduced within a short time-frame. Any of these policy initiatives on their own would impact on some of the food security metrics highlighted above. It is thus difficult to isolate the effect of a specific measure or reform on food security.

Take, by way of example, the study of trade liberalisation and food security coordinated by FAO (Thomas, 2006). FAO coordinated a study aimed to review the experience of trade liberalisation in 15 developing countries (covering Africa, Asia and Latin America) and the impact these reforms had on food security. In almost every case study, agricultural trade policy reform was accompanied by other macroeconomic and sectoral policy reforms. Take one typical example of this from their table summarising the range of policy reforms in developing countries (see Thomas, 2006, Table 4, p. 10). In the case of Ghana, in the 1983–1986 period, the package of policy reforms implemented related to fiscal policy, monetary policy, exchange rate policy, institutional changes such as reform of marketing boards and credit policy, and a wide range of policy initiatives in agriculture including output

and input price policies as well as agricultural trade liberalisation relating to both imports and exports. From the above-mentioned summary of 15 countries over several time periods, the FAO characterises only Peru as introducing agricultural trade liberalisation (between 1998 and 2000) in the absence of other policy reforms either in the agricultural sector or elsewhere in the economy.

The difficulty of interpretation is evident in the 'price decomposition' exercise also reported in the study (see Thomas, 2006, Table B.1, p. 86). Price decomposition is the separation of the components of price, such as world price changes, exchange rate movements and other effects (including policy shifts), in this case to assist with assessing the relative role of policy in influencing outcomes. This table reports the (net) change in the domestic price that arose from policy reforms (though no formal econometric methodology is used to isolate this). It is clear that policy reform across the economy can have offsetting effects. For Ghana, the study reports that in 1987–2000 the price of maize fell by around 20 percent; but that changes to the real exchange rate would have increased this price (by 24 percent) while 'changes in policies and other effects' would have caused it to decrease by around 33 percent. Note also that within this category of 'policies and other effects' the role of agricultural trade liberalisation is not isolated in the price decomposition exercise. We report in more detail on the price decompositions applied to a wider range of countries in section 6.

Thus the difficulty of isolating potential effects of agricultural trade liberalisation on a specific food security metric are exacerbated when policy reforms at the macroeconomic and sector level can have off-setting effects.

In gauging the effect of trade liberalisation, it is notable that, across many developing countries, the starting point for the trade reforms can also vary and even across commodity sectors within a country. In the FAO survey (Thomas, 2006), the data on nominal rates of protection show that, in some countries, the rate was positive (i.e. the domestic price was above world market prices) while, in some other countries, it was negative (the converse). This variation – which summarises the impact of policies and therefore the direction in which agricultural trade liberalisation is likely to drive domestic prices – also appears within countries and across commodity sectors. This can contribute to understanding what is likely to happen to food security in some countries.

Nicita et al. (2011) use a household model to assess the bias of trade policy in six sub-Saharan countries. They show that trade policies used in these countries have a pro-poor bias in that current trade policy already redistributes income to the poor. Trade policy reform will therefore redress the current bias and have implications for the poor.

## 2.3 Links between trade reform and poverty and trade reform and food security

The benefits of trade liberalisation are often outlined as the net benefits that can arise; but distributional effects are also important. Trade policy reform creates – at an aggregate level – both winners and losers. Most food-insecure segments of the population are also the poorest, as poverty limits their purchasing power to access food on the market. Trade reform can also affect poverty and hence by extension has a bearing on food security. This review is limited to papers that specifically focused on food security as a measure but trade liberalisation impacts on poverty are relevant to food security outcomes. Several reviews of trade/poverty linkages have been published recently, such as Winters et al. (2004) and Harrison (2007). Many of the issues highlighted above (separating out a single policy reform from a package of reforms, measuring poverty across a variety of metrics, price

adjustment mechanisms and so on) apply to both the trade/poverty nexus and the trade/food security nexus.

It is important to recognise the heterogeneity of outcomes on poverty from trade liberalisation. This is perhaps most obvious in separating the urban poor from the rural poor, but even among the rural poor there can be a variety of experiences. Harrison (2007) notes this in relation to two sets of farmers in Mexico having very different experiences following trade reform. Segments of the rural poor can also switch between household consumption and production for the market, which implies again that there can be a very different experience between the consumption effect following trade liberalisation and the production effect even within the rural sector. Further, even if trade liberalisation led to the agricultural sector producing more food in the aggregate, many net consumers of food in developing countries are also the rural poor (Winters et al. 2004).

The research on trade and poverty has also made use of household models to gauge the effects of trade policy. These more dis-aggregate models can highlight the change in status of groups within the rural sector and the exposure to the market as well as gender issues; i.e. to the extent that females are the household heads, change in the status of the household can also indicate potential gender effects arising from policy reforms.

## 2.4 Methodological approaches

The alternative methodological approaches used to assess the effects of trade liberalisation on food security have two broad, but overlapping, distinctions. The first distinction relates to *ex ante* versus *ex post* approaches. The former can create an experiment focusing on specific policy reform (e.g. agricultural trade liberalisation) and set aside the complexities associated with the potential impact of other policies on food security metrics. *Ex post* studies, however, will be based on actual evidence of change following the policy reform, but then have the problem of interpreting whether one specific policy (agricultural trade liberalisation) is the single cause of the change in the food security metric (even though, as noted above, other policy reforms are also likely to be undertaken).

The second distinction relates to data issues. In this context, most of the *ex ante* studies rely on calibration models, such as calibrated partial or general equilibrium models. These do not impose heavy demands on the underlying data and can predict what may happen (assuming the model is specified so as to detail the linkage between a trade liberalisation measure and a specific food security metric). One downside to this approach is that there is no statistical significance associated with any linkages identified.

*Ex post* studies typically rely on the experiences of trade liberalisation with reference to how food security metrics have changed. Some *ex post* studies simply report the data, while others can be econometric. *Ex post* studies have the advantage of being evidence-based, as they use data associated with reform experiences across developing countries and econometric approaches can be informative of the statistical significance of the relationships. However, they face the challenge of isolating effects associated with agricultural trade liberalisation from other policy reforms, as we have noted above. Moreover, with evidence-based studies that do not apply econometric techniques – or focus on a specific aspect of the trade liberalisation/food security nexus – it is impossible to identify a statistical relationship on the explicit links between a policy reform and a food security outcome. Many evidence-based studies that we discuss below tend to focus the statistical relationships on an intermediary mechanism; for example, what was the nature of price adjustment and price transmission following policy reform?

## 2.5 Research challenges and the systematic review

The research challenges described influenced our assessment of papers in the systematic review. There are several points to highlight. Firstly, finding direct and isolated evidence on the linkage between agricultural trade liberalisation and food security is likely to be challenging. Most trade reforms in developing countries have taken place concurrently with other economic policy reforms, making it difficult to assess direct evidence on the potential links.

Secondly, there is no single metric of food security, measurement being contingent on data availability and the preference of the researchers. Note that the choice of metric can itself be controversial. For example, measuring food security by reference to self-sufficiency sets aside the fact that lower self-sufficiency may also be associated with a higher overall level of supply being available. In the systematic review, we note the food security metric used in the individual research studies.

Thirdly, different methodologies have been applied to this issue, some relying on the experience since the policy reforms were introduced (*ex post* studies), others predicting the likely outcome for a given scenario (*ex ante* studies). While both are potentially informative, they do have different implications for how the results are assessed.

# 3 Conceptual framework

Given the range of definitions and measures of food security, the alternative methodologies that can be applied and the difficulty of isolating the impact of trade liberalisation alone on food security outcomes, it is worthwhile having a conceptual framework through which to interpret the often disparate studies that constitute the empirical evidence. For this, we draw on FAO's conceptual framework (Thomas, 2006). This was developed as part of FAO research to guide researchers in the analysis of trade liberalisation and food security. The case studies in this programme form part of the evidence on which we report below. While it should not be interpreted as covering every aspect of food security/trade linkage, it can nevertheless be useful as a guide for considering the evidence. The framework is reported in Figure 3.1 below.

Broadly defined, barriers to trade involve the use of government instruments that impact on imports or exports but do not affect domestic production or consumption decisions with equal force. Trade liberalisation therefore involves the reduction or the complete removal of these policy instruments. Tariffs (either specific or *ad valorem*) would be the most obvious barriers to trade though other non-tariff barriers are also widely used. A non-tariff barrier is any policy instrument that affects trade but is not a tariff; with this definition, the coverage of non-tariff barriers is broad and includes quantitative restraints on trade (e.g. import quotas, voluntary export restraints); import licensing; import subsidies; anti-dumping duties; state trading enterprises; export taxes, export licensing and export subsidies; and health and safety procedures among others. Although these trade policy measures may or may not be equivalent under certain circumstances, in most empirical models of trade liberalisation, they are assumed to be equivalent. In other words, an import quota has a tariff equivalent effect such that the price-distorting effect and impact on market access is identical whether a tariff or import quota is used. Countries often use a combination of trade policy instruments in a given sector of the economy. In this context, agricultural trade liberalisation is the reduction or removal of any of these barriers to trade that are directed at the agricultural and food sectors of the economy.

There are three principal parts to this figure: the nature of reforms, intermediate effects, and the impact on food security measures. We comment on each in turn.

## 3.1 Reforms

This systematic review focuses on agricultural trade liberalisation; but the framework indicates that a wide range of economic policy reforms may matter for food security. The difficulty of isolating the effects of agricultural trade liberalisation from a package of measures has been noted; similarly, not taking account of other wide-ranging reforms may result in misinterpreting what the impact of agricultural trade liberalisation on food security has been. When the reform package is wide-ranging, it could be that agricultural trade liberalisation could have a *ceteris paribus* positive effect on food security, but this effect is outweighed by macroeconomic reforms that result in the net effect being negative.

## 3.2 Intermediate effects

The FAO template suggests highlighting the intermediate effects that arise from these economic policy reforms. Note that this framework principally focuses on supply response issues and suggests various metrics for measuring this: changes in

yield, area and productivity, export and import volume and value changes, and supply response elasticities. The emphasis is clearly on associating these intermediate effects with 'availability'. Linking the package of economic reforms with the intermediate effects is the focus on 'price analysis', i.e. the changes in prices that result from the reform package. The presumption here is that the focus is on agricultural and food prices rather than the vector of all prices throughout the economy. Even though the latter matters for food security (as it has an effect on 'entitlements'), the focus is on how agricultural reforms and other policies can impact directly on the availability and consumption of food. We comment on specific issues highlighted by FAO on price issues below.

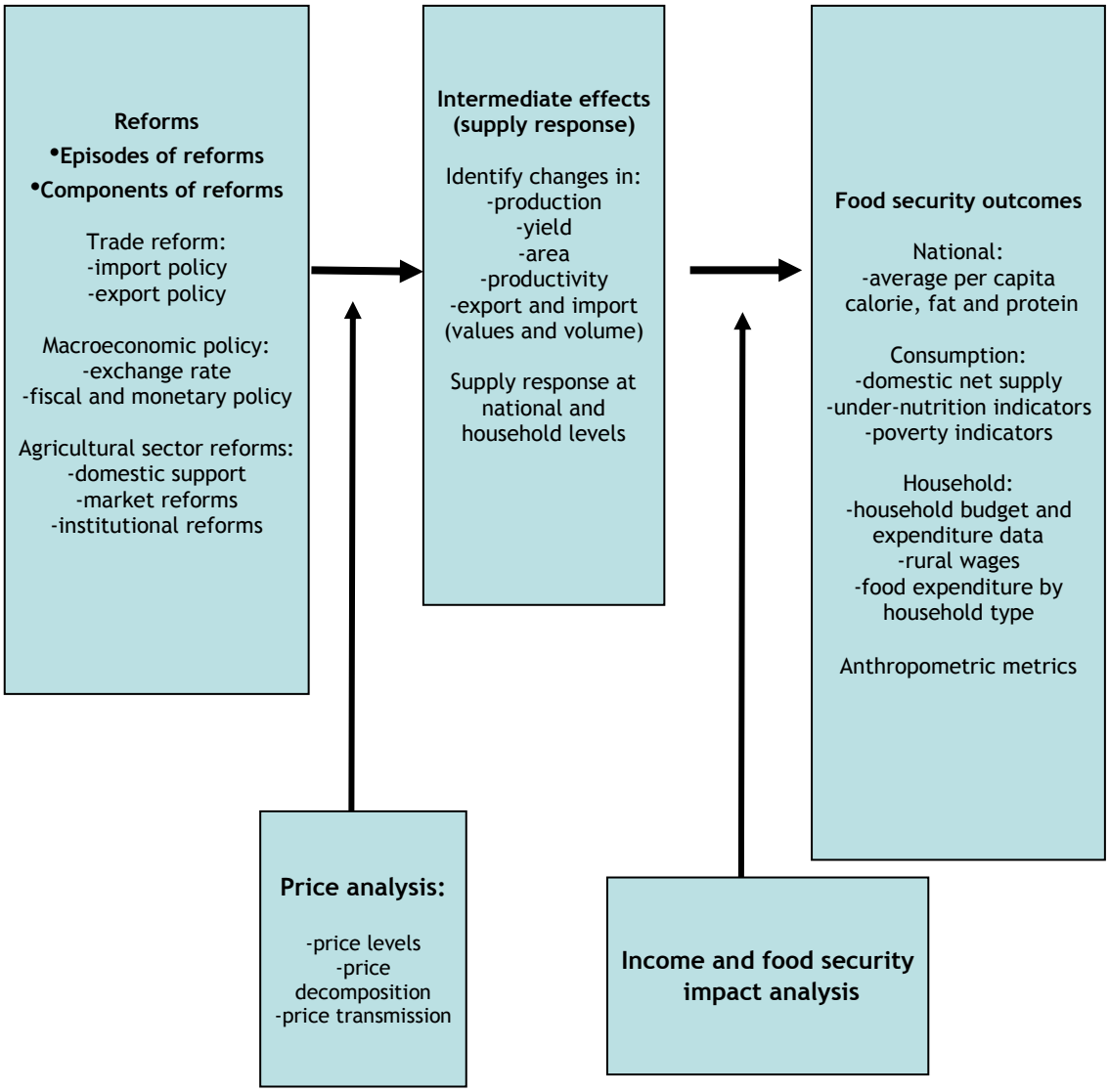
### 3.3 Food security outcomes

The final part of the conceptual framework relates to food security outcomes. Here FAO highlights a number of metrics and these are placed in two broad categories: national level and household level. Within each of these categories are a number of potential measures to employ. At the national level, the possibilities include average per capita consumption of calories, fats and proteins, domestic net supply, under-nutrition indicators and poverty indicators. At the household level, the focus is on budget and consumption data and other indicators of consumption (food expenditure by household type) and rural wages. While the intermediate effects focus mainly on 'availability' indicators, food security is assessed mainly on 'access' outcomes.

Box 3.1 brings some of these issues together in a simple, partial equilibrium representation of a small open economy to highlight many of the issues that relate agricultural trade liberalisation discussed above to some (aggregate) food security metrics. The figure highlights that, even in the absence of other economic reforms, the 'starting point' for the reform process matters. Further, domestic indicators of likely effects on availability may be inconsistent with increasing the overall level of food supply (and hence consumption possibilities) within the country. Specifically, the pattern of government-induced distortions will vary across countries, some leading to prices in excess of world market prices, and others to those below. Trade (and other) policy reforms that reduce these distortions can therefore have very different implications for food security outcomes.

Suppose we start as $P_t$ and assume the country is a small, importing country. The price $P_t$ assumes that the wedge between border and world prices is sustained by the use of some trade policy instrument(s). Agricultural trade reform will therefore push domestic prices towards $P_w$. Total availability of food will increase (i.e. domestic supply plus imports) and this would indicate (by this metric) that food security has improved. However, trade liberalisation will reduce domestic incentives, lead to a reduction in domestic supply and a reduction in self-sufficiency. By this metric – sometimes used in empirical studies (see below) – food security declines. Note that if the starting point is where domestic prices are below world market prices (i.e. the nominal protection coefficient is negative), agricultural trade liberalisation will lead to these effects going in the other direction.

**Figure 3.1:** FAO conceptual framework on policy reforms and food security outcomes




Source: Thomas (2006).

### 3.4 Unilateral versus multilateral trade reform

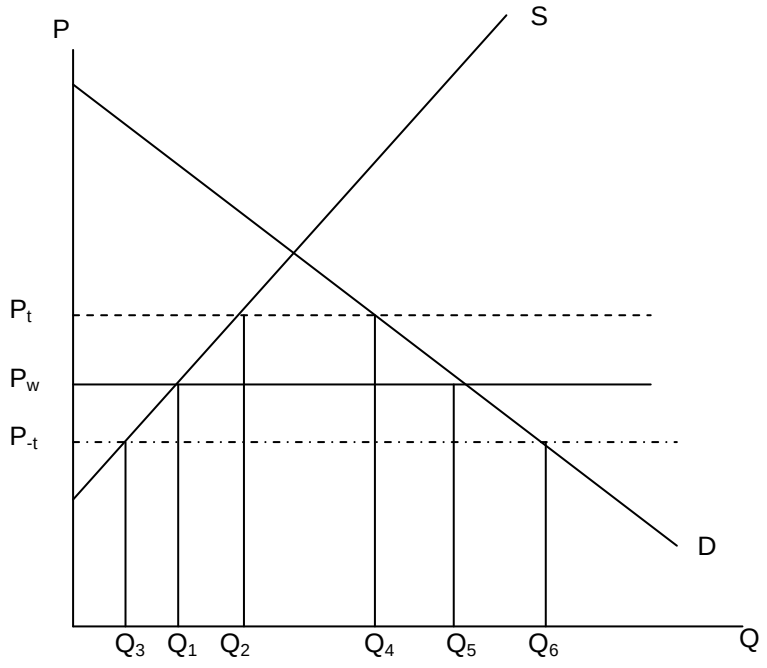
Box 3.1 outlines the example of a small country undertaking unilateral reform. With multilateral reform, not only could the domestic policies change (unless the country has special and differential treatment in trade negotiations, for example), but other countries' policies will also change. This could have an impact on the food security status of the country and will be reflected in a change in the world market price. Specifically, given the trade-distorting policies in the developed countries, it would be anticipated that world market prices would rise following multilateral reform. This would have a potential impact on food security in the importing country.

Suppose, in relation to Box 3.1, we had the case where the importing country imported at world market prices or applied a specific tariff to world market prices such that domestic prices were above world market prices by a given amount. With the rise in world market prices following multilateral policy reform, domestic prices will now increase and impact on imports, domestic supply and consumption. How effectively this happens will depend on the price transmission process on which we comment below. It may also be expected that, even though the world price change will be common, the impact on food security across developing countries will differ depending on import (and export) profile, and the characteristics of the demand and supply functions and, in the context of a general equilibrium framework, the links between agriculture and the rest of the economy.

**Box 3.1:** Partial equilibrium effects of trade liberalisation in a small open economy

In the figure, assume that domestic prices are maintained above world prices, say by some trade policy instrument. This would imply that the nominal protection coefficient is positive. With trade liberalisation, domestic prices converge on world market prices which are unchanged due to the small open economy assumption. With trade liberalisation at this starting point, domestic supply will decrease (from $Q_2$ to $Q_1$), imports increase ($Q_2Q_4$ to $Q_1Q_5$) and self-sufficiency fall ($0Q_2/0Q_4$ to $0Q_1/0Q_5$). Overall, total availability of food increases as represented by the increase in consumption from $0Q_4$ to $0Q_5$.

For countries where the nominal protection coefficient is initially negative, domestic prices are lower than world market prices. Trade reform will therefore push prices up to world market levels, with effects that are the reverse of those above: domestic supply increases ($Q_3$ to $Q_1$), self-sufficiency will increase ($0Q_3/0Q_6$ to $0Q_1/0Q_5$) and total consumption will fall ($0Q_6$ to $0Q_5$).




P=price, Q=quantity, S=supply, D=demand.

### 3.5 Partial and general equilibrium models

Box 3.1 provides a simple partial equilibrium model (PEM) of the potential impact of trade liberalisation on food security, which has the advantage of detailing some of the principal mechanisms associated with the conceptual framework. In many of the studies reviewed, a computable general equilibrium (CGE) approach is applied. In the context of general equilibrium models, it is relative prices that are important and that determine incentives and resource allocation throughout the economy as a whole. In principle, with general equilibrium, the effects of trade liberalisation can be broken down into two parts: the relative price effect keeping resource allocation constant, and resource reallocation in response to the relative price effect. Trade reform changes relative prices: for a country that previously protected farmers, the price of agricultural output would fall relative to the price of the 'other' goods. Consumers would then be able to change their consumption bundle. As resources throughout the economy are reallocated as a result of the relative price changes, the consumption bundle could increase further. In a simple two-sector economy, then, the size of the agricultural sector would fall while consumption of food products increases. These effects are not necessarily short-run; the reallocation of resources throughout the economy implies some medium- to long-run effect, which is often captured in CGE models with the assumptions about the elasticities used to calibrate the models. Also, in the context of global general equilibrium models, they may also allow for a price transmission aspect linking world to domestic prices.

### 3.6 Price analysis

The FAO framework outlined in Figure 3.1 also highlights mechanisms that link the reforms to the intermediate effects. These relate to price analysis, where FAO identifies some aspects of price changes that arise as a result of the reform process. These include price levels, price decomposition, price transmission and agricultural input prices (which will give some indication of the agricultural terms of trade). It is worth commenting on two aspects of the price analysis box: price decomposition and price transmission.

Price decomposition is a useful tool which attempts to attribute the net changes in an observed price that result from different factors. As applied in the FAO framework, price decomposition is essentially an accounting exercise that attempts to highlight the contribution of different determinants of domestic prices to the observed (net) change in price. When agricultural trade liberalisation is only part of a package of reform measures, it is useful to attempt to isolate the effect of one policy reform from another. Price decomposition can gauge whether agricultural trade liberalisation has had a positive effect even if other policy measures (say, for example, exchange rate policy) have had a negative effect by making food more expensive. Even in the cases where the net effect of policy reform is a deterioration in food security by some metric, the price decomposition analysis can attribute the principal source of the changes. In section 6, we highlight the outcome of price decomposition exercises for a subset of the evidence-based studies.

Price transmission is also an important issue in food security analysis. In broad terms, price transmission looks at the relationship between two (or more) price series. For example, if focusing on world or domestic prices (or farm and consumer prices), it will address the relationship between these two prices, including how quickly the change in one price will be reflected in a change in the other. One can retrieve other aspects of this price relationship: what is the level of the price

transmission between the two prices? Does it vary over time? Does the relation vary depending on whether one price was rising or falling? The price transmission process can also relate to price relationships across space.

Returning to the framework presented in Box 3.1, this simple representation of trade liberalisation in a small developing country assumes a one-to-one relationship between changes in the trade-policy-induced price and what prices domestic producers and consumers actually face. However, changes occurring to $P_t$ may not be fully reflected in changes in prices in the domestic market. This relates to the issue of price transmission and the break in this one-to-one relation may occur for a number of reasons. These include market imperfections (such as market power by intermediaries in the domestic market), geography (e.g. as a result of poor infrastructure, the domestic market may not be integrated such that price signals are not fully transmitted across regions of the country) or the existence of other government policies (e.g. safety nets for the poor or inter-state barriers to trade). This is important, since what really matters in terms of the food security metrics are the signals that consumers and producers face in the domestic market and there is not necessarily a one-to-one transmission between what happens to border prices (or even domestic agricultural prices) and the prices faced by consumers as the simple textbook representation would imply.

Another dimension to price transmission addresses the link between world price changes and corresponding domestic price changes. With no trade policy measures, domestic producers and consumers would face world market price changes (notwithstanding domestic market distortions). However, depending on the trade instrument employed, changes in world market prices may not be fully reflected in changes in domestic prices. At the extreme, if the economy is fully insulated from world markets, changes in world market prices will not affect domestic prices and the price transmission relationship will be non-existent.

There are, of course, many dimensions to this price transmission relationship that lie between full exposure to world price changes and complete isolation. These include the magnitude of the price transmission relationship and how long it takes for world price changes to pass through to domestic price changes, as well as accounting for the impact of other factors that may determine domestic prices and the speed of adjustment. While not necessarily being precise on the extent and nature of the relation between world and domestic prices, one may expect that if the reform process resulted in more openness to world markets, there would be a 'significant' increase in the relationship between world and domestic prices, assuming that domestic market imperfections do not overwhelm the relationship between these two prices. We comment further on this issue in section 6 below.

### 3.7 Comments on the FAO conceptual framework

The FAO framework helps place empirical evidence in context, allowing comparison of often disparate country case study evidence, and highlights many of the research challenges outlined in section 1. However, it does have some deficiencies. We summarise the positive and negative features for thinking about the links between agricultural trade liberalisation and food security below.

On the positive side, the framework highlights that agricultural trade liberalisation is only one aspect of an economic reform package and that other policy reforms can have off-setting effects on food security. Taken as a whole, when economic reform occurs, there may be no guarantee that food security will improve, and any changes will be contingent on the price distortions that characterised the pre-

reform situation. To some extent, this issue can be overcome with *ex ante* models that can simulate the effect of agricultural trade liberalisation only. However, in the context of *ex post* studies where trade liberalisation has occurred, (i) there is no prior expectation that economic reform will improve food security and (ii) it is important to provide some insight into why the food security outcome (positive or negative) has arisen. Finally, there is no reason why the food security outcome will be in the same direction for all countries. Not only will this depend on the overall package of economic reforms but also on the environment in which these reforms take place, including the role of institutions, geography, infrastructure, market integration and the existence of safety nets.

On the negative side, the framework largely emphasises food security issues in the aggregate. Food security is primarily an issue at the individual level (Barrett 2002) so, at best, these measures are likely to correlate with improving individual food security metrics. Even aside from the individual level, if the aggregate (national) level food security metrics improve, there may be substantial variations across regions, between urban and rural households and by vulnerable groups, for example by age and gender.

The framework provides no obvious insights as to the time-frame in which we should expect food security metrics to show a change. Clearly, policy reform may be instituted over a period of time, and agents take time to respond to changes in price signals, and production and consumption responses also occur with a lag. This is particularly an issue in *ex post* studies that look at case study evidence. Further, in some of the case studies reported below, the evidence on food security often relates to the 'intermediate effects' reported in Figure 3.1 rather than directly to the food security outcome. So some studies may report, for example, increases in production, but this is not *per se* a food security metric; increased production may be correlated with an increase in food security but by no means guarantees it. Indeed, in an open-economy context, food security may improve with a decrease in domestic food production.

Finally, the framework emphasises largely 'level' effects on food security metrics, with no explicit reference to gauging food security outcomes with respect to risk and uncertainty. In the context of static trade models, this perhaps is not surprising since there is very little focus on stochastic aspects of agricultural markets (domestic and international) in these models. The 'freedom from risk' aspect of food (in)security is therefore only implicit in this framework.

# 4 Methods

The scope of the study was defined in discussion with DFID, and a draft protocol developed. This involved determining clearly what was understood by the terms 'trade liberalisation', 'developing country' and 'food security, as defined in Appendix 4, section A4.1.1. It was agreed that food security, rather than food supply or poverty, was the key focus. On the basis of this understanding, a search strategy was devised, as given in Appendix 4.1, section A4.1.2. This was designed to capture the studies relevant to those concepts. This search strategy was then used in the series of databases, selected for their known strength in covering the agricultural economics literature, and other resources listed in Appendix 4.1, section A4.1.3.

The bibliographic data, abstracts and full text (where available) were saved into EndNote databases. The articles retrieved were next combined into a single set, and duplicate records removed using an autodeduplication procedure, and then by comparison of bibliographic information when sorted by title or by author.
The titles of the records were then subjected to the inclusion/exclusion criteria given in Appendix 4.1, section A4.1.4.

**A**. Is the research based in or referring to at least one developing country? If not, **exclude**.

**B**. Is the research focused on a trade liberalisation intervention/policy? If not, **exclude**.

**C**. Does the intervention include focus on an outcome measure of food security? If not, **exclude**.

**D**. Is the study an English language study? If not, **exclude**, but note for listing in the appendix of the final report.

Any records where it was clear that there was no relevance to the review subject were placed in a discard set, but if there was apparent relevance or if it was not clear, they were added to a set for screening at abstract level. Further screening on the same criteria at abstract level gave a comparable discard set and a set for full text screening. Any records where full text was not readily available online were followed up by library searching or requests, or requests to the authors, to facilitate the full text screening. The full text screening again generated a discard set, and a set for further analysis. The rejected and selected records were checked by a second reviewer and confirmed.

The final selected records were assessed using a critical appraisal tool to ensure evidence relevant to the systematic review question was captured. The tool was modified slightly from the original protocol in the light of experience to reflect the complexity of the information found in the papers.

Alongside the relevant bibliographic data, we recorded the country/region focus, whether the study was quantitative or qualitative, the methodology used, whether the study was *ex ante* or *ex post*, the data period covered, the product sector covered, whether food security was the main focus of the study, whether the study was at a household or national level (or both), what food security metric was used, what trade liberalisation was undertaken, any data source quoted, any sample size given and any controls. In recording the evidence, the stated objective was noted,

along with key insights, what the effect on the food security metric was, any comments on the mechanism and other observations.

Each study was given a criteria rating (see Appendix 4.2) that took account of whether the aims were clear, whether the methodology was clear/appropriate, whether an appropriate food security metric was isolated, whether the authors comment on potential mechanisms, whether controls were used or counterfactuals analysed, whether the findings were clear, and whether the paper contributed to the synthesis. Several of the rating criteria relate directly to the conceptual framework and rather than discuss the summative causality for each study in the text, the appendix tables which relate to each study report the rankings for the individual studies by the criteria listed (see section 5 and Appendix 5.1). In the discussion in section 5, however, we do report a summary of the criteria ratings and the evidence of the direction of effect reported in the studies reviewed. The statistical evidence in the papers was extracted with the intention of comparing effects of trade liberalisation on food security in the different studies (reflecting different countries, the extent of liberalisation, food security metrics and other factors). The plan was to look at changes in comparable criteria at fixed periods after trade liberalisation had occurred. Further details of attempts at meta-analysis of the results are given in the results section.

# 5 Search results

The articles identified by this search gave a total of 1,176 potential articles. The details of these items were put into a single combined library in EndNote. The next step was an automatically prompted deduplication. This was followed by a more thorough manual version. In total, 203 records were removed, leaving 973 records for further analysis.

The next step was to screen the titles of articles for items that were not linked to food security or trade liberalisation on a title basis. At this level, papers that were clearly not within the subject area – i.e. that represented 'false drops' – were removed. There were 279 of these, leaving 694 records for the next phase.
The titles and abstracts of these records were screened for relevance to the systematic review question. This process yielded 205 records that were potentially of relevance, for which full text was obtained. There were another 37 records which were of potential relevance but where the full text could not be obtained, despite several lines of approach. This left a discard set of 452 records, which were ruled as not providing evidence of strict relevance to the search question. The papers needed to provide evidence relating directly to food security, rather than, say, poverty or food supply, as food security was the agreed focus. They needed to refer directly to trade liberalisation rather than simply to market liberalisation. They needed to provide actual data on a metric of food security before and after the introduction of a liberalisation step. A sample check of 10 percent of the discarded records was conducted by a reviewer to confirm that they were correctly discarded.

The reasons for exclusion, which had been agreed as part of the protocol, were as follows:

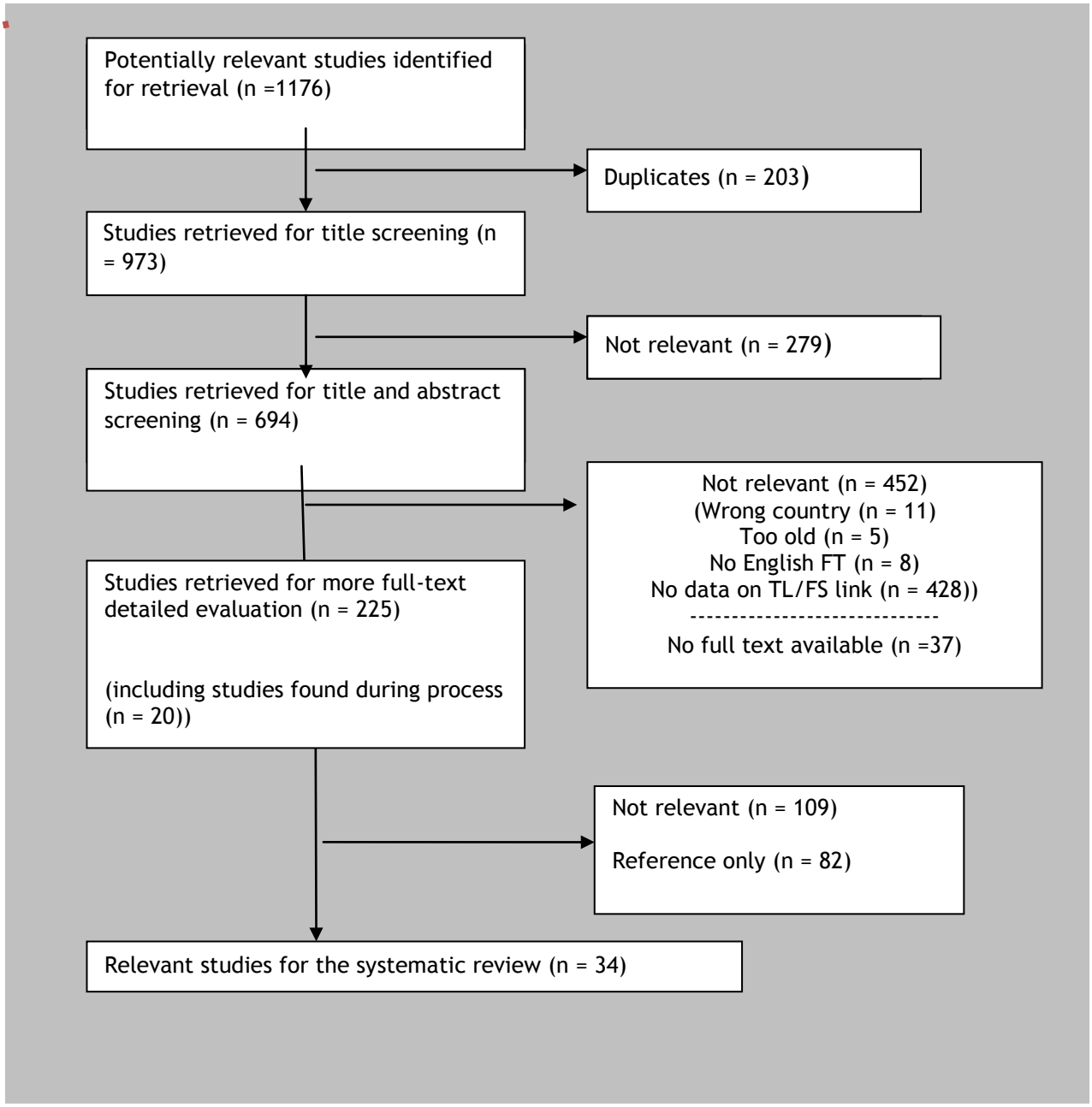
- Did not refer to developing countries (as defined by the World Bank criteria) (11 papers)
- Full text not available in English (eight records)
- Published before the creation of the World Trade Organization (five records)
- No evidence presented of effects before and after trade liberalisation on a measure of food security (428 records)

The set of 205 potentially relevant records were subject to full text analysis, along with 20 further records that were not identified by the original search but were recommended by authors, or found within the references of relevant papers. This process identified 34 papers that contained evidence of direct relevance to the systematic review question. There were a further 82 records that contained valuable discussion of the essence of the question, but did not contain original evidence for systematic review purposes. These were recorded for the purposes of assisting with the analysis of the issues, i.e. the papers were read and selected relevant arguments were included in the discussion section of the report, but any results reported were not subjected to the systematic analysis. A further 109 records were identified that on detailed analysis of full text were found not to contain evidence of a metric of food security before and after the introduction of trade liberalisation. Citations of rejected papers are given in Appendix 5.2.

The 34 papers were subjected to in-depth analysis using the protocol, as detailed in Appendix 4.1, section A.1.4. The intention was to identify evidence of the

impact of trade liberalisation on food security, in such a way as to allow fair and meaningful comparison between the papers. Figure 5.1 outlines and summarises the results of literature search and screening process, showing the final number of studies included in the final synthesis of the systematic review (bottom box) and the numbers of studies removed at each stage of the process, where n is the number of studies at each stage.

**Figure 5.1:** QUOROM statement flow diagram of the study selection process[1]




[1]Based on QUOROM statement flow diagram – see Moher et al. (1999).

As discussed in section 1 of this report, the review of the literature and the corresponding evidence raised several issues that underpin the systematic review of agricultural trade liberalisation and food security; in reporting on the evidence, we have endeavoured to highlight these issues in detail. The results of this analysis are summarised in Appendix 5.1. As many comparable data as possible were

obtained for each study, using a schema slightly modified from the original protocol to ensure the capture of information relevant to the study aims. In addition, a criteria score was assigned for each study. The basic bibliographic data were compiled, along with an indication of the publication type. The region or country of focus was noted. It was recorded whether the study was quantitative or qualitative, and any methodological technique applied was captured. *Ex ante* and *ex post* studies were delineated, as was the period the study covered (both for actual recorded data for *ex post* studies, and for anticipated data for *ex ante* studies). A key issue was whether food security was the core of the study. The metric(s) of food security were recorded, as was an assessment of whether the metric had or was predicted to change following trade liberalisation. The trade liberalisation step was recorded, along with any other key changes that occurred at the same time. The provider of the data on which the study was based was noted. The mechanism for the impact of the trade liberalisation on the food security metric was recorded, along with any other key points.

There were two key groups of papers – *ex ante* and *ex post*. The *ex post* papers contained measurements of metrics of food security before and after trade liberalisation episodes. The *ex ante* papers contained the results of calibrated models designed to predict the effect of liberalisation. It is evident that there are significant limitations with both approaches. The trade liberalisation events in the developing countries were not identical. The timing, nature and extent of measures introduced were very variable. However, even if they had been sufficiently similar to allow straightforward comparison, it is clear that many other factors have impacts on food production, prices and availability – such as extent of technical development, political stability, market development, climate, crises, etc. In addition, the nature of the metrics used to represent food security vary considerably, and different indicators often move in different directions. In addition , the *ex ante* studies incorporate baseline statistical data, and are clearly open to the criticism that they are models of reality with particular simplified assumptions of how trade liberalisation will affect food security. As such they are not providing direct evidence of what has happened, but an estimate of what, all other things being equal, might happen.

We took the data that focused on the countries covered from the *ex post* studies in the final selection. The data covered a wide range of metrics, some consumption-based and others relating more broadly to development and progress in the agriculture sector and the role of agriculture in the economy as a whole. (As we have noted elsewhere, there are broad perceptions of food security and a wide range of metrics used in the evidence-related studies so we were relatively broad in interpreting potential data to use). We examined to what extent it was possible to pool data so as to allow a cross-study and cross-country analysis of average effects of liberalisation episodes on food security.

However, after detailed extraction and consideration of the data, it became apparent that the results of such 'pooling' would be unreliable, as the studies did not give consistent information on the extent of liberalisation episodes, and used highly variable metrics of food security. The quantity and accuracy of available data (for the necessary time-frames) were extremely variable between countries and between categories, as a result of the different and extensive (academic and government) data sources quoted within the papers. From the narrative within the papers it was clear that it was important for us to note that trade liberalisation reforms were different for each country examined in the review. Speed of implementation, degrees of national economic and social issues, and political force

of implementation are all variables that cannot be estimated easily, and would affect the reliability of a given implementation date and subsequent measurement of variables. In certain cases, data sets do not extend beyond a certain point in relation to the liberalisation event, meaning non-equivalent data sets for comparison. The complexity of an economic analysis of import and export values, taking into account variable incomes and food prices, would not be consistently portrayed across the different studies, and could constitute a bias for this systematic review. More indirect measures of food security that related to income and price of key foods were subject to complex variations in recording and assumptions between studies, meaning that they could not be compared side by side. For the metrics that were most closely linked to food security, there were simply too few data to allow statistical trend analyses that could be considered reliable, meaning that meta-analysis in the form of forest plots would not have added value to the interpretation. The inclusion of study protocols that are markedly different from one another makes meta-analysis less reliable (Roehm 2005). Similarly, the use of different interventions, metrics or comparators limits the validity of any attempt at pooling data (Higgins and Green 2011). It is difficult to weight data from different studies when the sample sizes and statistical significances are not given (Walker et al. 2008), as for many studies here. Another issue is that some studies use similar data, sometimes in the same economic models, which potentially adds a 'double counting' factor (Goldfarb et al. 2002).

The potential to use available information such as World Bank figures to examine changes in nutritional data at fixed periods after trade liberalisation episodes, and making efforts to control for the extent of liberalisation using data sets such as the AgDistortions database to give data for individual countries and key crops, was noted but was beyond the brief of the review, which was to assess the published literature.

We examined the *ex ante* studies as a group to see if it was possible to pool results. There were major differences in the assumptions on which models were based, and the methodologies employed, and again in the food security metrics and time periods modelled. There was no clear hierarchy of study or model quality. It was concluded that no average numerical value for the effect of trade liberalisation on food security could be statistically justified.

With reference to the *ex post* studies, a considerable number of the studies reviewed discuss the 'experience' albeit in the context of a common template (see section 3), but without formal econometric analysis detailing the link between agricultural trade liberalisation and a food security outcome. The statistical analysis in these studies focused on prices (see Figure 3.1), specifically on price transmission. Price decomposition results were also reported but these were essentially accounting exercises with no statistical basis or assessment of statistical significance associated with them. Given the above constraints, it was therefore decided that the most valuable and reliable exercise was to use the tables generated and draw conclusions in terms of the results of the various kinds of study that had been conducted. Moreover, we included both *ex ante* and *ex post* studies given that research on agricultural trade liberalisation has typically employed both approaches.

One qualitative paper met the selection criteria. The paper was scored in the same way as the quantitative studies, and achieved a low score. It was also analysed separately in relation to the application of survey technique in a direct measurement of quality, and again achieved a low score.

# 6 Synthesis results

This section summarises our findings from the systemic review; details relating to the individual contributions are reported in Appendix 5.1. We divide this summary into three parts: (i) general overview; (ii) categorising studies according to the reported effect on food security; and (iii) further observations that arise with respect to the evidence reported.

## 6.1 Overview

Of the 34 studies considered in detail in this review, there was no clear consensus on the effect that trade liberalisation would have on food security. Table 6.1 summarises the evidence: 13 of the 34 studies concluded that food security would increase following trade liberalisation, 10 that it would decline, and 11 that the outcome would be more mixed and diverse.

**Table 6.1:** Summary of the evidence on the impact of food security resulting from agricultural trade liberalisation

| *Impact on food security* | *Number of studies* |
|---|---|
| Food security metric improved | 13 |
| Food security metric decreased | 10 |
| Evidence on food security mixed | 11 |
| Total number of studies | 34 |

The absence of any consistent effect also relates to individual countries. As we report below, there are some studies that report improvements in food security for a particular country while other studies report a decline in food security for the same country. China is the most obvious example, though similar examples can be found for some other countries (Nigeria and Uganda) as well as (though perhaps less surprisingly) broader country aggregates such as 'developing countries'.

## 6.2 Summary of specific effects on food security

In this subsection, we divide the studies according to the effects they report and extend the detail summarised in Table 6.1. In each case, we highlight the country coverage, a criteria score detailing the extent to which the study related to specific food security outcomes and insights into the particular linkages between agricultural trade liberalisation and food security, the methodology applied and the food security metric used to assess the impact of trade liberalisation, and the agricultural trade liberalisation intervention.

Table 6.2 lists the 13 studies that concluded that food security would improve following agricultural trade liberalisation. These studies cover a diverse range of countries, with several of them being focused on a single country (most notably four studies relating to China). The methodology applied is broadly evenly split between *ex ante* (seven) and *ex post* (six) approaches. In the final column of Table 6.2, the food security metrics used are highlighted. As discussed under 'Research challenges' (section 1), the metrics used are somewhat diverse and – given the discussion in Box 3.1 – potentially in conflict. For example, per capita food availability may not be consistent with self-sufficiency. Despite this, the majority

of studies report changes in metrics that are consumption-based (i.e. calorie intake, per capita consumption, among others).

Closer review gives no consistent perspective on the circumstances under which food security would improve. The *ex post* studies typically note that other policy reforms were in place when agricultural trade liberalisation was introduced and so precise mechanisms are unclear.

**Table 6.2:** Summary of studies that report improvements in food security involving agricultural trade liberalisation

| Study | Country/ region | Study type | Criteria Score | Food security metric | Trade liberalisation |
|---|---|---|---|---|---|
| Chang and Sumner (2004) | China | *Ex ante* | 7 | Household rice consumption | Border liberalisation |
| Diagne et al. (2006) | Senegal | *Ex post* | 6 | Food insecurity threshold (food expenditure allowing 2 400 calories a day per adult-equivalent) | Reduction of input and production subsidies and liberalisation of agricultural markets |
| Fuller et al. (2003) | China | *Ex ante* | 6 | Food consumption, prices | Reduced tariffs |
| Huang et al. (2006) | China | *Ex post/ex ante* | 7 | Food intake, malnutrition | Decline in tariffs and border taxes |
| Karim and Kirschke (2003) | Sudan | *Ex ante* | 7 | Self-sufficiency ratio, per capita consumption, ratio of total exports to food imports | Free trade |
| OECD (2000) | China | *Ex ante* | 6 | Food prices, income spent on food | Reduced tariffs |
| Opolot et al. (2006) | Uganda | *Ex post* | 6 | Food consumption, malnutrition, stunting | Easing of licensing, eliminating QR tariff reforms, transparency |
| Oyejide et al. (2006) | Nigeria | *Ex post* | 6 | Undernourished, calorie intake, import dependence | Import tariffs reduced |
| Pyakuryal et al. (2010) | Nepal | *Ex post* | 6 | Per capita food availability, extent of malnourishment | Elimination of QR, tariff reduction |
| Shapouri and Trueblood (2001) | Low-income countries | *Ex ante* | 4 | Food gaps | Removal of domestic support. Impact of rising food prices, and of full ATL |
| Thomas and Bynoe (2006) | Guyana | *Ex post* | 6 | Calorie intake, undernourished, poverty | Removal of quotas, licences |
| van Meijl and van Tongeren (2001) | Global | *Ex ante* | 7 | Food access, purchasing power for primary food products | Reduction in tariffs |
| Weerahewa (2004) | Sri Lanka | *Ex ante* | 7 | Calorie intake | Uruguay Round (tariff reduction) |

QR = quantitative restrictions.

Table 6.3 details the 10 studies that suggest a decrease in food security following agricultural trade liberalisation. Again, this covers a mix of countries with China featuring twice in the 12 cases. As before, there is no obvious disparity with respect to the methodology that is applied; five of the 10 studies are e*x post* while the remaining five are *ex ante* (four) or involve a qualitative study. The varied food security metrics used include consumption-based metrics, food production and self-sufficiency.

The 11 remaining studies, which highlight a more diverse picture of food security outcomes are reported in Table 6.4. Apart from the study by Greenfield et al. (1996), which reports no net effect, these other studies report a more nuanced outcome. For example, Bamou et al. (2006) note that household food security decreased even though national aggregates indicate an improvement in food security. Oduro and Kwadzo (2006), for Ghana, highlight regional variations in the changes in food security metrics, while Chowdhury et al. (2006) for Bangladesh note the impact on the urban poor and landless. Chirwa and Zakeyo (2006), who focus on Malawi, highlight that food nutrient supply increased though supply of the main staple decreased. Sbai et al. (2006) note similar variation in Morocco with the self-sufficiency increasing for some products but not for others. They also note variations in poverty levels over time. Greenfield et al. (1996) note no net effect on developing countries, though their study is at a relatively aggregate level and focuses on global reform following conclusion of the Uruguay Round. The studies detailed in Table 6.4, with the exception of the Greenfield et al. (1996) study, are *ex post*. The OECD (2002) study highlights that the outcome depends on the nature of multilateral reforms and whether they include policy reforms in member OECD countries as well as non-member economies (NMEs).

The studies cover a broad interpretation of trade liberalisation measures. In some cases, for example in those studies that referred to multilateral trade reforms, the model was used to simulate a possible Doha Round outcome against a benchmark of current policies in place and specified to relate to a future time-frame. In other cases, such as the case studies of unilateral reforms, agricultural trade liberalisation occurred in tandem with other policy reforms that could also impact on food security. Specifically, it is evident from the table 'Episodes and components of reform in case study countries' in the FAO study (Thomas 2006, p. 10) that multiple and complex changes were introduced in different countries. Types of trade liberalisation and other measures simultaneously introduced are noted in Appendix 5.1, but it was not considered practical to compare results in terms of liberalisation interventions. If any instrument that distorts incentives is changed, then there may be an effect on food security and there is no reason why one instrument will do this differently from another in terms of food security.

**Table 6.3:** Summary of studies that report decrease in food security involving agricultural trade liberalisation

| Study | Country/ region | Study type | Criteria ranking | Food security metric | Trade liberalisation |
|---|---|---|---|---|---|
| Abdullateef and Ijaiya (2010) | Nigeria | *Ex post* | 7 | Total quantity of food requirement, food utilisation | End of export duties |
| Adebua et al. (2002) | Uganda | Qualitative survey | 3 | Individual food production | Exchange rate liberalisation, reduced import subsidies |
| Bezuneh and Yiheyis (2009) | Developing countries | *Ex post* | 6 | Per capita daily dietary energy supply | Not specified |
| Chen and Duncan (2008) | China | *Ex ante* | 6 | Self sufficiency | Tariff reductions |
| Frohberg et al. (1990) | Developing countries | *Ex ante* | 7 | Per capita calorie consumption | Tariff removal (liberalisation by OECD countries) |
| Huang et al. (2005) | China | *Ex ante* | 7 | Per capita food consumption | Tariff reduction |
| Musonda and Wanga (2006) | Tanzania | *Ex post* | 6 | Per capita intake, self-sufficiency index | QR removal, tariff reduction |
| Nyangito et al. (2006) | Kenya | *Ex post* | 6 | Malnutrition, food consumption | QR removal, tariff reduction elimination of non-tariff barriers |
| Rodas-Martini et al. (2006) | Guatemala | *Ex post* | 6 | Malnutrition | Tariff reduction |
| UNEP (2005) | China | *Ex ante* | 7 | Food consumption | Tariff reduction |

QR = quantitative restrictions.

## 6.3 Further discussion on methods and evidence

Tables 6.2–6.4 summarise the evidence with respect to agricultural trade liberalisation and the change in food security as defined in each study. Given the range of empirical methods that have been applied, it is necessary to assess whether the evidence found is contingent on the method applied. Each method has its advantages and disadvantages. On the one hand, ex ante models have the potential to isolate the effect of agricultural trade liberalisation on food security by assuming that no other policy reforms were being applied. These calibration-based studies lead to predictions on potential outcomes from a specific policy change. By construction, the modeller can define the policy scenario of interest (e.g. complete liberalisation of agricultural trade instruments across all or a grouping of countries) but these scenarios may not bear much resemblance to the policy changes likely to take place nor what the experience of agricultural policy reforms has been in specific countries. Ex post studies, on the other hand, provide information on actual outcomes though the challenge here is separating the agricultural trade reforms from other policy reforms that have been introduced at

**Table 6.4:** Summary of studies that report mixed evidence on food security outcomes involving agricultural trade liberalisation

| Study | Country/region | Study type | Criteria score | Food security metric | Aspects of the mixed evidence | Trade liberalisation |
|---|---|---|---|---|---|---|
| Bamou et al. (2006) | Cameroon | *Ex post* | 6 | Per capita food supply, malnutrition, food import/export | Decreased (household); improved (national) | Removal of QR, lower input subsidies and import controls, tarrif reduction |
| Chand and Praduman (2006) | India | *Ex post* | 6 | Calorie intake, poverty | Varying with calorie metric | Exchange rate devaluation, improvement in trade terms |
| Chirwa and Zakeyo (2006) | Malawi | *Ex post* | 6 | Nutritional status | Supply of food nutrient rose, of main staple (maize) fell. | Removal of trade barriers, price liberalisation |
| Chowdhury et al. (2006) | Bangladesh | *Ex ante/ex post* | 5 | Food consumption, caloric intake | Rise in food grain seen, but fall in calorie intake predicted, particularly for urban poor and landless | Tariff reduction |
| Diao et al. (2005) | Global | *Ex ante* | 6 | Agricultural consumption | Depends on countries that liberalise. | Doha Round (elimination of protection and subsidies) |
| Greenfield et al. (1996) | Global | *Ex ante* | 7 | Consumption of food | No net effect | Import tariffs reduction (Uruguay Round) |
| Huang et al. (1999) | China | *Ex ante* | 7 | Grain self-sufficiency, grain consumption | Decline in self-sufficiency, rise in consumption | Tariffs, export subsidies, trade barriers reduced |
| Oduro and Kwadzo (2006) | Ghana | *Ex post* | 6 | Underweight, food import | Regional variations | Tariff reduction |
| OECD (2002) | Developing countries | *Ex ante* | 6 | Average food consumption, food availability | Depends on nature of multilateral reforms | Tariff reduction (OECD only or multilateral) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Panda and Ganesh-Kumar (2009) | India | *Ex ante* | 6 | Per capita calorie intake | Depends on relative price movements | Tariff reduction (unilateral and multilateral) |
| Sbai et al. (2006) | Morocco | *Ex post* | 4 | Poverty | Poverty varied over time; self-sufficiency rose for some products but not cereals | Removal of quotas |

the same time. One problem is that there has been no common method for addressing this issue that allows the analyst and the policy-maker to separate these effects.

Table 6.5 summarises the studies covered in this systematic review by methodology applied and the direction of effect on food security outcome. It is evident from the table that the effect on food security is not contingent on the methodology applied. Of the 16 *ex ante* studies covered in this review, seven (four) predict an improvement (deterioration) in food security following agricultural trade liberalisation. Of the 15 e*x post* studies covered, five (five) report an improvement (deterioration) in food security. Taken together, there is no obvious bias relating method applied to the expected impact on food security.

**Table 6.5:** Methodology and food security outcomes

| | Increase in food security | Mixed evidence on food security | Decrease in food security |
|---|---|---|---|
| *Ex ante* studies | 7 | 5 | 4 |
| *Ex post* studies | 5 | 5 | 5 |
| Combined | 1 | 0 | 1 |
| Qualitative | 0 | 0 | 1 |

Although the methods applied to address the review question can be broadly divided into *ex ante* and *ex post*, there are different approaches taken within these broader methodological categories. Tables 6.6 and 6.7 provide details of the *ex ante* and *ex post* methodologies respectively, highlighting the country focus, the reported impact, the food security metric and the study method.

Table 6.6 summarises the *ex ante* studies. Of the 16 studies included in the table, seven report a positive effect on food security, four report a negative impact and the remaining five report a mixed outcome. In terms of specific *ex ante* methods, no single method points to an unambiguous effect. Five of the studies are CGE models, seven are PEMs and two report results from both. There is no evidence from the results summarised in the table that a specific methodology results in a given outcome.

A similar conclusion arises with respect to the *ex post* studies which are reported in Table 6.7. Of the 15 *ex post* studies, there is an even split in terms of the reported

effect on food security. It is worth noting that few of the *ex post* studies apply a formal methodology to assess the overall impact; as we report in detail below, many of these studies draw upon price decomposition analysis to identify the effects of agricultural trade liberalisation accompanied in many cases with the analysis of price transmission effects.

From the summary of the alternative methodological approaches, we can conclude that while both approaches are consistent with the causal framework outlined in Figure 3.1 and, in particular, the key role played by prices in linking agricultural trade liberalisation with domestic price changes, we note that (i) for both the *ex ante* and *ex post* approaches, neither approach leads to a likelihood that the predicted outcome will be positive or negative, and (ii) neither partial nor general equilibrium models are likely to result in a particular outcome.

**Table 6.6:** Summary of *ex ante* studies

| Study | Country/region | Impact | Criteria score | Food security metric | Study method |
|---|---|---|---|---|---|
| Chang and Sumner (2004) | China | + | 7 | Household rice consumption | Econometric |
| Chen and Duncan (2008) | China | - | 6 | Self sufficiency | CGE model |
| Diao et al. (2005) | Global | +/- | 6 | Agricultural consumption | CGE model |
| Frohberg et al. (1990) | Developing countries | - | 7 | Per capita calorie consumption | CGE model |
| Fuller et al. (2003) | China | + | 6 | Food consumption, prices | PEM |
| Greenfield et al. (1996) | Global | +/- | 7 | Consumption of food | PEM |
| Huang et al. (1999) | China | +/- | 7 | Grain self-sufficiency, grain consumption | PEM/CGE model |
| Huang et al. (2005) | China | - | 7 | Per capita food consumption | PEM |
| Karim and Kirschke (2003) | Sudan | + | 7 | Self-sufficiency ratio, per capita consumption and the ratio of total exports to food imports | PEM |
| OECD (2000) | China | + | 6 | Food prices, income spent on food | PEM |
| OECD (2002) | Developing countries | +/- | 6 | Average food consumption, food availability | PEM + CGE model |
| Panda and Ganesh-Kumar (2009) | India | +/- | 6 | Per capita calorie intake | CGE model |
| Shapouri and Trueblood (2001) | Low-income countries | + | 4 | Food gaps | PEM |
| UNEP (2005) | China | - | 7 | Food consumption | PEM |
| van Meijl and van Tongeren (2001) | Global | + | 7 | Food access, purchasing power for primary food products | CGE model |
| Weerahewa (2004) | Sri Lanka | + | 7 | Calorie intake | Econometric PEM |

**Table 6.7:** Summary of *ex post* studies

| Study | Country/region | Impact | Criteria score | Food security metric | Study method |
|---|---|---|---|---|---|
| Abdullateef and Ijaiya (2010) | Nigeria | - | 7 | Total quantity of food requirement, food utilisation | Before/after + econometric + CGE model |
| Bamou et al. (2006) | Cameroon | +/- | 6 | Per capita food supply, malnutrition, food import/export | Before/after |
| Bezuneh and Yiheyis (2009) | Developing countries | - | 6 | Per capita daily dietary energy supply | Econometric |
| Chand and Praduman (2006) | India | +/- | 6 | Calorie intake, poverty | Before/after |
| Chirwa and Zakeyo (2006) | Malawi | +/- | 6 | Nutritional status | Before/after |
| Diagne et al. (2006) | Senegal | + | 6 | Food insecurity threshold (food expenditure allowing 2,400 calories a day per adult-equivalent) | Before/after |
| Musonda and Wanga (2006) | Tanzania | - | 6 | Per capita intake, self-sufficiency index | Before/after |
| Nyangito et al. (2006) | Kenya | - | 6 | Malnutrition, food consumption | Before/after |
| Oduro and Kwadzo (2006) | Ghana | +/- | 6 | Underweight, food import | Before/after |
| Opolot et al. (2006) | Uganda | + | 6 | Food consumption, malnutrition, stunting | Before/after |
| Oyejide et al. (2006) | Nigeria | + | 6 | Undernourished, calorie intake, import dependence | Before/after |
| Pyakuryal et al. (2010) | Nepal | + | 6 | Per capita food availability, extent of malnourishment | Before/after cf. CGE model |
| Sbai et al. (2006) | Morocco | +/- | 4 | Poverty | Before/after |
| Thomas and Bynoe (2006) | Guyana | + | 6 | Calorie intake, undernourishment, poverty | Before/after |

There are two final issues to address with respect to the review of the evidence reported above. Firstly, note that the studies cover a variety of food security metrics. As we noted in section 2, 'Research challenges', this is in many ways a barrier to obtaining some degree of consensus on how the available evidence can inform on the links between agricultural trade reform and food security outcomes. Coupled with the range of methods reported in the tables above, the disparity in food security metrics meant that, though we could establish clearly the direction of effect (albeit with the caveat that some food security metrics can have quite different implications for policy, e.g. self-sufficiency is a quite different

perspective on food security than, say, food consumption) and recognise that alternative food security metrics are likely to be correlated (e.g. food consumption is likely to be correlated with nutritional intake), we could not establish a standardised effect size. Given the range of methods applied and the alternative metrics of food security employed and that the overview of the evidence provides no clear outcome, we give further insights into the links between agricultural trade liberalisation and food security by providing further in-depth detail of the studies covered in the tables above. This is presented below.

Finally, in reviewing the evidence, we applied a criteria rating which is described in section 4. Details of the ratings by criteria were recorded for each study (see Appendix 5.1). Table 6.8 summarises the criteria ratings against food security outcomes to address whether rating scores are likely to be associated with a particular outcome. Again, no unambiguous picture emerges: there is no tendency for a highly-rated study to predict a change in food security in one direction or the other. Moreover, and not reported here, the publication outlet (e.g. a report published by an institution or peer-reviewed journal) is not likely to be associated with a consistent change in the food security metric one way or the other.

**Table 6.8:** Study-specific criteria scores and evidence of food security changes (number of studies with criteria scores)

| Criteria scores | Increase in food security | Mixed evidence on food security | Decrease in food security |
|---|---|---|---|
| 7 | 5 | 2 | 4 |
| 6 | 7 | 7 | 5 |
| 5 | 1 | 0 | 0 |
| 4 | 1 | 1 | 0 |
| 3 | 0 | 0 | 1 |

## 6.4 Further insights

Given that no clear outcomes on the link between food security and agricultural trade liberalisation emerge from the quantitative studies reviewed, we review in more detail two subsets of the studies reported above. Firstly, we consider the insights provided by the studies reported in the FAO project (Thomas, 2006), which applied a common template for organising the study of food security and trade liberalisation, as outlined in section 1 above. Secondly, building on those studies, we report on additional evidence reported in other country case studies. Thirdly, noting that multilateral as well as unilateral reform may have an impact on food security, we report the evidence from studies that focus on the impact of multilateral trade reforms. Finally, given that many of the studies (particularly the e*x post* studies covered in the FAO (Thomas, 2006) project) follow a common approach, we do not provide a critical appraisal of summative causality by study. Rather, we highlight the important insights from the evidence presented above where the study provides sufficient information to do this and draw some general conclusions on the links between the causal framework and the interpretation of the empirical evidence and, in turn, how this matters for addressing food security issues.

### *6.4.1 The FAO studies*

The FAO case studies[3] applied a common framework (see Figure 3.1) and attempted to provide a more 'standardised' analysis of the links between trade liberalisation and food security outcomes across a wide range of developing countries. Although the FAO framework was a template for the country analysts to work from, not every country case study involved access to the necessary data or similar analysis. The outcomes from this effort were reported in two ways: firstly, a case study for each country addressed the nature of trade and other economic reforms, other aspects of institutions and agro-climatic issues that may impact on agricultural productivity and an overview of how food security metrics had varied between the pre- and post-reform periods. Secondly, data analyses for all countries were pulled together in an overall summary, which focused on two issues: price decomposition and price transmission.

It should be noted where these analyses fit in with the overall framework outlined in Figure 3.1. Specifically, the outcomes we report in Tables 6.2–6.4 (and in more detail in Appendix 5.1) relate to food security outcomes as highlighted in the right-hand box in the figure. The data analyses that comprise the price decomposition and price transmission elements focus directly on the link between reforms and intermediate effects and, by extension, the food security outcomes. Thus, while the summaries of price decomposition and price transmission are relevant for addressing food security, they are not *per se* a direct measure of food security outcomes; nevertheless, they provide insight into why the food security outcomes across countries may differ. That said, while they give some indication that the institutional and policy environment will matter for determining prices, they do not necessarily give an indication as to how they matter for price changes or the analysis of price transmission.

The price decomposition analysis involves breaking down the change in domestic food prices into a series of factors: the change in the world price; the change in the exchange rate and the change in 'policies or other effects'. These 'other effects' will include trade liberalisation, though not exclusively. In only a limited number of studies is trade liberalisation highlighted as a separate factor. The FAO (Thomas, 2006) study recognises that in addressing the links between economic reform and food security outcomes, a wide range of factors will be important, not just trade policy. Also by carrying out this price decomposition exercise over different periods, the changing role of various factors can be analysed. In addition, as countries become more open to world markets, one can capture the possibility that world market prices increasingly account for changes in domestic prices post-reform. We provide a subset of the results below, which are representative for the country case studies as a whole. Broadly, they show two general outcomes: firstly, following reform, domestic prices may not always change in the same direction; secondly, the contribution of factors varies across countries and these factors may have off-setting effects.

Table 6.9 summarises the results for maize and/or rice price decompositions across 11 countries. The price decompositions reported relate to the latter period of the economic reform programmes and are based on a comparison of domestic price

[3] The FAO (Thomas, 2005) study focused on trade and food security issues in 15 countries. Two of these (Peru and Venezuela) are not characterised as 'developing countries' by the World Bank, which is the definition employed in this review. We therefore report the results for the 13 countries covered by this study.

changes in a given period relative to the change in prices in an earlier period. In the final column of Table 6.9, we report the overall assessment on the change in food security for that specific country. However, other factors may be important in determining this final outcome and are not necessarily correlated with what happens to prices, such as further breakdown of reform periods or changes in the prices of other commodities. Nevertheless, in six out of the 11 countries reported on in Table 6.5, where there was an observed decline in domestic prices, and there was some evidence that food security had improved (i.e. the overall assessment was either an increase in the food security metric or the evidence was mixed).

There are three important points that arise from this table. Firstly, the change in the domestic price varied, sometimes showing a substantial decrease, sometimes a substantial increase; in other words, the reform period was marked by a range of experiences in the domestic prices of staples. Secondly, the 'change in policies or other effects" (which includes trade policy effects) was not always the main factor accounting for these changes in the domestic prices. In seven out of the 15 entries in Table 6.5, changes in the real exchange rate were reported to be more important than changes in the 'policies or other effects'. Note that in 10 out of the 15 cases reported, the change in the real exchange rate had the opposite effect on domestic prices to the policy reforms. This underlines the fact that other policies may be important and indeed may offset sector-specific reforms such as trade policy; see, for example, the entries for Cameroon, Nigeria (maize), Senegal, Uganda, Morocco and Guyana. Finally, the 'change in policies and other effects' also varied markedly across countries, sometimes accounting for a net decrease in domestic prices (Cameroon, Ghana, Nigeria, Senegal, Uganda and Guyana) and sometimes an increase in domestic prices (Kenya, Malawi, Morocco, Guatemala and India). This emphasises that the starting point for assessing reform matters, as not all reform processes will involve a decrease in domestic prices and hence an (expected) improvement in food security.

**Table 6.9:** Price decomposition results from case studies

| Country (time period) | Change in domestic price | Change in world price | Change in real exchange rate | Change in policies and other effects | Reported change in food security (from Tables 6.2-6.4) |
|---|---|---|---|---|---|
| Cameroon (1994–1999/1989–1993) | | | | | Mixed |
| Rice | 23.7 | 2.5 | 37.8 | -16.5 | |
| Ghana (1992–2000/1987–1991) | | | | | Mixed |
| Rice | -36.3 | -3.8 | 24.4 | -56.9 | |
| Maize | -20.4 | -11.9 | 24.4 | -32.8 | |
| Guatemala (1996–2000/1991–1995) | | | | | Increase |
| Maize | -5.6 | -7.0 | -14.7 | 16.1 | |
| Guyana (1996–2000/1992–1995) | | | | | Increase |
| Rice | -30.0 | -24.9 | 146.9 | -107.9 | |
| India (1996–2000/1991–1995) | | | | | Decrease |
| Rice | -18.3 | -23.3 | -5.5 | 10.4 | |
| Kenya (1994–2000/1986–1993) | | | | | Decrease |
| Rice | 30.4 | 3.1 | -11.5 | 58.8 | |
| Maize | 13.0 | -8.6 | -11.5 | 33.2 | |
| Malawi (1995-2000/1990-1994) | | | | | Mixed |
| Rice | 47.5 | -20.6 | 24.2 | 43.9 | |
| Maize | 20.6 | -5.0 | 24.2 | 1.4 | |
| Morocco (1997-2000/1991-1996) | | | | | Mixed |
| Maize | -31.9 | -27.1 | -9.3 | 4.6 | |
| Nigeria (1994–1998/1986–1993) | | | | | Increase |
| Rice | -82.7 | 11.2 | -38.5 | -55.5 | |
| Maize | -22.6 | -38.3 | 44.7 | -29.0 | |
| Senegal (1984–1992/1986–1993) | | | | | Increase |
| Rice | 30.7 | -0.76 | 47.85 | -16.3 | |
| Uganda (1994–2000/1988–1993) | | | | | Increase |
| Maize | -2.2 | -11.4 | 10.6 | -1.3 | |

The focus of this review is on the links between agricultural trade liberalisation and food security. However, 'change in policies and other effects' is a catch-all and does not separate trade liberalisation from other effects. Other case studies do, however, highlight trade policy in the price decomposition analysis and a sample of these results is reported in Table 6.10. The commodity sectors are the same (rice and maize) and the price decompositions are reported for Tanzania. In large part, the observations made in Table 6.9 carry over to Table 6.10, but the country case study here also highlights the contribution of import tariffs. This indicates again that other factors may be more important than trade or other policies in accounting for the net change in domestic prices; and that in the overall context of

economic reform the impact of trade liberalisation on the net change in domestic price may be relatively minor[4].

**Table 6.10:** Price decomposition results from case studies with observations about trade policy

| Country (time period) | Change in domestic price | Change in World Price | Change in real exchange rate | Change in import tariff | Change in policies and other effects | Reported change in food security (from Tables 6.2-6.4) |
|---|---|---|---|---|---|---|
| Tanzania (1996-2000/1992-1995) | | | | | | Decrease |
| Rice | -41.39 | -24.94 | -35.54 | -1.55 | 20.65 | |
| Maize | -47.88 | -5.91 | -35.54 | -3.31 | -3.30 | |

This conclusion is also drawn in the FAO case study of China. The results for a number of commodity sectors, reported in Table 6.11, show that the role of trade in determining price changes relative to the previous period was relatively minor; the role of other factors being considerably more important in determining the level and direction of the change in commodity prices.

**Table 6.11:** China: decomposition of changes in domestic prices (2000 relative to previous period)

| | Change in domestic price | Change due to trade | Change due to other factors |
|---|---|---|---|
| Rice | -38.15 | 3.93 | -42.08 |
| Maize | -33.98 | 9.79 | -43.77 |
| Wheat | -31.76 | 14.45 | -46.21 |
| Other grains | 10.4 | -2.9 | 13.3 |

Further insights into economic reform and domestic prices come from the analysis of price transmission in the country case studies. There is an expectation that if the reform process led to countries being more 'open', then there would be stronger links between domestic and world prices as reflected in the price transmission regressions. Specifically, this involves a test for structural change in the pricing relationships (as measured by a Chow test), with FAO taking 1993 as the standardised break year. A summary of these results is presented in Table 6.12.

[4] In the case of Tanzania, the authors of the case study note that adverse climate events have an important bearing on the food security outcome.

**Table 6.12:** Evidence of structural change in price relationships from FAO country case studies

| Country | Evidence of structural breaks in price relations between domestic and world prices? (level of significance) |
|---|---|
| Cameroon | Yes: coffee (5%), cocoa (10%)<br>No: rice, cotton |
| Ghana | No: rice, maize, cocoa, groundnut |
| Guatemala | No: maize, wheat |
| Guyana | No: rice, sugar, bananas, coconut |
| India | Yes: lamb meat (5%)<br>No: rice, maize, coconut oil wheat |
| Kenya | Yes: rice (1%), coffee (1%)<br>No: maize, sugar, wheat, tea |
| Malawi | Yes: rice (1%), groundnut (5%)<br>No: maize, cotton, tobacco |
| Morocco | Yes: sunflower (1%)<br>No: maize, barley, groundnut |
| Nigeria | No: rice, maize, groundnut, cocoa |
| Senegal | Yes: sorghum (1%)<br>No: rice, cotton, groundnut |
| Tanzania | Yes: rice (10%) coffee-arabica (1%)<br>No: maize, coffee-robusta |
| Uganda | No: beans, maize, coffee, cotton, tobacco, tea |

There is no clear conclusion from FAO evidence on price relationships. On the one hand, the results here may result from the specific econometric techniques employed or the year chosen for the structural break. If more 'significant' reforms had taken place in an earlier period, which may not necessarily be common across countries, the results summarised in Table 6.12 might not report an accurate assessment. On the other hand, the results could be interpreted as indicating that, as a consequence of trade and other policy reforms, the country did not become (significantly) 'more open'. In other words, trade policy reform was not sufficiently substantive to lead to more openness, or other barriers to trade persisted (i.e. in the country-case studies, the focus was primarily on tariff barriers to trade and non-tariff barriers were not fully accounted for), or changes in domestic prices were influenced by a wide range of other factors that are not accounted for in the price transmission analysis.

### *6.4.2 Additional case study evidence*

We summarise the other case study evidence in Table 6.13. These results are based on *ex ante* studies – either partial or general equilibrium studies. In the study of Sri Lanka by Weerahewa (2004), an econometric model is estimated, with the results used to calibrate a simulation model. None of the studies reports any statistical aspects relating to their estimates of the impact on food security. Moreover, as well as different metrics of food security being employed, the results are

contingent on the baseline used. Trade reform scenarios will also differ ranging from partial reform (e.g. China's accession to the World Trade Organization) to completely removing all trade barriers.

**Table 6.13:** Unilateral trade reform and food security. Further insights

| Study | Food security metric | Quantitative effect due to trade liberalisation |
|---|---|---|
| Chowdhury et al. (2006): Bangladesh | Food consumption | Decline up to 0.5% in short term; increase by up to 1.8% in long term |
| Fuller et al. (2003): China | Food consumption (million metric tonnes) | Wheat and rice consumption declines by 0.13% and 0.34% respectively; increase in consumption of other commodities |
| Huang et al. (2005): China | Food prices and food consumption expenditure | Overall food prices rise between 2.4% and 4.4%. Food expenditure increases between 1.1% and 2.3% |
| Karim and Kirschke (2003): Sudan | Aggregate per capita consumption (1000 kg/head) | 1% increase compared with baseline |
| UNEP (2005): China | Per capita food consumption | Per capita rice consumption declines in rural and urban areas (-0.8% and -1.1% respectively); mixed effects for other commodities. |
| Weerahewa (2004): Sri Lanka | Calorie intake per day | 33.1% increase |

No unambiguous results arise linking trade liberalisation with food security. The study of Sri Lanka (Weerahewa 2004) suggests a substantive increase in calorie intake per day from trade, while that of Karim and Kirschke (2003) of the Sudan suggests more modest increases. Chowdhury et al. (2006), in their study of Bangladesh, predict a short-run and relatively small fall in food consumption followed by a more substantive increase over the longer run.

The three studies of China are more consistent in terms of the impact on food security. Perhaps this is not surprising, given the commodity profile and initial prices should be common in the underlying calibration of the models. With reference to the rice and wheat consumption, all studies predict that domestic prices for these commodities will rise following trade liberalisation, food expenditure will increase and consumption fall. The UNEP (2005) study also notes the decline in rice consumption in both rural and urban areas. However, there is a mix of effects in relation to other commodities, which is largely contingent on the initial starting points with respect to domestic prices (i.e. whether they were lower or higher than world prices) and the trade profile of the commodity sector.

While the results reported above rely on models calibrated to specific countries or, in the FAO project, on data and experience from a range of countries, research by Bezuneh and Yiheyis (2009) focuses on whether there is any evidence that trade

liberalisation has impacted on food security in 37 primarily developing countries[5]. The data period covers the 1980s and 1990s and where the trade liberalisation 'event' is captured by a dummy variable. The food security metric is per capita DES and the authors control for other factors that may influence food security: per capita real gross domestic product (GDP), irrigated land as a percentage of crop land, the price of imported food, foreign reserves and political instability. They also use dummies to control for differences in country–region. With the time series cross-section data, they estimate a panel model and also allow for lagged effects of trade liberalisation on food security.

The key results are presented in Table 6.14. Model 1 omits any regional dummies; Model 2 includes regional dummies; Model 3 omits regional dummies but includes lagged levels of DES. The results clearly indicate that the short-run effect of trade liberalisation on food security are negative, the result being statistically significant at the 5 percent level across all variants of the model. In Model 1, there is no lagged effect of trade liberalisation on food security, though this effect is significant at the 10 percent level when regional dummies are included (though they are all statistically insignificant). This mildly positive effect does not outweigh the contemporaneous negative effect on food security. When including lagged values of the food security metric (which is significant at the 10 percent level), the lagged effect of trade liberalisation disappears, though the immediate effect proves to be robust, the effect of trade liberalisation on food security being significant at the 5 percent level.

**Table 6.14:** Trade liberalisation and food security across 37 developing countries (dependent variable: change in log per capita dietary energy supply)

| | **Model 1 coefficient (t-ratio)** | **Model 2 coefficient (t-ratio)** | **Model 3 coefficient (t-ratio)** |
|---|---|---|---|
| Trade liberalisation | -0.0044<br>(2.102)** | -0.0042<br>(1.983)** | -0.0044<br>(2.060)** |
| Lagged trade liberalisation | 0.0033<br>(1.584) | 0.0033<br>(1.653)* | 0.0033<br>1.586 |
| Regional dummies | No | Yes | No |
| Lagged dietary energy supply | No | No | Yes |

** Significant at 5% level; * significant at 10% level.
Source: Bezuneh and Yiheyis (2009).

The results clearly indicate that trade liberalisation leads to a negative effect on food security across a broad sample of developing countries. However, setting aside econometric issues, one potential problem with the study is the measure of trade liberalisation. As the authors note, they have taken this as an 'event', which ignores various aspects of trade liberalisation including scope, pace and sequencing that we have discussed above.

[5] The countries are: Benin, Brazil, Cameroon, Chile, Colombia, Costa Rica, Ecuador, Gambia, Ghana, Guatemala, Guinea-Bissau, Guyana, Honduras, India, Indonesia, Jamaica, Kenya, Korea Republic, Malaysia, Mali, Mauritania, Mexico, Morocco, Nepal, Nigeria, Pakistan, Paraguay, Peru, Philippines, Sri Lanka, Thailand, Tunisia, Turkey, Uganda, Uruguay, Venezuela and Zambia.

### 6.4.3 Evidence involving multilateral trade reform

Trade liberalisation elsewhere can affect food security in a developing country. This is particularly true in the context of multilateral trade liberalisation, whether this involves developing countries in changing their policies or not. Policy reform in OECD countries in particular will matter. Given the high levels of support to domestic farmers and the share of international trade accounted for by OECD countries, policy reform in developed countries can have a significant effect on world market prices and, hence, production and consumption incentives and food import bills in developing countries. Specifically, since OECD policies have had the effect of depressing world market prices, multilateral policy reform would be expected to increase world market prices. Depending on the trade profile of the specific developing country, this in turn could impact on food security in the least-developed countries in particular. We report here on the studies summarised in Tables 6.2–6.4 that provide evidence on the extent of these issues.

#### ***6.4.3.1 Greenfield et al. (1996)***

This study reports the FAO's assessment on the food implications of the Uruguay Round on developing countries. The assessment was based on the FAO's World Food Model, which simulated changes in world prices, production, consumption and trade. The food security implications for developing countries are reflected in import bills where developing countries are highlighted by region and by low-income food-deficit countries within the region. The estimates are based on projections of the model with and without the Uruguay Round agreement; since the latter can be isolated, this gives an estimate of the changes that are caused by the Uruguay Round agreement on agricultural trade liberalisation. There is no statistical information associated with this specific model, so the estimates reported have no 'significance' associated with them.

The main results are summarised in Table 6.15. As expected, world market prices rise due to multilateral trade liberalisation, and this would have an effect on production and consumption decisions in developing countries. The net outcome for developing countries is reflected in the food security metric, here reported as the change in food import bills with the Uruguay Round effect isolated. All developing countries see an increase in the cost of food imports of around 15 percent. The effect of this varies by region, most notably for the Far East where import bills increase by 20 percent. The overall implication then is that the Uruguay Round would be expected to negatively impact food security across many developing countries. The authors conclude (though are not specific) that the food security implications for many developing countries will be largely determined by factors that the Uruguay Round would not have any influence on.

#### ***6.4.3.2 Frohberg et al. (1990)***

This study employs a global trade model for assessing the outcome of trade liberalisation. There are two distinguishing features of this model. Firstly, it is an econometrically estimated general equilibrium model, unlike other general equilibrium models, which are based on calibration. That said, however, there are no reported statistical properties of the model nor of the significance of the estimates it produces. Secondly, it focuses on more direct metrics of food security, including calories and proteins per capita and the number of people hungry. This is a more direct measure of food security than implied by food import bills, for example, as employed by Greenfield et al. (1996).

**Table 6.15:** Implications of the Uruguay Round on world prices for selected commodities and food import bills in developing and low-income food-deficit (LIFD) countries

| Commodity | Change in world price due to Uruguay Round | Food import bills | Percentage change due to Uruguay Round |
|---|---|---|---|
| Wheat | +7% | *All Developing Countries* | 15% |
| Rice | +7% | *LIFD* | 14% |
| Maize | +4% | *Africa* | |
| Millet/sorghum | +4% | All | 11% |
| Other grains | +7% | LIFD | 7% |
| Fats and oils | +4% | *Latin America & Caribbean* | |
| Oilmeal proteins | 0% | | 6% |
| Bovine meat | +8% | All | 12% |
| Sheep meat | +10% | LIFD | |
| Pig meat | +10% | *Near East* | |
| Poultry | +8% | All | 15% |
| | | LIFD | 10% |
| | | *Far East* | |
| | | All | 20% |
| | | LIFD | 19% |

Source: Greenfield et al. (1996).

The model projects an underlying baseline and then simulates the outcome of trade liberalisation in OECD countries relative to this baseline. From this, the impact of trade liberalisation on a range of countries can be derived. A summary of the relevant results is reported in Table 6.16. World food prices would be expected to increase (where prices here are food prices relative to the non-agricultural price). The model predicts that the change in this relative price is potentially substantial. The impact on food security for specific developing countries is also reported in Table 6.16. The model predicts a diverse outcome: food security improves in some countries (Nigeria and Kenya) and declines in others (India, Pakistan and Thailand). Overall, food security in developing countries declines as reflected in the percentage change in calories per capita and the number of people hungry.

#### *6.4.3.3 van Meijl and van Tongeren (2001)*

These authors use the CGE model GTAP (Global Trade Analysis Project) to simulate the outcome of trade liberalisation. They exploit the data framework in the GTAP database to give two different insights into the effect of food security following trade liberalisation. Firstly, they separate the food and agricultural sectors of countries into primary and processed sectors. It may be the case that a country is an exporter of primary commodities and an importer of processed food commodities; or it may be an exporter or importer of both categories; or an importer of primary commodities and exporter of processed food commodities. Secondly, they find that the structure of protection may differ, with higher tariffs on processed commodities giving rise to the potential issue of tariff escalation.

**Table 6.16:** Food security implications from OECD trade liberalisation

| Commodity | Relative price change (%) | Country | % Change: calories/capita | % Change: protein/capita | % Change: number hungry |
|---|---|---|---|---|---|
| Wheat | 18 | Egypt | -0.5 | -0.5 | -- |
| Rice | 21 | India | -0.9 | -1.0 | 5.6 |
| Coarse grains | 11 | Indonesia | +0 | -0.1 | -- |
| Bovine products | 17 | Kenya | 1.8 | 2.1 | -8.8 |
| Dairy products | 31 | Nigeria | 0.4 | -0.4 | -47.4 |
| Other animal products | -0 | Pakistan | -0.6 | -0.6 | 8.1 |
| Protein feed | 13 | Thailand | -0.1 | -0.2 | 1.0 |
| Other food | 5 | Developing countries | -0.3 | -- | 3.6 |
| Total agriculture | 9 | | | | |

-0: small negative change; -- not reported or calculated.
Source: Frohberg et al. (1990).

They classify country groupings according to level of development (low- and middle-income developing countries and high-income countries), whether countries are exporters/importers of primary/processed commodities, and whether countries have the potential for self-sufficiency. Table 6.17 summarises their country groupings (where they include developing countries).

**Table 6.17:** Country-group classifications

| Country group | Countries |
|---|---|
| LIEXP (low income: export primary and processed commodities) | India, Malawi, Mozambique, Vietnam, Zambia, Zimbabwe |
| LIAEXP (low income: net exporter primary/importer processed) | Tanzania, rest of sub-Saharan Africa |
| MIAEXP (lower-middle income: export primary/import processed) | Sri Lanka, Central America |
| MIFEXP (lower-middle income: import primary/export processed) | Indonesia, Malaysia, Morocco, Thailand |
| LMIMP (lower-middle income: import primary agricultural and processed food products) | China, Philippines, rest of Middle East, rest of North Africa |
| LIMP (low income: import primary and processed) | Bangladesh, rest of southern Africa, rest of South-east Asia |

Source: van Meijl and van Tongeren (2001).

They consider a range of trade liberalisation scenarios of which we report the results of two: trade liberalisation in the primary commodity sector only and trade liberalisation in primary and processed sectors. In each scenario, all tariffs and export subsidies are reduced by 50 percent as are all domestic support instruments. In focusing on the impact of trade liberalisation on food security, the metric they employ is a measure of 'food purchasing power', from which they distinguish between unskilled labour and landowners (where the latter is captured by land rent). The results of this are presented in Table 6.18. As is common in CGE models, there are no statistical aspects to the results generated.

**Table 6.18:** Effect of trade liberalisation on 'food purchasing power' by country group (percent change)

| Country classification | Trade liberalisation in primary commodities | | Trade liberalisation in primary and processed commodities | |
|---|---|---|---|---|
| | UnSLabour | Land | UnSLab | Land |
| LIEXP | -1.2 | 4.7 | -0.9 | 5.2 |
| India | -1.5 | 3.2 | -2.6 | 6.0 |
| LIAEXP | 0.2 | -3.2 | 0.3 | -3.1 |
| LIIMP | 1.7 | -3.5 | 3.0 | -5.3 |
| MIEXP | -0.9 | 7.3 | -1.4 | 11.2 |
| MIAEXP | 0.2 | -0.6 | -0.2 | 1.7 |
| MIFEXP | 0.5 | -0.7 | 0.1 | 1.5 |
| LMIIMP | 1.9 | -9.4 | 3.1 | -14.5 |
| China | 0.3 | -0.5 | 0.7 | -0.9 |
| UMIIP | 0.8 | -2.0 | 1.1 | -1.2 |

For country group classification, see Table 6.17. UnSLabour = unskilled labour. Land = landowners.
Source: van Meijl and van Tongeren (2001).

The effects of trade liberalisation on food security are informative in several respects. Firstly, there is clear heterogeneity across developing country groups: some gain and others lose. What determines this outcome is the net effect on prices. With trade liberalisation in all countries, world market prices will rise, but the effect in developing countries will depend not only on this but also on what happens to the domestic (trade-distorted) price. Secondly, there is a clear distributional effect: a net increase in the domestic price of food will harm unskilled labour but benefit landowners (farmers). This is the result of the effect on prices. Finally, there is an extra 'kick' associated with trade liberalisation in processed agricultural commodities: in some cases, this exacerbates the gains and losses to unskilled labour and landowners; in other cases, it is sufficient to reverse the food purchasing power impact that arises from trade liberalisation in primary products alone.

#### *6.4.3.4 Diao et al. (2005)*

These authors report the results from a multi-region, multi-sector CGE model using the GTAP database. The model is used to simulate the outcome of trade liberalisation involving developed countries only (or, in some cases, restricted to certain developed countries) or involving all countries (i.e. developed and developing countries). This allows for consideration of assumptions regarding underlying productivity growth, though this is not reported in the table below. The model covers 40 developing and middle-income countries; the summary of the results below is confined to developing countries. Food security is defined as 'agricultural consumption'. The results are presented in Table 6.19.

**Table 6.19:** Effect of trade liberalisation on agricultural consumption (percent change relative to baseline)

| | Liberalisation: developed countries cnly | Liberalisation: all countries |
|---|---|---|
| China | -0.2 | 0.4 |
| Indonesia | -0.4 | -0.2 |
| Malaysia | -0.5 | 1.9 |
| Philippines | -0.6 | 0.8 |
| Thailand | -0.7 | 1.9 |
| Vietnam | -0.3 | 1.0 |
| Bangladesh | -0.2 | 0.1 |
| India | -0.1 | 0..2 |
| Sri Lanka | -0.3 | 0.3 |
| Other South Asian countries | -0.3 | 0.8 |
| Central America & Caribbean | 0.2 | 1.6 |
| Morocco | -0.2 | 1.1 |
| Rest of North Africa | -0.9 | -0.2 |
| Botswana | 0.2 | 1.3 |
| Malawi | 0.3 | 0.5 |
| Mozambique | 0.1 | 0.4 |
| Tanzania | 0.9 | 1.7 |
| Zambia | 0.2 | 0.2 |
| Zimbabwe | 0.3 | 4.4 |
| Other Southern African countries | 0..2 | 2.3 |
| Uganda | 0.2 | 0.3 |
| Rest of sub-Saharan Africa | 0.0 | 0.4 |

Source: Diao et al. (2005).

There are three relevant points. Firstly, the percentage changes are relatively small though, as the authors note, this could translate into large absolute changes in food security metrics. Secondly, when liberalisation is confined to developed countries only, there is a rather mixed food security outcome across developing countries; some countries gain and others lose. Of the 23 countries reported on in Table 6.15, food security declines in 13, while in the other 10 it improves. Thirdly, when developing countries also reform their trade policies, the food security impact changes with all countries except Indonesia and the rest of North Africa are predicted to lose from trade liberalisation.

#### *6.4.3.5 OECD (2002)*

This study follows van Meijl and van Tongeren (2001) by addressing the potential impact on food security arising from trade liberalisation and by classifying countries by their net trade position, whether they are potentially competing with OECD countries and whether they have the potential for self-sufficiency. The authors add to this classification by identifying countries by their food security status: specifically, food-insecure countries, food-neutral countries, and food-secure countries (the last-named being mainly OECD countries). To address the effects of agricultural trade liberalisation on food security (according to the food security status of the countries in the classification), they employ two modelling approaches: the OECD AgLink model and the GTAP model. The AgLink model is a partial equilibrium with considerable market detail, given that it is typically used for OECD agricultural policy analysis, and the GTAP model is a computable equilibrium. Although largely focused on OECD policy-related issues, to consider the effect of OECD policies on food security in developing countries, the 'rest of the world' aggregate that had previously been defined in the model was replaced

by specification of temperate product markets in non-member countries. Both, of course, can address different issues, at least with respect to detail. The AgLink model can focus on the detail of agricultural markets (at least for temperate products produced by OECD countries), while the GTAP model has a multi-sectoral content, which means that trade liberalisation scenarios are not restricted to considering agricultural policy issues. This is useful, since, as we show below, this allows us to consider the relative importance of agricultural trade liberalisation for food security relative to wider trade liberalisation. Finally, as in van Meijl and van Tongeren (2001), the authors also separate the agricultural sector into primary agriculture and processed food.

**Table 6.20:** Country classification: food security status

| Food security | Trade status | Countries in the group |
|---|---|---|
| Food-Insecure | Net importers, not potentially self-sufficient | Botswana, Lesotho, Tajikistan, Yemen |
| | Net importers, potentially self-sufficient | Albania, Angola, Armenia, Azerbaijan, Bangladesh, Benin, Burkina Faso, Burundi, Central African Rep, Congo Dem Rep, Cuba, Dominican Rep, El Salvador, Ethiopia, Gambia, Georgia, Haiti, Liberia, Malawi, Mozambique, Peru, Rwanda, Senegal, Sierra Leone, Sri Lanka, Togo, Zambia |
| | Net importers, primary only | Kenya, Ghana, Pakistan, Papua New Guinea, Philippines |
| | Net exporters, non-competing | Cambodia, Cameroon, Chad, Ivory Coast, Guatemala, Guinea, Bissau, Honduras, Laos, Madagascar, Mali, Mauritania, Namibia, Nepal, Nicaragua, Niger, Somalia, Sudan, Tanzania, Uganda, Vietnam, Zimbabwe |
| | Net exporters, competing | Afghanistan, Bolivia, Mongolia |
| | India | India |
| Food-Neutral | Net importers, not potentially self-sufficient | Algeria, Cape Verde, Jordon, Kuwait, Libya, Saudi Arabia, Trinidad Tobago |
| | Net importers, potentially self-sufficient | Egypt, Estonia, Fiji, Gabon, Iran, Jamaica, Lebanon, Mauritius, Nigeria, Russian Fed, Uzbekistan, Venezuala |
| | Net importers, primary only | Bulgaria, Colombia, Guyana, Kyrgyzstan, Latvia, Malaysia, Maldives, Swaziland, Tunisia |
| | Net exporters, non-competing | Belize, Costa Rica, Dominica, Ecuador, Morocco, Myanmar, Panama, Suriname |
| | Net exporters, competing | Brazil, Chile, Moldova, Paraguay, South Africa, Syria, Thailand |
| | China | China |
| | Indonesia | Indonesia |

The OECD research employs a number of food security metrics reflecting access, availability and stability, as per the FAO framework. In terms of availability, agricultural consumption is used as the metric (specifically, calories per capita). Access can be proxied by the purchasing power of unskilled labour income, as in van Meijl and van Tongeren (2001). Perhaps the novel feature of the OECD study is attempting to account for stability. One 'narrow' measure of this is self-sufficiency but, as we have noted above, this may be in conflict with measuring availability. However, the authors also add in the ratio of stock-to-consumption, providing some aggregate measure of the extent to which a country has access to stocks in times of emergency.

In terms of mechanisms, the link between trade policy reform and food security outcomes arises via prices. Domestic policy reform has an impact on world market prices, which changes price incentives in developing countries. Related to our discussion of price analysis in section 2, one aspect that is explicitly added to the AgLink framework is a price transmission component, recognising that changes in world market prices are not always fully reflected in domestic prices. For example, the price transmission parameter on average is 0.40 for producer prices and 0.49 for consumer prices; the price transmission parameters are lower for some countries: for Bangladesh, it is 0.20 for both producer and consumer prices.

Consider first of all the results from the partial equilibrium AgLink model. The food security status classification of the non-OECD member countries are reported in Table 6.20. This classification gives the basis for addressing the food security impact across food-secure and food-neutral countries. The OECD considers a number of scenarios and we report the outcome from the simulations assuming continuation of OECD countries' commitments regarding export subsidy reductions agreed as part of the Uruguay Round. The results are presented in Table 6.21.

*A priori*, with reductions in export subsidies, we would expect world market prices to rise. This is confirmed in Table 6.21; with the rise in world market prices comes a decline in agricultural consumption that affects all countries whatever their food security and trade status, with the exception of China, which reports no change. In relative terms, the change seems small, though it may translate into relatively large numbers, particularly for the food-insecure countries. The trade liberalisation scenario has almost no effect on the other food security metrics, with only negligible changes in self-sufficiency ratios and no change in the stock-to-consumption ratios, whatever the status of the country in the classification.

As noted, the GTAP framework is not constrained by its partial equilibrium nature and therefore can address a potentially wider range of policy reforms. We report the OECD results relating to trade liberalisation involving the agricultural sector only and trade liberalisation affecting all sectors. In terms of country classification, the country groupings by trade and food security status in the GTAP framework are reported in Table 6.22.

**Table 6.21:** Results from AgLink model: continuation of URAA export subsidy reductions for OECD countries (percent changes in food security metrics)

| | Average consumption | Average world price of cereals | Self-sufficiency ratios (AgLink commodities) | Stock-to-consumption ratio for cereals |
|---|---|---|---|---|
| **Food-insecure** | | | | |
| Net importers, not self-sufficient | -0.1 | 1.2 | 0.001 | 0.000 |
| Net importers, self-sufficient | -0.1 | 0.5 | 0.001 | 0.000 |
| Net importers, primary only | -0.3 | 0.8 | 0.007 | 0.000 |
| Net exporters, not competing | -0.1 | 0.5 | 0.002 | 0.000 |
| Net exporters, competing | -0.1 | 1.0 | 0.002 | 0.000 |
| India | -0.2 | 0.6 | 0.006 | 0.000 |
| **Food-neutral** | | | | 0.000 |
| Net importers, not self-sufficient | -0.1 | 1.1 | 0.001 | 0.000 |
| Net importers, self-sufficient | -0.1 | 1.0 | 0.003 | 0.000 |
| Net importers, primary only | -0.2 | 0.7 | 0.006 | 0.000 |
| Net exporters, not competing | -0.1 | 0.5 | 0.002 | -0.001 |
| Net exporters, competing | -0.2 | 0.7 | 0.008 | 0.000 |
| China | 0.0 | 0.5 | 0.000 | 0.000 |
| Indonesia | -0.1 | 0..3 | 0.002 | 0.000 |

URAA = Uruguay Round Agreement on Agriculture.
Source: OECD (2002).

**Table 6.22:** Food security country status in the GTAP classification

| Trade relation | Food-insecure | Food-neutral |
|---|---|---|
| Net export position positive in agriculture and processed food - AGREXP | India, Vietnam, Zimbabwe, Central America - INSAGREXP | Argentina, Brazil, Chile, Colombia, Morocco, Thailand, Uruguay, rest of SACU, rest of Andean Pact - NEUAGREXP |
| Net export position positive in agriculture and negative in processed food - PRIEXP | Tanzania, Uganda, rest of sub-Saharan Africa -INSPRIEXP | |
| Net export position negative in agriculture and positive in processed food - PROEXP | other Southern African countries - INSPROEXP | China, Indonesia, Malaysia- NEUPROEXP |
| Net export position negative in agriculture and processed food, potentially self-sufficient - AGRIMP | Bangladesh, Malawi, Mozambique, Peru, Philippines, Sri Lanka, Zambia, rest of World, rest of South Asia - INSAGRIMP | Venezuela, former Soviet Union, rest of CEEC, rest of Middle East, rest of North Africa - NEUAGRIMP |
| Net export position negative in agriculture and processed food, not potentially self-sufficient | Botswana | |

CEEC = Central and eastern European countries. SACU = Southern African Customs Union. Other terms are GTAP abbreviations for the groups countries listed.
Source: OECD (2002).

The estimated impact on food security following the agricultural and wider trade liberalisation is reported in Table 6.23. The first figure in each entry relates to agricultural sector reform, with the corresponding figure in parenthesis relating to trade liberalisation across all sectors. The results overall suggest little effect on food consumption, whether considering the agricultural sector only or trade liberalisation more widely. Relatively larger effects are reported on self-sufficiency, though the largest of these relate to processed food. Taking trade reform more widely does not add any substantive 'kick' to the results that arise from liberalising agriculture only. Unskilled labour's purchasing power falls with trade reform, though, while not dismissing the relevance of the sign of these effects, the numbers reported are relatively small. Overall, the results suggest that OECD agricultural policies do not have a substantial impact on food security. The OECD report concludes:

> The small aggregate effects of OECD policy reforms on the selected set of food security indicators argue that OECD policy, by itself, may not be a major element of the broader food security problem faced by NMEs (OECD 2002, p. 7)

**Table 6.23:** OECD trade liberalisation and changes in food security metrics using GTAP **Scenario: OECD Agriculture Only (OECD All Sectors)** (percent change)

| | **Food consumption** | | **Food self-sufficiency** | | **Unskilled labour** |
|---|---|---|---|---|---|
| | Primary | Processed | Primary | Processed | Purchasing power |
| | | | | | |
| ***Food-insecure (INS)*** | | | | | |
| AGREXP | 0.2 (0.7) | 0.2 (0.9) | 0.0 (-1.2) | 4.3 (2.0) | 0.0 (1.5) |
| PRIEXP | 0.0 (0.7) | 0.0 (0.0) | -0.1 (-0.1) | 2.9 (2.8) | 0.0 (0.0) |
| PROEXP | -0.3 (-0.1) | -0.1 (0.2) | 5.1 (4.3) | 17.2 (14.5) | -1.3 (-0.5) |
| India | 0.0 (0.0) | 0.0 (0.1) | 0.1 (0.1) | 1.1 (0.6) | -0.2 (-0.1) |
| AGRIMP | -0.1 (0.1) | -0.1 (0.1) | 0.8 (0.2) | 1.5 (1.0) | -0.5 (-0.2) |
| | | | | | |
| ***Food-neutral (NEU)*** | | | | | |
| AGREXP | -0.1 (0.0) | 0.0 (0.0) | 0.8 (0.6) | 1.5 (1.2) | -0.5 (-0.4) |
| PROEXP | -0.1 (0.1) | -0.1 (0.1) | 0.3 (0.0) | 2.8 (0.7) | -0.2 (0.0 ) |
| China | -0.1 (0.1) | -0.1 (0.2) | 0.4 (0.2) | 0.6 (0.0) | -0.5 (-0.3) |
| AGRIMP | -0.1 (0.0) | -0.1 (0.0) | 0.8 (0.5) | 1.0 (1.2) | -0.5 (-0.1) |

Source: OECD (2002). See Table 6.22 for explanation of abbreviations

The OECD study also reports the results from simulations involving trade liberalisations in non-OECD countries, which are consistent with those reported in Table 6.23. The effect of trade liberalisations on food security metrics, reported in Table 6.24, is generally small. The main difference arises with respect to the purchasing power of unskilled labour, for which more effects that are positive in nature are recorded compared with the OECD-only simulations. Thus while OECD reforms gave rise to mildly negative effects, the effect of all countries reforming trade policy would be mildly positive effects. On the whole, though, the link between trade liberalisations and changes in food security metrics is not strong.

**Table 6.24:** All country trade liberalisation and changes in food security metrics using GTAP **Scenario: All Country, Agriculture Only (All Country, All Sectors)** (percent change)

| | **Food consumption** | | **Food self-sufficiency** | | **Unskilled labour** |
|---|---|---|---|---|---|
| | Primary | Processed | Primary | Processed | Purchasing power |
| | | | | | |
| ***Food Insecure (INS)*** | | | | | |
| AGREXP | 0.3 (0.7) | 0.6 (1.2) | -0.6 (-2.0) | 2.1 (0.0) | 0.4 (3.0) |
| PRIEXP | 0.0 (-0.1) | 0.1 (0.0) | -0.3 (0.0) | 1.2 (1.8) | 0.2 (0.4) |
| PROEXP | 0.2 (0.4) | 0.9 (1.3) | 3.5 (2.7) | 14.2 (11.7) | -0.4 (1.8) |
| India | 0.0 (-0.1) | 0.1 (0.1) | 0.0 (0.1) | 0.7 (0.6) | -0.5 (-0.1) |
| AGRIPM | 0.1 (0.1) | 0.2 (0.3) | -0.2 (-0.2) | 0.0 (-0.4) | 0.2 (0.7) |
| | | | | | |
| ***Food Neutral (NEU)*** | | | | | |
| AGREXP | 0.0 (0.0) | 0.2 (0.1) | 0.6 (0.8) | 0.0 (1.0) | 0.2 (-0.1) |
| PROEXP | 0.2 (0.3) | 0.2 (0.4) | -0.2 (-0.5) | 2.6 (1.1) | 0.5 (1.2) |
| China | 0.3 (0.4) | 0.6 (0.8) | -0.4 (-0.5) | -1.5 (-2.0) | 0.5 (1.2) |
| AGRIMP | 0.5 (0.7) | 0.8 (1.0) | -2.4 (-2.8) | -3.4 (-3.7) | 2.3 (2.9) |

Source: OECD (2002). See Table 6.22 for explanation of abbreviations

### 6.4.4 Further observations

Following from the above categorisation of the evidence and reference to the individual studies collated in Appendix 5.1, we highlight the following observations on the evidence regarding food security and agricultural trade liberalisation and how it relates to the framework outlined in section 3:

- The review of the literature on agricultural trade liberalisation and food security indicates that no single metric of food security is employed. Many of the studies use food security metrics consistent with the definitions of food security outlined in sections 3 and 4. These relate principally to availability and accessibility. However, other metrics employed are less persuasive as food security metrics (e.g. self-sufficiency) and may not necessarily be consistent with an overall increase in food availability.
- Most of the studies are at the aggregate level. This is consistent with traditional trade policy analysis, with the implication that aggregate measures of food security are typically employed. However, the focus on aggregate metrics does not necessarily give the full picture across regions, and urban/rural divides, in relation to vulnerable groups and so on.
- As noted in section 2, there is no one methodology that has been applied to the link between trade liberalisation and food security, which means no assessment of robustness or statistical significance can be readily attached to the studies. However, there is no obvious bias associated with particular methodologies as judged from the evidence produced. The 34 studies that report either a positive or negative impact on food security are split broadly evenly between *ex ante* and *ex post* studies. A similar conclusion can be drawn where one country has been the focus of several studies that report contrasting effects. Of the studies on China that indicate an improvement in food security (see Table 6.2), one uses an *ex post* methodology while four employ an *ex ante* methodology; but alll the studies of China that indicate a deterioration in food security (see Table 6.3), are *ex ante*. Thus, application of a specific methodology to a country does not appear likely to determine the outcome of a study.
- *Ex post* studies look at the experience of food security, but face the difficulty of isolating the direct effects of agricultural trade liberalisation when other policy reforms are also being introduced. *Ex ante* studies could isolate the direct links between food security and trade liberalisation, but few *ex ante* studies focus on the multiple policy reforms that have typically been the experience of many developing countries. While many *ex ante* studies reported in Appendix 5.1 focus on agricultural trade liberalisation, they seldom control for other aspects of the reform process, making them inconsistent with the experience of many developing countries. Even then, and as noted above, the evidence of the *ex ante* models does not point in a consistent direction.
- Closer review of the individual studies in Appendix 5.1 does not lead to any consistent perspective on the circumstances under which food security would improve. The *ex post* studies typically note that other policy reforms were in place when agricultural trade liberalisation was introduced and so precise mechanisms are unclear. While this is a realistic assessment, it yields no clear lessons or understanding of the precise mechanisms of the links between food security metrics and trade liberalisation. Although from a theoretical base we may highlight potential mechanisms (see, for

example, the earlier discussion on price transmission), it is difficult to isolate the cause and effect of one specific policy.

- The price decomposition results summarised in the FAO (Thomas, 2006) initiative highlight the importance of a range of policy reforms – not just trade (and not just agricultural trade) – in determining how prices change and further underpin the varied experience across developing countries in terms of food security outcomes. Moreover, the process of reform does not necessarily suggest that domestic prices will move in one direction. In some countries, food prices increased; in others, they fell during the policy reform periods. For some countries, this would have been due to the starting points; in others, it may be that exchange rate policy or other policy changes offset the changes brought about via agricultural trade liberalisation.

### 6.5 Concluding comments

Taken together, what lessons can policy-makers take from the links between the causal framework and the empirical evidence covered in this systematic review?

The most obvious is that how prices change following agricultural trade liberalisation will matter. The lack of clear evidence on food security outcomes following agricultural trade reform relates essentially to capturing the price change effect and how it will affect specific food security metrics. The studies vary not in challenging the central role of prices *per se* but more on isolating the effect due to agricultural trade liberalisation, how the price change relates to a specific food security metric, how this food security metric relates to country classifications and different constituent groups, and how different methodological approaches can address the extent of price changes (either explicitly or implicitly or as a residual effect once other changes have been accounted for).

In this context, it is worth making some final comments on the links between the studies reviewed and the FAO framework outlined in section 4. Isolating the agricultural trade liberalisation impact on a food security outcome is made difficult in two respects: firstly, other policies matter in determining the outcome; secondly, there may be no clear expectation that agricultural trade liberalisation will necessarily improve food security either because of the starting point or because other policy reforms have a more significant impact on domestic food prices compared with trade measures.

Many studies highlight the role of prices as a key mechanism that relates the reform process to the food security outcome. In this context, the FAO price decomposition results are informative but they are essentially accounting exercises with no statistical basis or underlying model. The focus on price transmission does have some statistical basis but these models are essentially *a*theoretical; they focus on the statistical relationship between prices but say little about the underlying economics as to why imperfect price transmission exists and why reported differences in price transmission exist between countries. In sum, the consensus between the underlying causal framework and the empirical work on food security outcomes relates to the role of prices: specifically, how do domestic prices change in response to agricultural trade liberalisation and, in turn, how does this impact on specific food security metrics. However, the evidence linking price changes to food security metrics – as addressed in the empirical research to date – gives no clear picture of the likely outcome. This is because 'prices' apply to different groups at different times and across alternative locations and, while the

simple framework identifies the key role that prices are likely to play, there has to be considerable effort in addressing what factors mediate the impact of the extent of price changes across space and time and how this ties with changes in food security status. At its simplest level, the prices consumers pay for food may not be the same as the prices farmers get paid for their crops yet both will be an important feature of the change in food security status following agricultural (or any other) policy reform. Understanding the role of institutions and government policies and the functioning of markets in developing countries may contribute to appreciating why food security outcomes differ across countries. The factors determining price transmission are an important issue for future research.

Most of the studies reviewed focus on net outcomes for food security. But distributional effects matter: between net consumers and producers; across regions; between urban and rural sectors; and within households. Gender and age also matter for addressing food insecurity. Perhaps it is not surprising that trade models miss these details, but it is a cautionary note that the aggregate (net) impacts on food security may not fully reflect the change in food security status (particularly for vulnerable groups) within a country.

Finally, in large part, the food security metrics employed in many studies relate to availability and accessibility. The studies reviewed, by and large, report level effects. But there is less analysis of the role of risk and uncertainty and how the more open markets that arise through trade liberalisation impact on the exposure to risk and fluctuations in food prices arising from both world and domestic markets.

# 7 Implications

Assessing the potential impact that agricultural trade liberalisation is likely to have on food security in developing countries is complex. In general terms, there is little clear, direct evidence that isolates what the impact is likely to be. The evidence as it does exist and is reviewed here does not point to an unambiguous outcome. Perhaps there is a good and obvious reason for this: across many developing countries, agricultural trade liberalisation does not occur in a policy vacuum. Other policy reforms at the sector or macroeconomic level tend to be a feature of policy reform packages in many developing countries, all of which may impact on food security. As such, isolating the effect of one particular policy reform can be difficult, as reported here and in other reviews of trade policy impacts in developing countries, most notably those examining links between trade and poverty. Furthermore, different countries have different starting points with the bias of protection varying across countries prior to reform. For example, some countries will have positive nominal rates of protection and others negative rates and this variation can also vary across commodity sectors within countries.

This overall impression is confirmed by the price analyses that accompany many of the country case studies reviewed. Domestic prices of commodities do change during and after the reform period but not always in the same direction and many factors contribute to this domestic price change, including world prices, exchange rates and trade and other policy reforms. A further insight that arises from these studies is that the effect of trade liberalisation may – in light of the other changes taking place in a given country – be outweighed by the impact of other policies. In multilateral trade liberalisation studies, the outcome will depend not just on what trade liberalisation occurs within a developing country, but what happens elsewhere. Since developed countries' agricultural trade policies have depressed world market prices, trade liberalisation in these countries should lead to an increase in world market prices. This will have different implications for agricultural exporters and importers; in the context of the latter, it will also matter how vulnerable they are to world price changes. But the overall picture suggests wide variation in the food security implications for developing countries following multilateral trade liberalisation.

There are two inferences that can be drawn from this review of the evidence. One is that the impact of trade liberalisation on food security metrics is country-specific. With variations in the environments in which policy reform occurs, the nature of the change in policies, and the starting points against which policy reform is introduced, and given the characteristics of the countries involved, perhaps we should not be surprised at the diversity of outcomes and that the evidence points in no single direction.

The alternative inference is that we do not fully understand the linkages between trade liberalisation and food security. While the methodology that underpins the evidence presented here is useful, arguably the research on this issue is underdeveloped, the mechanisms not clearly isolated and the methodology applied to date not sufficiently rigorous for addressing the complexities of food security. Trade policy analysis typically focuses on aggregate outcomes and this may hinder detailed insights into the implications for food security following agricultural trade liberalisation.
While the framework for addressing the food security issues has trade liberalisation at one end of the spectrum and changes in food security metrics at the other,

many of the studies focus on prices as the main mechanism linking these effects. Trade reform changes domestic prices and, under some circumstances, will change the extent to which domestic and world prices are related. In principle, price data are readily available, which makes price an obvious factor to focus on. There are, however, research gaps relating to how we address the price transmission process across a number of dimensions: between world and domestic prices, across regions, across households and so on. Moreover, price changes imply a re-distributional impact: the fall in domestic prices for a commodity is positive for net consumers but may have a negative impact on producers. With price data typically being available at the aggregate level, the potential distributional effects imply that a dis-aggregated and more nuanced assessment of food security outcomes is also necessary.

Taken together, the review of the evidence here points to four important gaps in understanding the potential impact of agricultural trade liberalisation reform on food security:

- Better understanding is needed of the mechanisms that link trade liberalisation with food security. Price changes at the border do not necessarily translate into price changes in domestic markets at either the farm or consumer level and there can often be wide variation across regions. The typical framework that is employed to address trade policy reform (albeit sometimes implicitly), as outlined in Box 3.1, may not be an appropriate representation of reality. Moreover, clearer understanding of domestic market reforms that are often concurrent with trade liberalisations implies that the effectiveness of trade policy changes is contingent on what happens in the domestic market. For example, governments may reduce trade barriers but also use alternative instruments that will dilute the impact likely to be expected with trade liberalisation. Some of the studies in this review point to this, but clearly there is a need for a closer attention to detail.
- What factors determine price transmission across time and across space? Market imperfections will matter as will institutions, the policy environment, infrastructure and geography. While price transmission exercises are, in themselves, potentially informative, there is considerable need for assessing what factors determine the imperfect price transmission that is often observed.
- There is also a need for evidence that can give a more accurate characterisation of changes in food security metrics. Food security issues vary across the rural–urban divide, between regions, across populations segments and across households. More detailed evidence may give more accurate and more nuanced insights into the diversity of changes in food security following trade policy reform. Moreover, trade policy analysis has traditionally focused at the aggregate level; focusing more directly on more micro-orientated outcomes as has been done for income distribution and poverty may provide more direct insights into impacts at a dis-aggregate level. As Chen and Ravallion (2007) note, while poverty and food security are linked, it is difficult to assess food security from poverty statistics given the difficulties of calculating non-food spending, while falls in poverty by some measures have not necessarily led to improvements in food security. This emphasises the importance of looking at food security metrics separately from poverty data.

- Finally, there is a need for greater understanding of vulnerability and risk. As noted, some of the studies focus on self-sufficiency as the appropriate food security metric, which is not wholly consistent with an increase in imports giving the opportunity to increase overall consumption. But food *in*security can also matter, and understanding the potential links between vulnerability and risk is important. The increased relevance of this relates to section 2. With recent price spikes on world commodity markets highlighting the impact of price volatility and expectations that this will be increasingly important in the future, how trade liberalisation changes exposure to risk is an issue that has not been addressed. The evidence reviewed here is largely contained to level effects; but trade liberalisation can also change risk exposure and this issue is likely to feature in future debates on food security and agricultural trade (De Schutter 2011).

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# Appendices

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## Appendix 4.1: Methodology used in the review

### *A4.1.1 Glossary*

*Food security*

World Trade Organization and FAO definition: When the nutritional needs of a country or population are met consistently. This is commonly defined as *"when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 2002).*

*Trade liberalisation*

General agreement amongst organisations and businesses (e.g. BusinessDictionary.com and the UN): Removal of or reduction in the trade practices that restrict trade, unilaterally or multilaterally, including the dismantling of tariffs (such as duties, surcharges, and export subsidies), imposition of export tariffs as well as non-tariff barriers (such as licensing regulations, quotas, and arbitrary standards).

*Developing countries*

As defined currently (July 2010) by the World Bank, economies are divided according to 2008 GNI per capita, calculated using the World Bank Atlas method. The group of countries included consists of the: 43 low income economies, $975 or less; and 55 lower middle income economies, $976 - $3,855. Studies that relate to countries that were developing countries during the study period but no longer are will not be explicitly sought, but will be included where identified. http://data.worldbank.org/about/country-classifications/country-and-lending-groups#Low_income

### *A4.1.2 Search terms*

**Search one:**
"food security" AND "developing countries" AND ("trade liberalistion" OR "export subsidies" OR "trade barriers" OR tariffs OR "World Trade Organisation" OR "non-tariff barriers to trade" OR "free trade" OR GATT OR "General Agreement on Tariffs and Trade" OR "international trade" OR "agricultural trade" OR "trade relations" OR "trade agreements" OR "trade negotiations" OR "terms of trade" OR "comparative advantage")

**Search two:**
"food security" AND("trade liberalistion" OR "export subsidies" OR "trade barriers" OR tariffs OR "World Trade Organi*ation" OR "non-tariff barriers to trade" OR "free trade" OR GATT OR "General Agreement on Tariffs and Trade" OR "international trade" OR "agricultural trade" OR "trade relations" OR "trade agreements" OR "trade negotiations" OR "terms of trade" OR "comparative advantage") AND (Afghanistan OR Albania OR Angola OR Armenia OR Azerbaijan OR Bangladesh OR Belize OR Benin OR Bhutan OR Bolivia OR "Burkina Faso" OR Burundi OR Cambodia OR Cameroon OR "Cape Verde" OR "Central African Republic" OR Chad OR China OR Comoros OR "Cote d'Ivoire" OR "Ivory Coast" OR "Democratic Republic of the Congo" OR Djibouti OR Ecuador OR Egypt OR "El Salvador" OR Eritrea OR Ethiopia OR Gambia OR Ghana OR Georgia OR Guatemala OR Guinea OR "Guinea-Bissau" OR Guyana OR Haiti OR Honduras OR India OR Indonesia OR Iran OR Iraq OR Jordan OR Kenya OR Kiribati OR "Korea Democratic People's Republic" OR Kosovo OR "Kyrgyz Republic" OR Kyrgyzstan OR "Lao People's Democratic Republic" OR Lesotho OR Liberia OR Madagascar OR Malawi OR Maldives OR Mali OR "Marshall Islands" OR Mauritania OR Micronesia OR Moldova OR Mongolia OR Morocco OR Mozambique OR Myanmar OR Nepal OR Nicaragua OR Niger OR Nigeria OR Pakistan OR "Papua New Guinea" OR Paraguay OR Philippines OR Rwanda OR Samoa OR "Sao Tome and Principe" OR Senegal OR "Sierra Leone" OR "Solomon Islands" OR Somalia OR "Sri Lanka" OR Sudan OR Swaziland OR Syria OR Tajikistan OR Thailand OR "Timor-Leste" OR Togo OR Tonga OR Tunisia OR Turkmenistan OR Uganda OR Ukraine OR "United Republic of Tanzania" OR Uzbekistan OR Vanuatu OR Vietnam OR Yemen OR Zambia OR Zimbabwe)

**Further detail of basic Google search:**
A search for further documents was undertaken using Google using the advanced search and limiting document type to just .doc, .pdf for documents and .xls and .csv for any possible data sets.

### *A4.1.3 Databases and other resources searched*

**Databases:**

Agricola

CAB Direct

Social Sciences Citation Index (ISI Web of Knowledge)

IDEAS (Economic and Finance Research) this includes the RePec database

Ebsco (Food Science Source and Econlit)

Dissertations Express (http://disexpress.umi.com/dxweb)

Networked Digital Library of Theses and Dissertations (NDLTD) (www.theses.org)

Ageconsearch (http://ageconsearch.umn.edu/)

USDA's Economic Research Service site

**Other information sources:**

Google (Advanced Search)

Google Scholar

British Library of Development Studies

Eldis (Google Development websearch)

Research4Development (R4D) – the portal to DFID centrally funded research

**Handsearch of the following key journal titles:**

*European Review of Agricultural Economics*

*Agricultural Economics*

*American Journal of Agricultural Economics*

*Food Policy*

**Websites of the following organisations:**

World Bank

World Trade Organization

FAO

United Nations Conference on Trade and Development (UNCTAD)

International Food Policy Research Insititute (IFPRI)

International Centre for Trade and Sustainable Development (ICTSD)

International Food and Agricultural Trade Policy Council (IPC)

International Fund for Agricultural Development

### *A4.1.4 Draft coding tool*

**Initial screening questions to determine whether or not to include the study.**

**A**. Is the research based in or referring to at least one developing country? If not, **exclude**

**B**. Is the research focused on a trade liberalization intervention/policy? If not, **exclude**

**C**. Does the intervention include focus on an outcome measure of food security? If not, **exclude**

**D**. Is the study an English language study? If not, **exclude**, but note for listing in the appendix of the final report.

**1. Basic description of the paper**

1.1. Title

1.2. Authors

1.3. Date of publication

1.4. Language

1.5. Stand-alone paper or one of several from a study

**2. Description of the intervention studied** (circle all that apply)

2.1. Intervention

- 2.1.1. Export subsidies
- 2.1.2. Tariffs (import or export)
- 2.1.3. Quotas
- 2.1.4. Trade-restricting taxes
- 2.1.5. Trade-restricting laws
- 2.1.6. Import subsidies
- 2.1.7. Other non-tariff barriers
- 2.1.8. Trade agreements

2.2. Population

- 2.2.1. Rural, urban, total, other subgroup
- 2.2.2. Gender specific
- 2.2.3. Age
- 2.2.4. Unspecified

2.3. Country

- 2.3.1. Specify which developing countries
- 2.3.2. Specify whether other developing countries are also included

**3. Study design**

- 3.1. Outcome evaluation (if not one of the below, should be excluded)
  - 3.1.1. Controlled before–after designs (CBA, with a counterfactual directly related to food security)
  - 3.1.2. Using micro survey data
  - 3.1.3. Interrupted time series
  - 3.1.4. Statistical matching
  - 3.1.5. Other non-comparative study
  - 3.1.6. Modelling studies
    - 3.1.6.1. Partial equilibrium models (PEMs)
    - 3.1.6.2. Computable general equilibrium (CGE) models
    - 3.1.6.3. Other type of counterfactual model
- 3.2. Does the study also include a process evaluation? (i.e. examining how trade liberalization works, not just whether it works)
- 3.3. Other studies
  - 3.3.1. Qualitative case studies
  - 3.3.2. Empirical qualitative before/after comparison, without a counterfactual (with an assessment made for empirical validity).
  - 3.3.3. Quantitative correlation studies
- 3.4. Does the study consider a specific variable related to food security, and whether they utilize empirical information, rather than making generalized statements on the basis of a-priori beliefs?

**4. Outcomes assessed / outcome variables relating to food security**

- 4.1. Income/poverty levels
- 4.2. Food expenditure
- 4.3. Food consumption
- 4.4. Nutritional status
- 4.5. Food prices
- 4.6. Any other outcome related to food security described in the study

**5. Outcomes assessed by subgroup**

- 5.1. Individual/household, community, regional, national levels
- 5.2. Local economy
  - 5.2.1. Employment
  - 5.2.2. Wages
  - 5.2.3. Production structure
  - 5.2.4. Production levels of foods
- 5.3. Subgroups
  - 5.3.1. Women
  - 5.3.2. Socioeconomic levels
- 5.4. Terms of trade
- 5.5. Agricultural trade (imports/exports)

**6. Sampling methods employed**
**The papers will include a range of study types macro or sectoral data, micro non-survey based data, micro survey based data. For the last two categories the following elements would be noted:**

- 6.1. Population from which sample is drawn
- 6.2. How sample was selected
  - 6.2.1. Methods of identification of population from whom participants are selected
  - 6.2.2. Methods used to identify the participants from this population
  - 6.2.3. Planned (a priori) sample size
  - 6.2.4. Actual sample size
- 6.3. How people were recruited into study
- 6.4. Whether consent was sought, how and from whom
- 6.5. Data collection methods
  - 6.5.1. Types of data collected
  - 6.5.2. Details of data collection methods or tool(s)
  - 6.5.3. Who collected the data
  - 6.5.4. Location of data collected
  - 6.5.5. How did the study team ensure the data collection methods were trustworthy, reliable and valid

**7. Data analysis methods**
- 7.1. Which methods were used to analyse the collected data
  - 7.1.1. Comparative descriptions
  - 7.1.2. Before/after comparison
  - 7.1.3. Econometric-based
  - 7.1.4. Model-fitting based
- 7.2. How did the study team ensure the analysis was trustworthy, reliable and valid

A modified version of the results of using the draft coding tool appears as applied to selected records appears in Appendix 5.1.

**Appendix 4.2: Criteria score**

A criteria score was applied to the **quantitative** studies.

- Are the aims clear?
- Is the methodology clear/appropriate?

Do they isolate an appropriate food security metric?

- Do they comment on potential mechanisms?
- Are the findings clear?
- Is the control/counterfactual analysed?
- Does the paper contribute to the synthesis?

**Criteria score**

**Code: 1=yes, 0=no.**

Only one **qualitative** study was included at the final stage, and therefore relative comparison using the formal critical appraisal tool was not feasible, but the sampling approach for this paper was examined with the following questions:

- Appropriate selection of participants?
- Completeness?
- Recruitment into study unbiased?
- Consent given?
- Data collection methods suitable?
- Relevant data?
- Data collection trustworthy, reliable and valid?
- Appropriate statistical analysis?
- Analysis was trustworthy, reliable and valid?

## Appendix 5.1: Reviewed studies

| **Study overview** | |
|---|---|
| Title | Agricultural trade liberalization and food security in Nigeria |
| Authors | Abdullateef U, Ijaiya AT |
| Publication outlet | *Journal of Economics and International Finance* |
| Year of publication | 2010 |
| Volume/pages | 2(12): 299-307 |
| Publication category | Peer-reviewed journal |
| **Details** | |
| Country/region focus | Nigeria |
| Quantitative? | Yes |
| Methodology | CGE model, econometric |
| *Ex ante/ex post study* | *Ex post* |
| Data period | 1981-2005 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | National |
| Food security metric | Total quantity of food requirement, food utilization |
| Trade reform characteristics | End of export duties |
| Other trade/macro/policy controls? | Exchange rate policies liberalised |
| Data source | ADB, Central Bank of Nigeria, Federal Office of Statistics |
| Sample size (where given) | |
| Controls | Modelling of total food requirement v. domestic food requirement v. import, v. export and consumer price index |
| **Evidence** | |
| Stated objective | Examine effects of ATL on FS in Nigeria |
| Key insights | Liberalisation did not impact development of the agriculture sector, and major policy efforts did not address the fundamental problem of food production, and hence food requirement and utilization. |
| Effect on food security metric | Decrease |
| Comments on trade/food security mechanisms? | Open trade encourages export of food from a net food importer, and has the tendency to further reinforce food insecurity. |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 7 |

ADB = African Development Bank. ATL = agricultural trade liberalization. FS = food security

| **Study overview** | |
|---|---|
| Title | *Household efforts in poverty alleviation in northern Uganda with respect to agriculture under structural adjustment program: the case of Arua District* |
| Authors | Adebua A, Odwee JJAO, Okurut FN, Okee Obong JB |
| Publication outlet | NURRU Publications |
| Year of publication | 2002 |
| Volume/pages | No. 14 |
| Publication category | Working paper |
| **Details** | |
| Country/region focus | Uganda |
| Quantitative? | Qualitative |
| Methodology | Survey |
| *Ex ante/ex post study* | *Ex post* |
| Data period | Before and after 1980 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | No |
| Household/national | Household |
| Food security metric | Individual food production |
| Trade reform characteristics | Exchange rate liberalisation, reduced import subsidies |
| Other trade/macro/policy controls? | Less state involvement in marketing |
| Data source | Survey |
| Sample size (where given) | 400 households |
| Controls | Not given |
| **Evidence** | |
| Stated objective | Has household FS changed since structural adjustment programme? |
| Key insights | 82.0% of survey respondents produced enough food before SAP, 10.7% after. |
| Effect on food security metric | Decrease |
| Comments on trade/food security mechanisms? | |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 0 |
| Are the findings clear? | 0 |
| Control/counterfactual analysed | 0 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 3 |

FS = food security. SAP = Structural Adjustment Program.

| **Study overview** | |
|---|---|
| Title | Cameroon |

| | |
|---|---|
| Authors | Bamou E, Tchanou JP, Mkouonga FH, Njinkeu D |
| Publication outlet | FAO |
| Year of publication | 2006 |
| Volume/pages | *Trade-related reforms and food security: country case studies* (Thomas H, ed.): 121-143 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | Cameroon |
| Quantitative? | Yes |
| Methodology | Before/after |
| *Ex ante/ex post study* | *Ex post* |
| Data period | 1994-2000, post URAA |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | Household and national |
| Food security metric | Per capita food supply, malnutrition |
| Trade reform characteristics | Removal of quantitative restrictions, lower input subsidies and import controls, reduced tariffs |
| Other trade/macro/policy controls? | Reform of banking sector |
| Data source | MINEFI/DSCN, MINAGRI/DEPA (1992) and World Bank Database |
| Sample size (where given) | |
| Controls | Decomposition of change in domestic price v. change in world price v. change in real effective exchange rate v. other changes |
| **Evidence** | |
| Stated objective | Impacts of trade reforms on FS |
| Key insights | Severe child undernourishment rose from 3% to 6.4%, 1991 to 2001. Undernourished increased by 0.1 million, but 25% population growth, and proportion undernourished fell 6%. 5.5% rise in per capita (p.c.) availability of calories 1992-2001. Food imports: agricultural exports ratio declined and total supply of key commodities rose, p.c. food supply decreased. |
| Effect on food security metric | Mixed: decreased (household); increased (national) |
| Comments on trade/food security mechanisms? | Increase in rural malnutrition was consistent with improvement in national FS indicators being linked to wider economic growth rather improved agricultural performance. |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security. URAA = Uruguay Round Agreement on Agriculture.

*What is the evidence of the impact of agricultural trade liberalisation on food security in developing countries? A systematic review*

| **Study overview** | |
|---|---|
| Title | Has trade liberalization improved food availability in developing countries? An empirical analysis |
| Authors | Bezuneh M, Yiheyis Z |
| Publication outlet | *International Association of Agricultural Economists Conference*, Beijing, China,16-22 August 2009 |
| Year of publication | 2009 |
| Volume/pages | |
| Publication category | Conference paper |
| **Details** | |
| Country/region focus | Developing countries |
| Quantitative? | Yes |
| Methodology | Econometric |
| *Ex ante/ex post study* | *Ex post* |
| Data period | 1980-2000 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | National |
| Food security metric | Per capita daily dietary energy supply |
| Trade reform characteristics | Not specified (follows Li 2003) |
| Other trade/macro/policy controls? | |
| Data source | FAO |
| Sample size (where given) | |
| Controls | Co-determinants of DES level of per capita real GDP 10, irrigated land as a percentage of crop land, the price of imported foods, foreign reserves in months of imports, and political instability |
| **Evidence** | |
| Stated objective | To examine empirically the effect of TL on food availability in selected developing countries |
| Key insights | TL exerts negative short-run effect on food availability and energy supply, followed by small positive, overall effect not statistically significant. |
| Effect on food security metric | Decrease |
| Comments on trade/food security mechanisms? | |
| Other observations? | Increasing domestic/local production is more important. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 0 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

DES - dietary energy supplies TL = trade liberalisation.

| **Study overview** | |
|---|---|
| Title | India |
| Authors | Chand R, Praduman K |
| Publication outlet | FAO |
| Year of publication | 2006 |
| Volume/pages | *Trade-related reforms and food security: country case studies* (Thomas H, ed.): 329-364 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | India |
| Quantitative? | Yes |
| Methodology | Before/after comparison |
| *Ex ante/ex post study* | *Ex post* |
| Data period | 1991-2001 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | Household and national |
| Food security metric | Calorie intake |
| Trade reform characteristics | Exchange rate devaluation, improvement in the terms of trade. |
| Other trade/macro/policy controls? | Fiscal deficit reduction, dismantling foreign capital barriers, changes in industrial policy, and financial sector and capital market reform, reduced implicit bias against agriculture in protection |
| Data source | Indian Ministry of Agriculture |
| Sample size (where given) | |
| Controls | PD analysis of extent of PT from international markets to domestic markets and the relative effect on domestic prices of changes in exchange rate, international prices, trade protection |
| **Evidence** | |
| Stated objective | Impacts of trade reforms on FS |
| Key insights | Undernourishment fell 4% between 1992 and 2011, and per capita (p.c.) calorie intake rose by 5%. However, p.c. income of rural households rose but no reduction in calorie and protein deficiency, as p.c. intake of cereals declined. Increase in real procurement and market prices of cereals, and in public stockholding. Consumer prices rose, impacting p.c. consumption. |
| Effect on food security metric | Mixed |
| Comments on trade/food security mechanisms? | Rise in real prices of cereals resulted in decline in cereal consumption. |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

PD = price decomposiition PT = price transmission FS = food security.

| **Study overview** | |
|---|---|
| Title | Trade impact on food security: analysis on farm households in rural China |
| Authors | Chang M, Sumner DA |
| Publication outlet | *American Agricultural Economics Association Annual Meetings*, Denver, Colorado, USA, 1-4 August 2004 |
| Year of publication | 2004 |
| Volume/pages | |
| Publication category | Conference paper |
| **Details** | |
| Country/region focus | China |
| Quantitative? | Yes |
| Methodology | Econometric |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 1991-2000 |
| Product/sector coverage | Agriculture, grain |
| Food security main focus of study? | Yes |
| Household/national | Household |
| Food security metric | Household rice consumption |
| Trade reform characteristics | Border liberalisation |
| Other trade/macro/policy controls? | |
| Data source | China's State Market Administration Bureau, author survey |
| Sample size (where given) | 1200 households |
| Controls | (i) TL plus mean of the price distribution shifts downward and no change in the spread, and (ii) and (iii) when the spread also changes |
| **Evidence** | |
| Stated objective | Effect of increased trade on household FS |
| Key insights | Opening the border to grain importing will lower the domestic price, improving FS for rural farm households, and increasing rice consumption. Most Chinese farmers derive most their income from sources other than grain, and buy grain. |
| Effect on food security metric | Increase |
| Comments on trade/food security mechanisms? | TL causes downward shifting of price distribution -+ve or –ve depending on assumptions. |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 7 |

FS = food security. TL = trade liberalisation.

| **Study overview** | |
|---|---|
| Title | Achieving food security in China: implications of World Trade Organization accession |
| Authors | Chen CL, Duncan R |
| Publication outlet | Australian Centre for International Agricultural Research (ACIAR) |
| Year of publication | 2008 |
| Volume/pages | ACIAR Technical Reports 69 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | China |
| Quantitative? | Yes |
| Methodology | CGE model |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 2000 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | Household and national |
| Food security metric | Self sufficiency |
| Trade reform characteristics | Tariff reductions |
| Other trade/macro/policy controls? | |
| Data source | CERD |
| Sample size (where given) | |
| Controls | Trade balance fixed/unfixed |
| **Evidence** | |
| Stated objective | To study impacts of TL on FS |
| Key insights | Overall food self-sufficiency declines by -1.548%. A slight reduction in grain self-sufficiency -0.063%, with regional variations, and worst impacts for rural areas. China would gain from lower import prices, and raised GDP. |
| Effect on food security metric | Decrease |
| Comments on trade/food security mechanisms? | The distinction between self-sufficiency and FS is noted, with the argument that FS is more important. |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 0 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security. TL = trade liberalisation.

| **Study overview** | |
|---|---|
| Title | Malawi |
| Authors | Chirwa EW, Zakeyo C |
| Publication outlet | FAO |

*What is the evidence of the impact of agricultural trade liberalisation on food security in developing countries? A systematic review*

| | |
|---|---|
| Year of publication | 2006 |
| Volume/pages | *Trade-related reforms and food security: country case studies* (Thomas H, ed.): 399-433 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | Malawi |
| Quantitative? | Yes |
| Methodology | Before/after comparison |
| *Ex ante/ex post study* | *Ex post* |
| Data period | 1987-2000 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | Household and national |
| Food security metric | Nutritional status |
| Trade reform characteristics | Removal of trade barriers, price liberalisation |
| Other trade/macro/policy controls? | Deregulation of agricultural marketing activities and smallholder crop production, removal of fertilizer subsidies by -92, currency devaluation |
| Data source | Reserve Bank of Malawi, IMF, FAO, Centre for Social Research, Malawi Nat. Statistical Office |
| Sample size (where given) | |
| Controls | Decomposition of real domestic prices into real world price effect, exchange rate effect and other factors |
| **Evidence** | |
| Stated objective | Impacts of trade reforms on FS |
| Key insights | Food and nutrient supply per capita increased. Little impact on FS of rural households. Real expenditures and incomes declined; marginal increase in child nutritional status. 16% decline in proportion undernourished from 1992-2001. Calorie intake/day declined 17% (1982-92) and rose 15% (1992-2001). |
| Effect on food security metric | Mixed |
| Comments on trade/food security mechanisms? | Real prices for tradable commodities fell; exchange rate change had a positive impact, offset by the negative effects of international prices and poor mix of other economic policies. |
| Other observations? | The reform process did not recognize the need for additional policies to complement market liberalization and compensate for its more serious effects. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security.

| **Study overview** | |
|---|---|
| Title | *Food policy liberalization in Bangladesh: how the government and the markets delivered?* |
| Authors | Chowdhury N, Farid N, Roy D |
| Publication outlet | IFPRI |
| Year of publication | 2006 |
| Volume/pages | MTID DP 92 |
| Publication category | Discussion paper |
| **Details** | |
| Country/region focus | Bangladesh |
| Quantitative? | Yes |
| Methodology | Before/after, and CGE model |
| *Ex ante/ex post study* | *Ex post, ex ante* |
| Data period | 1988-2000 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | No |
| Household/national | Household and national |
| Food security metric | Food consumption, caloric intake |
| Trade reform characteristics | Tariffs reduced |
| Other trade/macro/policy controls? | |
| Data source | BBS Household Expenditure Survey |
| Sample size (where given) | |
| Controls | Multi-market model of Bangladesh with upper and lower bounds of the estimates of the effect of multilateral TL |
| **Evidence** | |
| Stated objective | |
| Key insights | Food grain consumption has risen post TL. Per capita consumption of all cereals declined during 1992-2000 from 185 to 170 kg, but could be change in preference. Calorie intake: decline between 0 and 68 calories per day. |
| Effect on food security metric | Mixed |
| Comments on trade/food security mechanisms? | |
| Other observations? | Increase in food grain observed, but decrease in calorie intake predicted, particularly for urban poor and landless. |
| **Criteria scores** | |
| Are the aims clear? | 0 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 0 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 5 |

TL = trade liberalisation.

| **Study overview** | |
|---|---|
| Title | Senegal |
| Authors | Diagne A, Cabral FJ, Ndiaye BO, Danskh M, |

| | |
|---|---|
| | Sane M |
| Publication outlet | FAO |
| Year of publication | 2006 |
| Volume/pages | *Trade-related reforms and food security: country case studies* (Thomas H, ed.): 539-558 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | Senegal |
| Quantitative? | Yes |
| Methodology | Before/after |
| *Ex ante/ex post study* | *Ex post* |
| Data period | 1998-2000 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | Household and national |
| Food security metric | Food insecurity threshold (food expenditure allowing 2,400 calories a day per adult-equiv.) |
| Trade reform characteristics | Reduction of input and production subsidies and liberalization of agricultural markets |
| Other trade/macro/policy controls? | Reform of the price system to encourage the substitution of local cereals for imported cereals |
| Data source | Enquête sur les priorités and Enquête sénégalaise auprès des ménages surveys |
| Sample size (where given) | |
| Controls | Decomposition analysis of variation of real domestic producer price, Variation in world price, in exchange rate and changes in policies |
| **Evidence** | |
| Stated objective | Impacts of trade reforms on FS |
| Key insights | Food-insecure households declined from 42.5% in 1992 to 34.3% in 1995. Food balance improved between 1988-90 and 1998-2000. Daily per capita consumption of calories increased by 1.96%. Local production contribution to cereal requirements was 59% in 1980-1983 but 50% in 1994-2000. 1% increase in proportion undernourished from 1992-2001. |
| Effect on food security metric | Increase |
| Comments on trade/food security mechanisms? | Growth of supply not met growth in demand created by population growth (25% in 1992-2001). Changes in domestic marketing systems and inputs complicate analysis of TL effects. |
| Other observations? | Rural households more food-insecure, as are households headed by women. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security. TL = trade liberalisation.

| **Study overview** | |
|---|---|
| Title | *Tell me where it hurts an' I'll tell you who to call: industrialized countries' agricultural policies and developing countries* |
| Authors | Diao XS, Diaz-Bonilla E, Robinson S, Orden D |
| Publication outlet | IFPRI |
| Year of publication | 2005 |
| Volume/pages | |
| Publication category | Discussion paper |
| **Details** | |
| Country/region focus | Global |
| Quantitative? | Yes |
| Methodology | CGE model |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 1997 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | No |
| Household/national | National |
| Food security metric | Agricultural consumption |
| Trade reform characteristics | Doha Round (elimination of protection and subsidies) |
| Other trade/macro/policy controls? | |
| Data source | GTAP |
| Sample size (where given) | |
| Controls | (i) Elimination of protection and subsidies only in the USA (and Canada); (ii) only in the EU (and EFTA); (iii) only in Japan (with Korea); (iv) in all industrialized countries at the same time, but not developing countries; (v) in all countries in the world |
| **Evidence** | |
| Stated objective | Impact of industrial country TL on agriculture in developing countries |
| Key insights | Most developing countries become more food-secure, but some are disadvantaged by TL by developed countries, unless the developing countries liberalise too. Extent of technical innovation is key, in influencing consumption. |
| Effect on food security metric | Mixed |
| Comments on trade/food security mechanisms? | When only industrialized countries liberalize their agricultural policies there is more production of agricultural and food processed goods in developing countries. |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 0 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

EFTA = European Free Trade Association. EU = European Union. TL = trade liberalisation.

| **Study overview** | |
|---|---|
| Title | Would developing countries benefit from agricultural trade liberalization in OECD countries? |
| Authors | Frohberg K, Fischer G, Parikh KS |
| Publication outlet | *Agricultural trade liberalization: implications for developing countries* (I. Goldin and O. Knudsen, eds.) OECD |
| Year of publication | 1990 |
| Volume/pages | 225-258 |
| Publication category | Book chapter |
| **Details** | |
| Country/region focus | Developing countries |
| Quantitative? | Yes |
| Methodology | General equilibrium model |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 1981-2000 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | No |
| Household/national | National |
| Food security metric | Per capita calorie consumption |
| Trade reform characteristics | Tariff removal (liberalisation by OECD countries) |
| Other trade/macro/policy controls? | |
| Data source | Basic Linked System IIASA |
| Sample size (where given) | |
| Controls | Comparison of all OECD TL, European Community alone TL or USA alone TL |
| **Evidence** | |
| Stated objective | Would developing countries benefit from ATL in OECD countries? |
| Key insights | Under unilateral liberalisation in OECD countries, higher food prices mean lower calorie intake in most developing countries:. -0.1% by 2005 and by -0.3% 2010. USA liberalisation would have little effect. |
| Effect on food security metric | Decrease |
| Comments on trade/food security mechanisms? | Liberalisation would raise world prices. |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 7 |

ATL = agricultural trade liberalisation. TL = trade liberalisation.

| **Study overview** | |
|---|---|
| Title | China's accession to the World Trade Organization: what is at stake for agricultural markets? |
| Authors | Fuller F, Beghin J, De Cara S, Fabiosa J, Cheng F, Matthey H |
| Publication outlet | *Review of Agricultural Economics* |
| Year of publication | 2003 |
| Volume/pages | 25(2): 399-414 |
| Publication category | Peer-reviewed journal |
| **Details** | |
| Country/region focus | China |
| Quantitative? | Yes |
| Methodology | PEM |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 2003-2010 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | No |
| Household/national | National |
| Food security metric | Food consumption, prices |
| Trade reform characteristics | Reduced tariffs |
| Other trade/macro/policy controls? | |
| Data source | Food and Agricultural Policy Research Institute |
| Sample size (where given) | |
| Controls | With and without tariff changes |
| **Evidence** | |
| Stated objective | Impact of WTO accession on agricultural markets |
| Key insights | Total rice consumption in China declines by 0.5% - 2005-2010. Following accession, revenues decline in China's livestock, grain, and oilseed industries, while cotton production prospers despite increased imports. Chinese consumers benefit from lower food prices, with vegetable oil, dairy, and meat consumption increasing significantly. |
| Effect on food security metric | Increase |
| Comments on trade/food security mechanisms? | |
| Other observations? | No significant drop in self-sufficiency. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 0 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

WTO = World Trade Organization.

| **Study overview** | |
|---|---|
| Title | The Uruguay Round Agreement on Agriculture: food security implications for developing countries |
| Authors | Greenfield J, De Nigris M, Konandreas P |
| Publication outlet | *Food Policy* |
| Year of publication | 1996 |
| Volume/pages | 21 (4/5), 365-375 |
| Publication category | Peer-reviewed journal |
| **Details** | |
| Country/region focus | Global |
| Quantitative? | Yes |
| Methodology | PEM |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 2000 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | National |
| Food security metric | Consumption of food |
| Trade reform characteristics | Import tariffs (Uruguay Round) |
| Other trade/macro/policy controls? | |
| Data source | FAO World Food Model |
| Sample size (where given) | |
| Controls | With and without Uruguay Round changes |
| **Evidence** | |
| Stated objective | FS implications of Uruguay Round |
| Key insights | The FS prospects of developing countries as measured in food consumption are largely determined by underlying factors which the Uruguay Round would not alter to any substantial degree, but vary from food product to product. The impact of the round on food import bills of developing countries and low-income food-deficit countries would be 15% and 14% respectively. |
| Effect on food security metric | No effect |
| Comments on trade/food security mechanisms? | Increased production usually leads to reduced net imports. |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 7 |

FS = food security.

| **Study overview** | |
|---|---|
| Title | Trade liberalization and China's food economy in the 21st century: implications to China's national food security |
| Authors | Huang JK, Chen CL, Rozelle S |
| Publication outlet | Conference paper |
| Year of publication | 1999 |
| Volume/pages | *China's Agricultural Trade and Policy: Issues, Analysis, and Global Consequences*, San Francisco, California, USA, 25–26 June 1999 |
| Publication category | Conference paper |
| **Details** | |
| Country/region focus | China |
| Quantitative? | Yes |
| Methodology | CAPSiM is a PEM, or sector-wise general equilibrium model |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 1995-2020 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | National |
| Food security metric | Food consumption, grain self-sufficiency |
| Trade reform characteristics | Tariffs, export subsidies, trade barriers |
| Other trade/macro/policy controls? | |
| Data source | CAPSiM, State Statistic Bureau, China Foreign Economic Statistical Yearbook, various issues; China' Customs Statistics, various issues; China Statistical Yearbook (with corrections) |
| Sample size (where given) | |
| Controls | Current tariff regime v. free trade or free trade plus productivity enhancement investment |
| **Evidence** | |
| Stated objective | Implications of TL for FS in China |
| Key insights | While grain self-sufficiency will rise after an initial fall, it will be lower under free trade than under baseline assumptions. Total grain consumption will rise 2.69% per year v. 1.6% baseline. |
| Effect on food security metric | Mixed |
| Comments on trade/food security mechanisms? | Grain market prices will decline under free trade, except for rice. |
| Other observations? | Investment in R&D and agricultural productivity most effective policy to increase FS. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 7 |

FS = food security. TL = trade liberalisation.

| **Study overview** | |
|---|---|
| Title | Impacts of trade liberalization on agriculture and poverty in China |
| Authors | Huang JK, Rozelle S, Xu ZG, Li NH |
| Publication outlet | *Seminar organised by the Venture Trust and the Centre for Applied Economics and Policy Studies*, Massey University, New Zealand |
| Year of publication | 2005 |
| Volume/pages | Agricultural Policy Discussion Paper No. 18 |
| Publication category | Discussion paper |
| **Details** | |
| Country/region focus | China |
| Quantitative? | Yes |
| Methodology | PEM |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 2001-2010 |
| Product/sector coverage | Agriculture |
| Household/national | Household and national |
| Food security main focus of study? | No |
| Food security metric | Per capita food consumption |
| Trade reform characteristics | Reduction of tariffs |
| Other trade/macro/policy controls? | |
| Data source | CAPSiM, China's National Statistical Bureau and China's Custom Authority |
| Sample size (where given) | |
| Controls | No change v. WTO tariff proposals |
| **Evidence** | |
| Stated objective | Impact of TL on agriculture and poverty |
| Key insights | Real food consumption at constant prices to decline by about 1% in 2005 and 2% in 2010 due to TL. Per capita food consumption of importable commodities rises as their prices fall with TL while per capita food consumption of the exportable commodities will decline. |
| Effect on food security metric | Decrease |
| Comments on trade/food security mechanisms? | The shift in prices due to TL will change incentives for agricultural producers. Relative prices of domestic agricultural commodities vary because the impacts of trade policy differ among commodities. |
| Other observations? | Most farmers will benefit; regional variations in benefits. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 7 |

FS = food security. TL = trade liberalisation. WTO = World Trade Organization.

| **Study overview** | |
|---|---|
| Title | China |
| Authors | Huang JK, Rozelle S, Ni HX, Li NH |
| Publication outlet | FAO |
| Year of publication | 2006 |
| Volume/pages | *Trade-related reforms and food security: country case studies* (Thomas H, ed.): 183-222 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | China |
| Quantitative? | Yes |
| Methodology | Before/after and PEM |
| *Ex ante/ex post study* | *Ex post and ex ante* |
| Data period | 1985-2001 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | Household and national |
| Food security metric | Food intake, malnutrition |
| Trade reform characteristics | Decline in tariffs and border taxes |
| Other trade/macro/policy controls? | Devaluation of the exchange rate, the expansion of special economic zones, marketing policies |
| Data source | CAPSiM, NSBC, Statistical Yearbook and Rural Statistical Yearbook |
| Sample size (where given) | |
| Controls | Model aims to separate effects of trade liberalisation and domestic policy reform |
| **Evidence** | |
| Stated objective | Impacts of trade reforms on FS |
| Key insights | Major improvement in FS at national and household level. Sharp falls in poverty rates have dramatically improved household FS, malnutrition has dropped. More due to domestic than TP, which has had positive and negative effects. Less impact on aggregate production and consumption, Undernourished fallen by 6% 1992-2001, and calorie intake per day up 10%. |
| Effect on food security metric | Increase |
| Comments on trade/food security mechanisms? | TP reforms have had powerful structural change impacts, moving the country towards sectors in which it has a comparative advantage. |
| Other observations? | Both trade and domestic reforms have been important and followed a gradual approach that appears to have worked well. Changes in TP affected domestic agricultural production and FS less than domestic policy reform. Future TL will affect poor farmers negatively through lower prices. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 7 |

FS = food security. TL = trade liberalisation. TP = trade policy. WTO = World Trade Organization.

| **Study overview** | |
|---|---|
| Title | The implications of world trade liberalization on agricultural trade and food security: a case study of Sudan |
| Authors | Karim IAAE, Kirschke D |
| Publication outlet | *25th International Conference of Agricultural Economists*, 16-22 August 2003, Durban, South Africa |
| Year of publication | 2003 |
| Volume/pages | |
| Publication category | Conference paper |
| **Details** | |
| Country/region focus | Sudan |
| Quantitative? | Yes |
| Methodology | Multi-market PEM |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 1995- Post URAA |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | National |
| Food security metric | Self-sufficiency ratio, per capita consumption and the ratio of total exports to food imports |
| Trade reform characteristics | Free trade |
| Other trade/macro/policy controls? | Price increases, increased price of production |
| Data source | Not specified |
| Sample size (where given) | |
| Controls | World market price changes scenario (direct impact) and higher cost scenario (direct and indirect impact), with and without TL |
| **Evidence** | |
| Stated objective | Impact of international ATL on FS |
| Key insights | Liberalisation, through higher world price would improve self-sufficiency ratio, per capita consumption (approx. 1%) and ratio of total exports to food imports. However, a higher cost of production would reverse this. |
| Effect on food security metric | Increase |
| Comments on trade/food security mechanisms? | Free trade increases production, trade, national income, national FS and welfare. |
| Other observations? | A self-sufficiency policy in cereals could be detrimental to FS. Domestic policy environment matters very much. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 7 |

ATL – agricultural trade liberalisation. FS = food security. URAA = Uruguay Round Agreement on Agriculture

| **Study overview** | |
|---|---|
| Title | Tanzania |
| Authors | Musonda FM, Wanga GG |
| Publication outlet | FAO |
| Year of publication | 2006 |
| Volume/pages | *Trade-related reforms and food security: country case studies* (Thomas H, ed.): 559-586 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | Tanzania |
| Quantitative? | Yes |
| Methodology | Before/after comparison |
| *Ex ante/ex post study* | *Ex post* |
| Data period | 1981-2000 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | Household and national |
| Food security metric | Per capita intake |
| Trade reform characteristics | Removal of quantitative restrictions, tariff reduction and rationalisation |
| Other trade/macro/policy controls? | End of price control, currency valuation |
| Data source | United Republic of Tanzania, Economic Survey, FAO |
| Sample size (where given) | |
| Controls | Decomposition of producer prices, border prices and exchange rate |
| **Evidence** | |
| Stated objective | Impacts of trade reforms on FS |
| Key insights | Population below food poverty line fell from 22% to 19%, 1991-2001 for basic needs poverty line, from 39 to 36%. Rural poverty, though greater, has fallen. Overall reduction small. Malnutrition in under 5s up 4% and life expectancy down by 8%. Per capita daily calorie intake down from 2,146 in 1988-90 to 1,916 in 1998-2000. Protein and fat intake also declined. Some households reported improved FS through improved earnings and access to cheap imported foods, others reported worsening. Proportion undernourished up 8% 1992-2001 and calories per capita down 5%. |
| Effect on food security metric | Decrease |
| Comments on trade/food security mechanisms? | Real producer prices have fallen due to exchange rate changes, with impacts on production. |
| Other observations? | Adverse climatic events such as El Niño rainfalls hindered FS. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security.

| **Study overview** | |
|---|---|
| Title | Kenya |
| Authors | Nyangito HO, Nzuma J, Ommeh H, Mbithi M |
| Publication outlet | FAO |
| Year of publication | 2006 |
| Volume/pages | *Trade-related reforms and food security: country case studies* (Thomas H, ed.): 365-397 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | Kenya |
| Quantitative? | Yes |
| Methodology | Before/after comparison |
| *Ex ante/ex post study* | *Ex post* |
| Data period | 1980-2000 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | Household and national |
| Food security metric | Malnutrition, food consumption, self-sufficiency ratio |
| Trade reform characteristics | Quantitative restrictions and reduction in tariffs, elimination of non-tariff barriers |
| Other trade/macro/policy controls? | Input policy reform, exchange rate reform and the liberalization of interest rates |
| Data source | Republic of Kenya, Statistical Abstracts, FAO |
| Sample size (where given) | |
| Controls | Decomposition of the sources of change in domestic prices, world prices and exchange rates |
| **Evidence** | |
| Stated objective | Impacts of trade reforms on FS |
| Key insights | Despite strategic food reserves, FS has deteriorated, with increasing malnutrition. Proportion undernourished down 7% 1992-2001, but protein per person down 14%, while calorie intake up 6%. |
| Effect on food security metric | Decrease |
| Comments on trade/food security mechanisms? | Policy reforms have helped macroeconomic stability, but not growth in the agricultural sector. Poor coordination and sequencing of reforms impacted effectiveness. Drought and rising world food prices have impacted FS. |
| Other observations? | Domestic support needed to develop agriculture sector. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security.

| **Study overview** | |
|---|---|
| Title | Ghana |
| Authors | Oduro AD, Kwadzo GTM |
| Publication outlet | FAO |
| Year of publication | 2006 |
| Volume/pages | *Trade-related reforms and food security: country case studies* (Thomas H, ed.): 223-264 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | Ghana |
| Quantitative? | Yes |
| Methodology | Before/after |
| *Ex ante/ex post study* | *Ex Post* |
| Data period | 1980-2000 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | Yes |
| Household/national | Household and national |
| Food security metric | Underweight, food import |
| Trade reform characteristics | Tariff reduction |
| Other trade/macro/policy controls? | Exchange rate, input subsidies |
| Data source | Ghana Statistical Service |
| Sample size (where given) | |
| Controls | Changes in real price, change in world price, change in real exchange rate, trade policy and residuals |
| **Evidence** | |
| Stated objective | Impacts of trade reforms on FS |
| Key insights | National level FS improved - food imports declined as a share of total exports between 1992 and 1996, but then reversed, though remaining below the 1992 level. Decline in underweight children, increased in 5 regions. Poverty declined from 51.9% in 1991/92 to 39.5% in 1998/99, but not all regions benefited. Proportion undernourished down 23% 1992-2001, calorie availability up 26%. |
| Effect on food security metric | Improved, then declined |
| Comments on trade/food security mechanisms? | Liberalisation failed to improve price incentives for food crop farmers. |
| Other observations? | Food prices went up, because of return of emigrants from Nigeria, and drought and bush fires. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security.

| **Study overview** | |
|---|---|
| Title | *Agricultural policies in emerging and transition economies 2000* |
| Authors | OECD |
| Publication outlet | OECD |
| Year of publication | 2000 |
| Volume/pages | |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | China |
| Quantitative? | Yes |
| Methodology | PEM |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 1999-2005 |
| Product/sector coverage | Agriculture |
| Food security main focus of study? | No |
| Household/national | National |
| Food security metric | Food prices, income spent on food |
| Trade reform characteristics | Reduced tariffs |
| Other trade/macro/policy controls? | Domestic policy reform, and higher GDP growth |
| Data source | Eglin model, World Bank and State Statistical Bureau, AgLink |
| Sample size (where given) | |
| Controls | Compare (i) higher income growth, (ii) no wheat tariff-rate quotas (TRQ) , or (iii) no TRQ of any kind, (ii) and (iii) both with higher GDP |
| **Evidence** | |
| Stated objective | Impact of TL on FS |
| Key insights | Falling wheat prices would mean more to spend on food - real income effect of 1%. |
| Effect on food security metric | Increase |
| Comments on trade/food security mechanisms? | |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 0 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security. TL = trade liberalisation.

| **Study overview** | |
|---|---|
| Title | *The medium-term impacts of trade liberalisation in OECD countries on the food security of non-member economies* |
| Authors | OECD Joint Working Party on Agriculture and Trade |
| Publication outlet | OECD |
| Year of publication | 2002 |
| Volume/pages | |
| Publication category | Working paper |
| **Details** | |
| Country/region focus | Developing countries (non-OECD) |
| Quantitative? | Yes |
| Methodology | Partial and general equilibrium models |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 1997 |
| Product/sector coverage | Agriculture |

| | |
|---|---|
| Food security main focus of study? | Yes |
| Household/national | National |
| Food security metric | Food availability |
| Trade reform characteristics | Reduction in tariffs (OECD only or multilateral) |
| Other trade/macro/policy controls? | |
| Data source | GTAP/AgLink |
| Sample size (where given) | |
| Controls | Comparing no TL, OECD only or international tariff changes, with or without processed food sectors |
| **Evidence** | |
| Stated objective | |
| Key insights | OECD unilateral liberalisation causes average food availability and food access decrease by about 1% while food stability is mixed but often marginally positive.<br>For Uruguay Agreement extension, consumption per capita change: 0.2% to -0.3%.<br>OECD liberalisation, ag only 0.2% to 0.3%<br>OECD all sectors -0.1% to 0.9%<br>All countries, all sectors -0.1 to 1.3%<br>URAA extension by All countries and all sectors, -0.1 to 1.2%. |
| Effect on food security metric | Mixed: Decrease (unilateral) /Increase (multilateral) |
| Comments on trade/food security mechanisms? | Effects are small because many OECD non-members have limited interactions with international markets, and OECD agricultural policies directly affect only a certain set of commodities. |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 0 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

TL = trade liberalisation.

| | |
|---|---|
| **Study overview** | |
| Title | Uganda |
| Authors | Opolot J, Wandera A, Abdalla YA |
| Publication outlet | FAO |
| Year of publication | 2006 |
| Volume/pages | *Trade-related reforms and food security: country case studies* (Thomas H, ed.): 587-615 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | Uganda |
| Quantitative? | Yes |
| Methodology | Before/after comparison |
| *Ex ante/ex post study* | *Ex post* |
| Data period | 1992-2000 |
| Product/sector coverage | Agriculture |
| Food Security Main Focus of Study? | Yes |
| Household/national | Household and national |
| Food security metric | Food consumption, malnutrition |
| Trade reform characteristics | Easing licensing requirements and eliminating quantitative restrictions - tariff reforms and transparency |
| Other trade/macro/policy controls? | Restrictive fiscal policies, exchange rate policy, monetary and credit policies |

| | |
|---|---|
| Data source | Uganda Bureau of Statistics |
| Sample size (where given) | |
| Controls | Decomposition of real domestic price, real international price, real exchange and rate applied tariff |
| **Evidence** | |
| Stated objective | Impacts of trade reforms on FS |
| Key insights | Aggregate per capita availability of calories increased 3% and proportion of undernourished has decreased by 4 % 1992-2001. Food-secure households increased from 60.9% to 71.8% during 1995-2003. Per capita food production has declined, dietary deficiencies have worsened. |
| Effect on food security metric | Increase |
| Comments on trade/food security mechanisms? | Increased agricultural output and total and farm household incomes, but basic food requirements not met. Export earnings don't meet rising import requirement including food, so country is food-insecure at national and household levels. |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security.

| **Study overview** | |
|---|---|
| Title | Nigeria |
| Authors | Oyejide TA, Ogunkola EO, Alaba OB |
| Publication outlet | FAO |
| Year of publication | 2006 |
| Volume/pages | *Trade-related reforms and food security: country case studies* (Thomas H, ed.): 465-501 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | Nigeria |
| Quantitative? | Yes |
| Methodology | Before/after |
| *Ex ante/ex post study* | *Ex post* |
| Data period | 1980-2000 |
| Product/sector coverage | Agriculture |
| Food Security Main Focus of Study? | Yes |
| Household/national | Household and national |
| Food security metric | Undernourished, calorie intake, import dependence |
| Trade reform characteristics | Import tariffs reduced |
| Other trade/macro/policy controls? | Exchange rates changed |
| Data source | Central Bank of Nigeria |
| Sample size (where given) | |
| Controls | Decomposition of exchange rate, world price and trade policy effects on prices |
| **Evidence** | |
| Stated objective | Impact of trade reform on food security |
| Key insights | Undernourished declined from ~25 million in 1979-80 to ~ 7 million in 1998-2000. Daily calorie intake increased. 2000 kcal, before reform, and nearly 2800 after. Decline in the proportion of undernourished from 39% in 1979-80 to 13% in 1990-92 and further to 7% in 1998-2000. Food import dependence fell from 13% of total imports during 1980-82 to 6% during 1989-91, but then rose to 12% 1998-2000. However, domestic food production meets most needs. |
| Effect on food security metric | Increase |
| Comments on trade/food security mechanisms? | Although FS has improved, impact of higher prices on production and investment has been limited, as has application of new technologies. |
| Other observations? | End of oil boom biggest factor in Nigerian economy. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security.

| **Study overview** | |
|---|---|
| Title | *Trade liberalization, poverty, and food security in India* |
| Authors | Panda M, Ganesh-Kumar A |
| Publication outlet | IFPRI Discussion Paper 00930 |
| Year of publication | 2009 |
| Volume/pages | |
| Publication category | Discussion paper |
| **Details** | |
| Country/region focus | India |
| Quantitative? | Yes |
| Methodology | CGE model |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 2003-4 |
| Product/sector coverage | Agriculture |
| Food Security Main Focus of Study? | Yes |
| Household/national | Household |
| Food security metric | Per capita calorie intake |
| Trade reform characteristics | Tariff reduction (unilateral and multilateral) |
| Other trade/macro/policy controls? | |
| Data source | National Sample Survey Organization |
| Sample size (where given) | |
| Controls | Baseline and Doha changes, national and multilateral |
| **Evidence** | |
| Stated objective | |
| Key insights | While the impact is generally positive, GDP growth and income-poverty reduction may not improve FS and/or nutritional status of the poor. Bottom 30% in both rural and urban areas suffer a decline in calorie and protein intake, in contrast to the rest of the population, even as all households increase their intake of fats. |
| Effect on food security metric | Mixed |
| Comments on trade/food security mechanisms? | Outcome depends on relative food price movements and changes in income. |
| Other observations? | Trade policy analysis should consider indicators of FS in addition to overall growth and poverty measures. |
| **Criteria scores** | |
| Are the aims clear? | 0 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security.

| **Study overview** | |
|---|---|
| Title | Trade liberalization and food security in Nepal |
| Authors | Pyakuryal B, Roy D, Thapa YB |
| Publication outlet | *Food Policy* |
| Year of publication | 2010 |
| Volume/pages | 35, 1-43 |
| Publication category | Peer-reviewed journal |
| **Details** | |
| Country/region focus | Nepal |
| Quantitative? | Yes |
| Methodology | Before/after, compared to CGE model |
| *Ex ante/ex post study* | *Ex post* |
| Data period | 1971-2002 |
| Product/sector coverage | Agriculture |
| Food Security Main Focus of Study? | Yes |
| Household/national | National |
| Food security metric | Per capita food availability, extent of malnourishment |
| Trade reform characteristics | Elimination of quantitative restrictions, and reduction and rationalization of tariffs |
| Other trade/macro/policy controls? | Downsized public food distribution system |
| Data source | FAOSTAT, World Bank, Nepal Rastra Bank |
| Sample size (where given) | |
| Controls | Not given |
| **Evidence** | |
| Stated objective | Impacts of TL on FS |
| Key insights | Aggregate indicators of food sufficiency and security (per capita food availability, extent of malnourishment) show improvement since liberalization. |
| Effect on food security metric | Improved (but not in rural areas) |
| Comments on trade/food security mechanisms? | Reallocation of resources away from agriculture leads to decline in production. |
| Other observations? | Spatial integration is important, as demonstrated by greater success in other countries in region. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Control/counterfactual analysed | 0 |
| Are the findings clear? | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security. TL = trade liberalisation.

| **Study overview** | |
|---|---|
| Title | Guatemala |
| Authors | Rodas-Martini P, Cifuentas LG, Pira JP |

*What is the evidence of the impact of agricultural trade liberalisation on food security in developing countries? A systematic review*

| | |
|---|---|
| Publication outlet | FAO |
| Year of publication | 2006 |
| Volume/pages | *Trade-related reforms and food security: country case studies* (Thomas H, ed.): 265-296 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | Guatemala |
| Quantitative? | Yes |
| Methodology | Before/after |
| *Ex ante/ex post study* | *Ex post* |
| Data period | 1980-2001 |
| Product/sector coverage | Agriculture |
| Food Security Main Focus of Study? | Yes |
| Household/national | National |
| Food security metric | Malnutrition |
| Trade reform characteristics | Tariff reduction |
| Other trade/macro/policy controls? | Currency devaluation, elimination of ceiling prices |
| Data source | Economic Commission for Latin America and the Caribbean, Ministry for Economics, National Institute of Statistics of Guatemala |
| Sample size (where given) | 1,334,894 to 2,191,451 households |
| Controls | PD by international prices, change in the rate of exchange and change in other factors |
| **Evidence** | |
| Stated objective | Impacts of trade reforms on FS |
| Key insights | FS improved in 1980s, worsened in 1990s. Malnutrition of children declined throughout the period studied. Proportion undernourished rose 9% 1992-2001, and per capita calorie access fell 8%. |
| Effect on food security metric | Decrease |
| Comments on trade/food security mechanisms? | Price falls were caused by international price falls. Country less reliant on key commodities. |
| Other observations? | Domestic markets still isolated from world markets, adverse climate effects. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security. PD – price decomposition

| **Study overview** | |
|---|---|
| Title | Morocco |
| Authors | Sbai A, Jaoad M, Jakhjoukhi A |
| Publication outlet | FAO |
| Year of publication | 2006 |
| Volume/pages | *Trade-related reforms and food security: country case studies* (Thomas H, ed.): 435-463 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | Morocco |
| Quantitative? | Yes |
| Methodology | Before/after comparison |
| *Ex ante/ex post study* | *Ex Post* |
| Data period | 1984-1999 |
| Product/sector coverage | Agriculture |
| Food Security Main Focus of Study? | ? |
| Household/national | Household and national |
| Food security metric | Poverty |
| Trade reform characteristics | Removal of quotas |
| Other trade/macro/policy controls? | Exchange rate devaluation |
| Data source | Enquête Nivea de Vie au Maroc, Annuaires statistiques du Maroc, FAO |
| Sample size (where given) | |
| Controls | Decomposition of domestic price, change in world price, change in real exchange rate and change in other factors |
| **Evidence** | |
| Stated objective | Impacts of trade reforms on FS |
| Key insights | Poverty fell 1984-91, but rose in 1990s. In 1998/99 22% below the poverty threshold, 13% in 1990/91. However, rural poverty 1998/99 was 29% v. 16% in urban areas. Proportion undernourished rose 1% from 1992-2001, Per capita calorie availability fell 0.1%. |
| Effect on food security metric | Mixed |
| Comments on trade/food security mechanisms? | Poverty fall at end of1980s mainly from rapid growth of informal sector, good agricultural seasons, and strong domestic demand mainly stimulated by increased wages and salaries. |
| Other observations? | Self-sufficiency rose for many products, but not cereals. Poverty affected by population rise. High protection helped larger farmers in high production areas but not small subsistence producers in the semi-arid zones. So protection did not benefit poor or enhance FS. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 0 |
| Do they comment on potential mechanisms? | 0 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 4 |

FS = food security.

| **Study overview** | |
|---|---|
| Title | Impacts of agricultural policy reform on low-income countries |
| Authors | Shapouri S, Trueblood M |
| Publication outlet | *Agricultural policy reform in the WTO — the road ahead* (Burfisher ME, ed.) Market and Trade Economics Division, Economic Research Service, US Department of Agriculture. Agricultural Economic Report No. 802. |
| Year of publication | 2001 |
| Volume/pages | 91-100 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | Low-income countries |
| Quantitative? | Yes |
| Methodology | PEM |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 2000-2010 |
| Product/sector coverage | Agriculture |
| Food Security Main Focus of Study? | Yes |
| Household/national | National |
| Food security metric | Food gaps |
| Trade reform characteristics | Removal of domestic support. Impact of rising food prices, and of full ATL foreign exchange earnings examined in model |
| Other trade/macro/policy controls? | |
| Data source | World Bank, FAO, USDA/ERS |
| Sample size (where given) | 67 countries |
| Controls | No change v. full liberalisation v. full liberalisation plus increased exports |
| **Evidence** | |
| Stated objective | Impact of TL on FS |
| Key insights | TL will slightly reduce food insecurity of low-income, food-deficit countries on average (1% for full liberalisation, 5% for that plus increased exports. For most food-insecure countries domestic food production is most important for FS. For import-dependent countries such as those in North Africa ,the effect will be larger. |
| Effect on food security metric | Increase |
| Comments on trade/food security mechanisms? | Sub-Saharan Africa will gain most through low food-import dependency and high share of agriculture in total exports. |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 0 |
| Do they comment on potential mechanisms? | 0 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 4 |

ATL – agricultural trade liberalisation. FS = food security. TL = trade liberalisation.

| **Study overview** | |
|---|---|
| Title | Guyana |
| Authors | Thomas CY, Bynoe M |
| Publication outlet | FAO |
| Year of publication | 2006 |
| Volume/pages | *Trade-related reforms and food security: country case studies* (Thomas H, ed.): 297-327 |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | Guyana |
| Quantitative? | Yes |
| Methodology | Before/after comparison |
| *Ex ante/ex post study* | *Ex post* |
| Data period | 1970-2000 |
| Product/sector coverage | Agriculture |
| Food Security Main Focus of Study? | Yes |
| Household/national | National and household |
| Food security metric | Calorie intake, undernourished, poverty |
| Trade reform characteristics | Removal of quotas, licences |
| Other trade/macro/policy controls? | End of price control, unified exchange rate |
| Data source | World Bank, Ghana Statistical Bureau, Rapid Assessment Survey |
| Sample size (where given) | |
| Controls | Decomposition of domestic price, change in world price, change in real exchange rate and change in other factors |
| **Evidence** | |
| Stated objective | Impacts of trade reforms on FS |
| Key insights | Overall poverty rates improved, but primarily in urban areas. For 1970-2000 period, the per capita supply of calories was 4% above recommended level. Undernourished people are high for region but proportion has fallen by 7% from 1992 to 2001. |
| Effect on food security metric | Increase |
| Comments on trade/food security mechanisms? | Reforms led to rapid economic growth, apparently improving household welfare. Economic growth has slowed since 1997. Reforms led to a decline in producer prices. |
| Other observations? | Rise in exports exceeded by rise in imports: import reliance deepened. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 0 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 6 |

FS = food security.

| **Study overview** | |
|---|---|
| Title | *Integrated assessment of the impact of trade liberalization: a country study on China's rice sector* |
| Authors | UNEP |
| Publication outlet | UNEP |
| Year of publication | 2005 |
| Volume/pages | |
| Publication category | Institutional report |
| **Details** | |
| Country/region focus | China |
| Quantitative? | Yes |
| Methodology | PEM |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 2001-2010 |
| Product/sector coverage | Rice |
| Food Security Main Focus of Study? | No |
| Household/national | National and household |
| Food security metric | Food consumption |
| Trade reform characteristics | reduced tariffs |
| Other trade/macro/policy controls? | |
| Data source | CAPSiM, NSBC's rural household income and expenditure survey |
| Sample size (where given) | |
| Controls | China's Nominal protection rate (NPR) moves in line with WTO agreement , v. NPR is constant v. no trade reform |
| **Evidence** | |
| Stated objective | |
| Key insights | China real food consumption will decline by about 1% in 2005 and 2% in 2010 due to TL. Food consumption of importable commodities rises, while that of exportables (including rice) fall, along with prices. Grain self-sufficiency will fall but food grain and overall food self-sufficiency will rise. Regional variation, and poor farmers gain much less than rich ones. |
| Effect on food security metric | Decrease |
| Comments on trade/food security mechanisms? | Stimulation of domestic production. |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 7 |

TL = trade liberalisation.

| **Study overview** | |
|---|---|
| Title | *Multilateral trade liberalization and developing countries: a North South perspective on agriculture and processing sectors* |
| Authors | van Meijl H, van Tongeren F |
| Publication outlet | Agricultural Economics Research Institute |
| Year of publication | 2001 |
| Volume/pages | |
| Publication category | Report |
| **Details** | |
| Country/region focus | Global |
| Quantitative? | Yes |
| Methodology | General equilibrium model |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 1997 |
| Product/sector coverage | Agriculture |
| Food Security Main Focus of Study? | Yes |
| Household/national | National and household |
| Food security metric | Food access, primary food purchasing power |
| Trade reform characteristics | Reduction in tariffs |
| Other trade/macro/policy controls? | |
| Data source | GTAP, UN Trade Statistics, OECD PSE |
| Sample size (where given) | |
| Controls | (i) TL in primary products (PP): reduction of all import tariffs (IT) and export subsidies (ES) with 50% in all countries; (ii) TL in PPs and reduction of domestic agricultural support (DAS): as (1) plus 50% cut in input and output subsidies in developed countries; (iii) TL in primary and processed agricultural products and reduction of DAS. All reductions are 50%; (iv) TL in all products and reduction of DAS: in addition to (ii) all IT and ES in non-agricultural sectors are reduced with 50% in all countries; (v) As (iv) plus trade balance of low-income countries is fixed at base year levels. |
| **Evidence** | |
| Stated objective | Effect of TL on developing countries |
| Key insights | Under partial TL, in low and middle income exporting countries, food access index for unskilled workers declines, via increased domestic food prices. In importing countries reverse is seen. Comprehensive TL yields best results for food-insecure countries. |
| Effect on food security metric | Increase |
| Comments on trade/food security mechanisms? | Factor earnings assumed to rise for those production factors that are used relatively intensively in expanding sectors. |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 7 |

TL = trade liberalisation.

| **Study overview** | |
|---|---|
| Title | *Impacts of trade liberalization and market reforms on the rice sector in Sri Lanka* |
| Authors | Weerahewa J |
| Publication outlet | IFPRI |
| Year of publication | 2004 |
| Volume/pages | |
| Publication category | Discussion paper |
| **Details** | |
| Country/region focus | Sri Lanka |
| Quantitative? | Yes |
| Methodology | Econometrically estimated PEM |
| *Ex ante/ex post study* | *Ex ante* |
| Data period | 1979-2000 |
| Product/sector coverage | Agriculture |
| Food Security Main Focus of Study? | Yes |
| Household/national | Household and national |
| Food security metric | Calorie intake |
| Trade reform characteristics | Uruguay Round (tariff reduction) |
| Other trade/macro/policy controls? | Privatization of paddy procurement system |
| Data source | Central Bank of Sri Lanka, FAO |
| Sample size (where given) | |
| Controls | Removal of all border charges v. removal of import duties v. no government purchases |
| **Evidence** | |
| Stated objective | Impact of rice TL on supply of paddy, demand for rice, imports of rice and calorie intake at the national level |
| Key insights | A 33% increase in calorie intake results from removal of all duties, 23%, for removal of import duties. Losses to the paddy producers due to TL can be considerably minimized if oligoposony power can be eliminated simultaneously. |
| Effect on food security metric | Increase |
| Comments on trade/food security mechanisms? | Liberalisation will cause a drop in prices, positively affecting consumers, but not producers. |
| Other observations? | |
| **Criteria scores** | |
| Are the aims clear? | 1 |
| Is methodology clear/appropriate? | 1 |
| Do they isolate an appropriate food security metric? | 1 |
| Do they comment on potential mechanisms? | 1 |
| Are the findings clear? | 1 |
| Control/counterfactual analysed | 1 |
| Does the paper contribute to the synthesis? | 1 |
| **Overall score** | 7 |

TL = trade liberalisation.

**Additional sampling assessment for Adebua et al., 2002.**

| | |
|---|---|
| Population from which sample is drawn | Arua District of northern Uganda |
| How sample was selected | Random sampling |
| Methods of identification of population from whom participants are selected | Random sampling of counties |
| Methods used to identify the participants from this population | Random sampling |
| Planned (a priori) sample size | 400 households |
| Actual sample size | 199 households |
| How people were recruited into study | Interview – however, requests for payment and participants concerned information might be passed to tax inspectors |
| Whether consent was sought, how and from whom | Not clear |
| Data collection methods | Questionnaire survey |
| Types of data collected | Input and output data, opinion on food security |
| Details of data collection methods or tool(s) | Questionnaire survey |
| Who collected the data | 2 interviewers |
| Location of data collected | Unknown |
| How did the study team ensure the data collection methods were trustworthy, reliable and valid | However, limited by gender bias (97% male) and insecurity in area |
| Which methods were used to analyse the collected data | Bivariate analysis, analysis of variance of before/after comparison |
| How did the study team ensure the analysis was trustworthy, reliable and valid | Not explained |
| **Criteria scores** | |
| Appropriate selection of participants | 1 |
| Completeness | 0 |
| Recruitment into study unbiased? | 0 |
| Consent given | 0 |
| Data collection methods suitable | 1 |
| Relevant data | 1 |
| Data collection trustworthy, reliable and valid | 0 |
| Appropriate statistical analysis | 1 |
| Analysis was trustworthy, reliable and valid? | 0 |
| Overall score | 4 |

## Appendix 5.2: Rejected studies

### *A5.2.1 Studies excluded at full text level*

#### ***A5.2.1.1 No before/after data on impacts of trade liberalisation on food security***

Alam MJ, Buysse J, McKenzie AM, Wailes EJ, Van Huylenbroeck G (2010) Linkage between world and domestic prices of rice under the regime of agricultural trade liberalization in Bangladesh. Paper presented at: *Australian Agricultural and Resource Economics Society Conference*. Adelaide, South Australia, 10–12 February. 20 pages

Del Ninno C, Dorosh P (2001) Averting a food crisis: private imports and public targeted distribution in Bangladesh after the 1998 flood. *Agricultural Economics* 25: 337–346.

Del Ninno C, Dorosh PA, Smith LC (2003) Public policy, markets and household coping strategies in Bangladesh: avoiding a food security crisis following the 1998 floods. *World Development* 31(7): 1221–1238.

Diaz-Bonilla E, Thomas M, Robinson S, Cattaneo A (2000) *Food security and trade negotiations in the World Trade Organization: a cluster analysis of country groups.* Washington, DC: International Food Policy Research Institute.

FAO (2003) The state of food insecurity in the world 2003. Monitoring progress towards the World Food Summit and Millennium Development Goals. Rome: Food and Agriculture Organization of the United Nations.

Gayi SK (2007) Does the WTO Agreement on agriculture endanger food security in sub-Saharan Africa? In: Guha-Khasnobis B, Acharya SS, Davis B (eds) *Food security: indicators, measurement, and the impact of trade openness.* Oxford**:** Oxford University Press, pages 239–261.

Hårsmar M (2004) *Heavy clouds but no rain: agricultural growth theories and peasant strategies on the Mossi Plateau, Burkina Faso.* Unpublished doctoral thesis, Department of Rural Development Studies, Swedish University of Agricultural Sciences.

Herath A (2006) Flexible trade policies in agriculture sectors of developing countries: proposing a technical approach for Sri Lanka. Paper presented at: *International Association of Agricultural Economists Conference,* Gold Coast, Queensland, Australia, 12–18 August. 17 pages.

Islam N (1990) *Horticultural exports of developing countries: past performance, future prospects, and policy issues.* Research Report No. 80. Washington, DC: International Food Policy Research Institute.

Konandreas P, Perkins R (1990) Some implications of trade liberalization in cereals for low income food deficit countries. In: Goldin I, Knudsen O (eds) *Agricultural trade liberalization: implications for developing countries.* Paris: Organisation for Economic Co-operation and Development, pages 467–470.

McCalla AF, Nash J (eds) (2007) Reforming agricultural trade for developing countries. Volume 1. Key issues for a pro-development outcome of the Doha Round. Washington, DC: World Bank.

Morisson C (1991) Adjustment, incomes and poverty in Morocco. *World Development* 19(11): 1633–1651.

Morrison J, Sarris A (2007) Determining the appropriate level of import protection consistent with agriculture led development in the advancement of poverty reduction and improved food security. Rome: Food and Agriculture Organization of the United Nations, pages 13–57.

PANAP (2002) Empty promises, empty stomachs - impact of the Agreement on Agriculture (AoA) and trade liberalisation on food security. Penang: Pesticide Action Network Asia and the Pacific (PANAP).

Parikh KS, Fischer G, Frohberg K (1987) *Agricultural trade regimes: impact on sector proportions, real incomes and hunger in the world*. Bombay: Indira Gandhi Institute of Development Research.

Rada N, Regmi A (2010) *Trade and food security: implications from the Indonesian agricultural experience*. Washington DC: United States Department of Agriculture, Economic Research Service.

Sanogo I, Amadou MM (2010) Rice market integration and food security in Nepal: the role of cross-border trade with India. *Food Policy* 35(4): 312–322.

Sarris AH (1993) Cereal stocks and production variability in a liberalized world trade environment. In: Reinsel R (ed) *Managing food security in unregulated markets*. Boulder, Colorado: Westview Press, pages 15–39.

Sassi M (2004) Agricultural trade liberalization and food security: an hypothesis of classification of the developing countries. *Rivista di Economia Agraria* 59(3): 401–423.

Shapouri S (1999) *Food security assessment*. Washington, DC: United States Department of Agriculture, Economic Research Service.

***A5.2.1.2 Focused on market liberalisation rather than trade liberalisation***

Ahmed R, Haggblade S, Chowdhury TE (2000) *Out of the shadow of famine: evolving food markets and food policy in Bangladesh*. Baltimore, Maryland: Johns Hopkins University Press.

Govereh J, Chapoto A, Jayne TS (2008) *Assessment of alternative maize trade and market policy interventions in Zambia*. FSRP Working Paper No. 33. Lusaka: Food Security Research Project.

Jha S, Srinivasan PV (2004) Achieving food security in a cost effective way: implications of domestic deregulation and reform under liberalized trade. Washington, DC: International Food Policy Research Institute.

Jones S (1998) Liberalised food marketing in developing countries: key policy problems. Oxford: Oxford Policy Management.

Kherallah M, Badiane O (1999) Market liberalization and the poor. *Quarterly Journal of Agriculture* 38(4): 341–358.

Orr A, Mwale B, Saiti-Chitsonga D (2001) Market liberalisation, household food security and the rural poor in Malawi. *The European Journal of Development Research* 13(1): 47–69.

Seshamani V (1998) The impact of market liberalisation on food security in Zambia. *Food Policy* 23(6): 539–551.

***A5.2.1.3 No specific original data presented regarding impact of trade liberalisation on food security***

Badiane O (1990) The impact of regional trade liberalization on national food security – the case of Senegal. *American Journal of Agricultural Economics* 72(5): 1364.

Badiane O (2006) *Agricultural trade liberalization under Doha.* DSGD Discussion Paper. Washington DC: International Food Policy Research Institute.

Chilowa W (1998) The impact of agricultural liberalisation on food security in Malawi. *Food Policy* 23(6): 553–569.

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