



Department
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Food prices and poverty

Agriculture and growth evidence paper series

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DFID evidence papers

DFID uses a range of evidence synthesis approaches to address the challenge of providing decision makers with the evidence that they need to make better choices.

The “evidence paper” is an expression of the opinion that DFID has of the existing evidence on a given subject.

This paper, written by staff members of DFID, provides a summary of evidence underpinning a range of debates related to food prices and poverty.

The authors do not attempt to prescribe policy conclusions, which, for DFID, will appear elsewhere. This is not a policy document, and is not meant to represent DFID's policy position.

Executive summary - food prices and poverty

- ❖ **The relationship between international and domestic food prices is highly context specific** and likely to vary both across countries and over time. Econometric evidence suggests that in many cases domestic food prices in developing countries show a large degree of independence from international prices. In particular, in countries with high transport costs to world markets, the difference between import and export parity prices means there can be wide bands of prices where only domestic factors determine the ruling price.
- ❖ **Increases in staple food prices create both winners and losers, across countries, within countries, and amongst the poor.** Empirical studies have found that for most countries the number of poor households that lose out from price increases is typically larger than the number that benefit. Therefore, at least in the short term, food price increases are generally found to result in an increase in the prevalence and depth of poverty. This finding is supported by broad cross-country studies that simulate the impact of a hypothetical increase in staple food prices based on information from household surveys, by empirical studies of changes in welfare following food price spikes, and by a systematic review of food price demand elasticities.
- ❖ Evidence suggests that **second-round responses to food price increases such as upward pressure on unskilled rural wages and changes in household production decisions may reduce a welfare loss**, but is not conclusive. Some simulation studies have found that predicted rural wages increase following increases in food prices. The potential importance of second-round effects is supported by cross country studies failing to find increases in self-reported food insecurity despite rapid increases in food prices.
- ❖ **The impact of high price volatility (variation around the mean) is likely to be lower where there are substitutes with uncorrelated prices.** Several studies find evidence of the poor substituting food types in response to changes in relative prices. One study identified suggests that the negative consequences of price volatility are more serious for net food sellers, who tend to be wealthier. When alternatives are available, net food buyers can react to take advantage of changes in relative prices, whereas sellers must make decisions in advance. In the context of Ethiopia, the study suggests that the benefits from price stabilisation would be concentrated in the upper end of the income distribution and overall stabilisation was found to be an overall regressive policy.
- ❖ Simulations show that **whilst the poverty headcount does tend to rise with increases in staple food prices, the majority of the increase in the poverty gap results from those already below the poverty line getting still poorer.** Consistent with expectations

from theory, there is suggestive evidence that the poor cope with food price volatility by making changes to both the quantity and the type of food they consume.

- ❖ There is broad consensus that **access to land is an important determinant of household ability to benefit from higher food prices**, and to limit the negative consequences of food price shocks.
- ❖ Secondary evidence reviewed suggests that, in practice, the majority of **public food stock schemes have been ineffective at improving food security** outcomes due to unclear and contradictory objectives, high cost crowding out other investment, and discouraging private investment. However, **targeted release of food stocks was found to more cost-effectively improve food security amongst the most vulnerable whilst introducing fewer distortions**.

The agriculture and growth evidence paper series

Agriculture is and will continue to be critical to the futures of many developing countries. This may or may not be because agriculture can contribute directly and/or indirectly to economic growth. But it will certainly be critical because poverty is still predominantly a rural phenomenon and this looks set to remain for the next two decades at least.

The Agriculture and growth evidence paper series has been developed to cover a range of issues that are of most relevance to DFID staff. The first five topics that will be covered by this series are shown below. However, as further issues are identified so further papers will be commissioned.

Agriculture and growth

- *Agricultural growth and the national economy*
- *Agriculture's contribution to economic growth*
- *Agricultural growth and structural transformation*

Food prices and poverty

- *Is there such a thing as an optimum staple food price or food price trend relative to other prices or income?*
- *Food price spikes and poor households*

Agriculture and poverty

- *Agricultural growth and poverty reduction*
- *Agricultural growth vs. growth in other sectors*
- *Value for money of agricultural growth*
- *Contextual influences of agricultural growth and poverty reduction*

Agriculture and the private sector

- *Direct state involvement in agricultural input and output markets.*
- *The role of the public sector in supporting private sector investment*
- *Opportunities for commercialisation of agriculture*

Agriculture and women

- *The impact of agricultural growth on women*
- *The impact of women on agricultural growth*

How to use this paper

The paper is not intended to be a comprehensive overview of all issues relating to food prices and poverty. It concentrates on those areas that are of particular focus for DFID policy and strategy.

The search strategy for the evidence is shown in annex 2. The objective of this search strategy was to identify the range of evidence that is indicative of the body of evidence that underpins the statements that are included throughout this section. The evidence includes qualitative and quantitative evidence from both peer reviewed and grey sources.

All papers directly referred to within this evidence paper are described and assessed (where appropriate) in accordance with the DFID How to note Assessing the strength of evidence (see annex 3 for a summary of appraisal criteria). The descriptors that are used to articulate this assessment are summarised in the tables below.

Table 1: Descriptors of research type and design

Research type	Research design
Primary and empirical (P&E)	Experimental (EXP) + state method used
	Observational (OBS) + state method used
Secondary (S)	Systematic review (SR)
	Other review (OR)
Theoretical or conceptual (TC)	N/A

Table 2: Descriptors of research quality

Study quality	Abbreviation	Definition
High	↑	Demonstrates adherence to principles of appropriateness/rigour, validity and reliability; likely to demonstrate principles of conceptual framing, openness/ transparency and cogency
Moderate	→	Some deficiencies in appropriateness/rigour, validity and/or reliability, or difficulty in determining these; may or may not demonstrate principles of conceptual framing, openness/transparency and cogency
Low	↓	Major and/or numerous deficiencies in appropriateness/rigour, validity and reliability; may/may not demonstrate principles of conceptual framing, openness/ transparency and cogency

The synthesis of evidence and description of the overall “evidence base” are based on combining this grading of strength of the individual pieces with three other characteristics: the size of the total body of evidence assessed; the context/s in which this evidence is set (local, regional or global); and the consistency of the findings produced by the studies constituting the body of evidence.

1. What is the effect of higher food prices on poverty?

Is there such a thing as an optimum staple food price or food price trend relative to other prices or income?

Theoretical and conceptual overview

Important nuances in the impact of staple food price changes on poverty are often missing from development organisation communications (Swinnen, 2011 [TC]). Limits to effective market integration in developing countries means that developments in international markets cannot be assumed to be reflected in the prices faced by the poor. Trade policy, taxes, transport costs, and time lags all influence the extent to which international price changes are reflected in domestic and local markets. Price transmission from international markets is likely to be greatest in coastal countries, with reduced transport costs, and relatively low state intervention in food markets. Even once the issue of price transmission is resolved, the theoretical impact of staple food price increases is indeterminate. Increases in staple food prices create both winners and losers between wealthier households and the poor, and amongst the poor.

In the short term, that is holding household production and consumption decisions constant, a change in staple food prices produces both gainers and losers. Households that produce more food than they consume and sell the surplus would benefit, whilst households that produce less food than they consume and purchase the remainder would be made worse off. Given constraints on food production in urban areas, urban households are typically food buyers, whilst for rural households identification is less straightforward. The immediate aggregate welfare impact of changes in domestic food prices depends on the relative sizes of these net surplus and net deficit groups¹, and is an empirical question that can be answered with nationally representative household surveys.

However, in the medium term, adjustments in response to relative price changes may mitigate against the negative welfare effects. Higher prices increase the incentives for food production, and so net surplus households may hire additional labour, pushing up incomes even for net deficit households.² Changes in relative prices may also alter the production decisions of net deficit households, for example switching from cash crop to food production. Furthermore, in the presence of alternative food types, an increase in the relative price of one type may lead households to substitute it with the now relatively cheaper type, thereby reducing the welfare loss. There is a broad consensus that these effects exist, but disagreement regarding their magnitudes.

¹ See Zezza et al (2009 [P&E; OBS; →]) for a good exposition of this proposition

² Dorward 2012a [TC]; although it observed that without a simultaneous technical change that increases the marginal product of labour, equilibrium wages relative to food prices must be lower after the price increase.

The poverty consequences of food prices depend not only on the level, but also on the dynamic process by which they come about. The optimal food price for poverty reduction is likely to be a low price that is maintained through productivity increases, including amongst poor producers. In such a case, consumers benefit from lower prices, and net food producers do well because on-going productivity increases compensate for lower prices. Neither high prices nor low prices driven by productivity improvements (only amongst large-scale producers) could deliver the same benefits.

In the longer term, theoretical analysis presented by Dorward (2012b [TC]) shows that high food prices raise incentives for governments and private companies to invest more in agricultural research. This in turn would improve agricultural productivity to ultimately deliver lower relative food prices and higher agricultural wages. As such, higher agricultural prices could be seen as a substantial opportunity for investment in agriculture.

Examining 1972/73 and 2007/08 food price crises, Timmer (2010 [TC]) argues that long-run declines in food prices contribute to reducing investment in agriculture. This results in growth in demand consistently outstripping supply, setting the scene for regular price crises. At crisis points, the paper argues, governments respond with sub-optimal stop-gap measures, where a better solution would have been to pursue more forward-looking policies to stabilize production around long-run consumption trends.

Empirical evidence

The potential scope of relevant empirical studies begins with drivers of changes in international food prices. These then interact with market realities and government policies (exchange rates, stocks, other controls) to determine the extent to which these are transmitted to domestic contexts and local markets. The impact of these local price changes will then vary across producers (income effect) and consumers (consumption effect), which can then be aggregated and generalised.

A literature of 19 primary and empirical studies has been reviewed that generally finds that the net short term impact of rapid increases in staple food prices is an aggregate worsening of poverty. This literature draws on a wide range of country studies and cross-country comparisons, covering countries in Africa, Asia, and Latin America. Studies are of variable quality as evidence on which to base policy (of studies identified, three were rated as high quality and a further 12 as moderate quality). Secondary literature indicates strong consensus around this point.

Seven primary and empirical studies were identified that investigate medium term partial equilibrium adjustments (wage effects, substitution between food types, and supply response) to a varying degree, and a further four investigating the general equilibrium response. Of these studies, nine were rated as moderate quality (including country studies³ as well as broader cross-country studies including countries in sub-Saharan Africa, Asia, and Latin America)⁴, and the remaining two as low quality.⁵

³ Mexico: Attanasio et al (2013 [P&E; OBS; →]), Wood et al (2012 [P&E; OBS; →]), and Dyer and Taylor (2011 [P&E; OBS; →]); Morocco: Diao, Doukkali and Yu (2008 [P&E; OBS; →]); Mozambique: Arndt et al (2008 [P&E; OBS; →])

⁴ Ivanic, Martin and Zaman (2011 [P&E; OBS; →]), Ivanic and Martin (2008 [P&E; OBS; →]), Zezza et al (2009 [P&E; OBS; →])

⁵ Ethiopia Ticci (2011 [P&E; OBS; ↓]), 9 LICs Ataman Aksoy and Isik-Dikmelik (2008 [P&E; OBS; ↓])

No empirical studies examining the impact of higher food prices on longer term technical and institutional change were identified.

The key findings from this body of evidence include:

Domestic food prices in sub-Saharan Africa frequently exhibit substantial independence from international prices, but identified studies do not account for potentially important threshold effects.

In an econometric study of 11 sub-Saharan African countries⁶, Minot (2011 [P&E; OBS; →]) found that only 13 of 62 price series considered showed a long-run relationship where the domestic price was influenced by the international price of the same commodity. However, the same study found that whilst just 10% of domestic maize prices were linked to international maize prices, almost half of rice prices considered were significantly linked. The extent to which international price changes were reflected in domestic markets across foodstuffs was consistent with the relative importance of trade in that commodity. Of the countries considered, Malawi, Mozambique, and Ethiopia showed the strongest relationship to the international market. Zambia, Uganda, South Africa, and Kenya showed no prices with a long-term relationship to world markets. Abbott (2009 [S; OR]) summarises an FAO assessment of price transmission, also finding considerable variation in the extent of transmission.

However, despite methodological improvements that allow investigation of a long run relationship rather than assuming instantaneous pass-through, this evidence is still limited. It is acknowledged that the methodology used by Minot does not account for the threshold effects of import and export parity prices, beyond which the relationship between domestic and international prices may well be different.⁷

Robles (2011 [P&E; OBS; →]) examines food price transmission to a sample of Latin American and Asian countries⁸, which may be expected to be more closely connected to the global market than many sub-Saharan African economies. The study finds a generally finds evidence of a positive transmission effect of wheat and rice prices, but with variation in the degree of transmission across countries.

Food price increases create both winners and losers, but the majority of empirical studies have found that, in the short term, the aggregate effect is typically a worsening of poverty.

There is a rich strand of methodologically similar literature simulating the immediate impact of staple food price changes on household welfare.⁹ Nationally-representative household

⁶ Error Correction Model covering Ethiopia, Ghana, Kenya, Malawi, Mozambique, South Africa, Tanzania, Uganda, and Zambia. Trends in prices are also examined for Rwanda, Cameroon and Mali but they are not included in the econometric analysis.

⁷ For example, high transport costs may mean that the difference between the domestic price and the international price required to make importing food profitable may be greater. Similarly the difference required for exporting to be profitable would also be greater. As long as the domestic price remained between these two 'parity' thresholds, they may be expected to move independently of international prices. However, beyond these thresholds there would be expected to be a relationship.

⁸ Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Dominican Republic, Ecuador, Peru, Bangladesh, Pakistan, and Vietnam.

⁹ For example see: Ivanic, Martin and Zaman (2011 [P&E; OBS; →]), Ivanic and Martin (2008 [P&E; OBS; →]), Wodon et al (2008 [P&E; OBS; →]), Zezza et al (2009 [P&E; OBS; →]), Ataman Aksoy and Isik-Dikmelik (2008

surveys are used to identify net deficit and net surplus producers of staple foods and their initial welfare levels. The change in welfare that would result from changes in food prices (typically holding everything else constant) is then simulated and compared to the poverty line to estimate changes in the headcount poverty rate, poverty gap, and nutrition. A wide geographic area is covered; with the Dessus et al (2008 [P&E; OBS; →]) alone covering the urban populations of 72 developing countries.

These simulation studies have consistently found that poor households are more likely to be net buyers of staple foods, and so increases in prices result in a worsening of poverty.¹⁰ However, the magnitude of the estimated impact on poverty varies significantly across countries. For example, Ivanic, Martin, and Zaman (2011 [P&E; OBS; →]) estimated a net poverty increase of 3.6% in Tajikistan and net *decrease* of 1.2% in Vietnam from 2010/11 food price increases.

However, there are reasons to exercise caution in the interpretation of simulation study results. The robustness of conclusions reached via this technique is dependent on the ability of the household surveys used to identify households' net food positions. Headey and Fan (2008 [S; OR]) point out that there may be a tendency for household surveys to underestimate the extent to which households may be net sellers because the consumption side of surveys is generally better measured than the production side.¹¹ Wood et al (2012 [P&E; OBS; →]) and Ivanic and Martin (2011 [P&E; OBS; →]) allow for substitution between food types following a change in relative prices, but most studies have not allowed for this possibility and so are likely to overestimate the welfare impact in cases where not all staple food prices are increasing.

Simulation studies also examine the impact of food price changes holding other factors constant; this is useful for isolating the impact of food price changes alone, but is unlikely to be the case in practice. Ultimately, these projections are based on models and associated assumptions, and so should be interpreted with caution (Swinnen and Squicciarini, 2012 [TC]).

Studies of observed changes in welfare and nutrition are broadly consistent with the simulation study predictions.¹² Reductions in welfare following episodes of food price increases are found, except in the context of sustained improvements in average income. Compton et al (2010 [S; OR]) survey empirical data available in 2010 and find that high food prices did increase malnutrition (especially in young children) and poverty. Brinkman et al (2010 [S; OR]) examine a number of alternative indicators for consumption, nutrition and health over the period 2006-2010, finding that dietary diversity is negatively correlated with food price levels. The paper also summarises the findings of a UN World Food Program assessments in 19 countries¹³, finding widespread evidence of reductions in the quantity of food consumed and switching to less preferred food types. Using detailed (non-representative) data for Mexico, Attanasio et al (2013 [P&E; OBS; →]) find substantial reductions in welfare for the poor as a result of observed food price increases.

[P&E; OBS; ↓]), Rios et al (2008 [P&E; OBS; →]), Dessus et al (2008 [P&E; OBS; →]), Ticci (2011 [P&E; OBS; ↓]), Wood et al (2012 [P&E; OBS; →]), Valero and Valero-Gil (2008 [P&E; OBS; →]).

¹⁰ Vietnam is identified as an exception, where an increase staple food prices is expected to result in an increase in overall welfare, this is attributed to the relatively egalitarian distribution of land (Zezza et al (2009 [P&E; OBS; →]); Ivanic, Martin and Zaman (2011 [P&E; OBS; →])).

¹¹ The most common surveys (the LSMS family) estimate consumption rather than income, as this is considered to be less variable from year to year. In many LICs no regular surveys of incomes are carried out.

¹² For example Hossain and Green (2011 [P&E; OBS; ↓]) and Perez et al (2011 [P&E; OBS; ↓])

¹³ Afghanistan, Cambodia, Nepal, Pakistan, Palestine, Benin, Burkina Faso, Burundi, Djibouti, Ethiopia, Guinea, Kenya, Lesotho, Liberia, Uganda, El Salvador, Guatemala, Honduras, and Nicaragua.

This is consistent with a systematic review and meta-regression using 136 studies reporting 3,495 own food price elasticities from 162 countries (Green et al, 2013 [S; SR]), which found that price increases in all foods resulted in greater reductions in food consumption in poor countries and amongst poor households. Based on these findings, a 10% increase in the global price of cereals was estimated to reduce demand in low income countries by 6.1%, as compared to 4.3% in high income countries.

Evidence suggests that non-farm rural wage increases in response to food price increases could be an important counterbalance of poverty impact, but is not conclusive.

Simulation studies achieve varying levels of complexity in accounting for possible adjustments in response to price changes. At one end of the spectrum, Dessus et al (2008 [P&E; OBS; →]) hold all household production and consumption decisions constant and do not account for changes in wages.¹⁴ At the other end, three studies identified estimate general equilibrium responses to exogenous food price changes for Morocco, Mexico and India.

Two simulation studies identified provide insights into the impact of partial-equilibrium wage adjustments in response to staple food price changes. Ivanic and Martin's 2008 9-country study [P&E; OBS; →] attempted to account for unskilled wage responses to higher food prices using national versions of the GTAP model, but found only small effects. Zezza et al (2009 [P&E; OBS; →]) also experimented with taking wage effects into account in Bangladesh and Ghana, but find that the results do not change substantially. Lasco et al (2008 [P&E; OBS; →]) investigate the relationship between agricultural wages and rice prices in the Philippines, finding that rice prices are an important determinant of rural wages.

Four studies that examine general equilibrium effects of food price changes were identified, three using data from middle income countries (Diao, Doukkali and Yu (2008 [P&E; OBS; →]) for Morocco, Dyer and Taylor (2011 [P&E; OBS; →]) for rural Mexico, and Jacoby (2013 [P&E; OBS; →]) for India) and one using data for Mozambique (Arndt et al (2008 [P&E; OBS; →]) In the case of Morocco, it is found that the general equilibrium impact of an exogenous staple food price increase is small, due to the fact that poor farmers tend to specialise in the production of staple foods.¹⁵ In Mexico, wage increases are predicted to be an important channel through which the benefits of higher agricultural prices are distributed.

Jacoby (2013 [P&E; OBS; →]) estimates a district-level general equilibrium model for India. The study finds that both agricultural and non-agricultural wages rose faster in districts with more production of crops that experienced substantial price increases, supporting the argument for the importance of second-round effects.

Arndt et al (2008 [P&E; OBS; →]) estimate a computable general equilibrium model for Mozambique to estimate the impact of increases in international food and fuel prices. The study estimates that food price increases of the magnitude experienced in late 2007/8 would increase the national poverty headcount by 1 percentage point.¹⁶ However, the effect in urban areas is stronger, projected to increase poverty by 2.8 percentage points.

¹⁴ This study is focussed entirely on urban populations, and so the potential role of wage increases is less clear.

¹⁵ A further key limitation of this study is an inability to differentiate between poor farmers and the rural landless on the consumption side, and so the negative impact on the rural poor is likely to be underestimated.

¹⁶ The authors present scenarios holding the land allocation between crops constant and allowing it to change; poverty is projected to increase by 1 percentage point holding the allocation constant and 0.8 percentage

Using data from the Gallup World Poll, Headey (2013 [P&E; OBS; ↑]) finds that global self-reported food insecurity declined during between 2005/6 and 2008, despite simulation projections of increases in hunger. In the eight most populous developing countries (excluding China)¹⁷ declines in food insecurity were observed, whilst in many other regions including coastal West Africa, Eastern and Southern Africa, and Latin America, increases were reported. However, no substantial aggregate change was observed between 2007 and 2008, driven largely by a decline in food insecurity in India and increases elsewhere. The study finds evidence that strong economic growth provided an effective buffer, as did actions to inhibit transmission of international prices to domestic markets. Econometric analysis in the paper finds that economic growth tends to be associated with reductions in food insecurity, whilst food inflation tends to be associated with increases; consistent with simulation analyses.

points allowing it to change. In urban areas, poverty is projected to increase by 2.8 percentage points holding land allocations constant, and 2.7 percentage points allowing for changes.

¹⁷ China was excluded from the sample due to specific concerns regarding biases in responses to the food security question.

2. What are the consequences of food price volatility for poor households?

Theoretical and conceptual overview

There are clear theoretical grounds supporting the case that the poorest households are likely to be most-affected by changes in staple food prices, and that they are least able to cope with the consequences of price increases. Whilst the bulk of the world's poor are farmers (Swinnen and Squicciarini, 2012 [TC]), they are also likely to be net buyers of food. They are therefore affected by volatility in the prices of both what they produce and what they buy.

Engel's Law postulates a negative relationship between proportional expenditure on food and income, such that at lower income levels, a greater share of household budgets is allocated to basic foodstuffs. Rapid increases in food prices relative to incomes associated with food price volatility reduce the real income of net buyers and increases income instability.

Volatility is the variation in prices around the mean, with high volatility meaning substantial variation. Volatility measures ups and downs around the mean and not direction; it is a measure of price risk.¹⁸ The consequences of high price volatility differ from high price levels. Predictable price changes have different costs and benefits to unpredictable ones.¹⁹

High price volatility reduces the benefits of higher prices for net producers.²⁰ For food producing households, price volatility makes the returns to increased production more uncertain and so would act as a disincentive to further investment. A similar logic applies at the macro level, where price volatility may depress investment in distribution networks for food, agricultural inputs, and credit.

Volatility in farm prices need not necessarily translate into volatility in farm incomes of the same magnitude. This is because, in relatively isolated markets where the amount of food demanded is less responsive to changes in prices, much of the volatility in prices would arise from variable harvests. When harvests are poor, sharp price increases would compensate for reduced output. Conversely, bumper harvests would result in lower prices.²¹

In a context where there are substitute food types with uncorrelated prices, the impact of price volatility may be more severe for net food sellers than net food buyers. Whilst production decisions must be made far in advance of knowing the relative prices of goods at

¹⁸ Von Braun and Tadesse (2012, [S; OR])

¹⁹ FAO (2011 [S; OR])

²⁰ Dorward (2012a [TC])

²¹ I am grateful to Steve Wiggins for this helpful observation

the time of sale, the same is not true of consumption decisions. When buying food from the market, consumers do not face uncertainty about what price they will pay, and can take advantage of occasions when prices are below the mean (which exist by definition in cases of high volatility). This argument rests on buyers' ability to switch between food types in response to changes in relative prices. Despite the costs of food price volatility, it is not self-evident that public food stocks to stabilise prices are desirable. Theoretically, such stocks could be accumulated when prices are perceived to be above trend, and released when below trend to stabilise prices around the trend level. This would reduce the mal-consequences of staple food volatility. However, by muting price signals, such policies also risk undermining the incentives to invest in agricultural production and storage, and so in the long run could worsen food security outcomes.

Empirical evidence

6 primary and empirical studies were identified that investigate the coping strategies adopted by the poor in response to staple food price increases and variability. Of these studies, 1 was rated as high quality and a further 3 as moderate quality, between them drawing on data from 4 countries.²² The studies consistently find that poor households make changes to both the quantity and the type of the food they consume in response to food price spikes.

One empirical study was identified that investigates the impact of staple food price volatility on poor households. The study drew on data from one country²³, and was rated as moderate quality.

The findings that emerge from the empirical evidence include:

Household surveys have consistently confirmed that a greater proportion of poorer household expenditure goes towards food.

There is broad consensus from nationally-representative household surveys that the poorest households are likely to devote the greatest share of their expenditure to food.²⁴

Simulations of the impact of food price increases on households²⁵ that examine the change in the poverty gap, in addition to the change in the poverty headcount, have found that the majority of the increase in poverty comes from worsening welfare of the already poor, rather than new households falling below the poverty line.

Empirical studies have consistently found evidence of poorer households adjusting the quantity and type of food consumed to cope with price volatility.

Compton et al (2010 [S; OR]) present data on coping strategies adopted in response to a food price spike from 13 countries, finding a very high prevalence of reducing dietary intake. Kumar and Quisumbing (2011 [P&E; OBS; ↑]), using panel data from Ethiopia, also find that

²² Ethiopia (Kumar and Quisumbing, 2011 [P&E; OBS; ↑]), Afghanistan (D'Souza and Joliffe 2010 [P&E; OBS; →]), China (Jensen and Miller, 2008 [P&E; OBS; →]), Mexico (Attanasio et al 2013 [P&E; OBS; →]). In addition, studies rated as low quality used data from Bangladesh, Indonesia, Kenya, and Zambia (Hossain and Green (P&E; OBS; ↓)) and Bolivia (Perez et al (2011 [P&E; OBS; ↓])).

²³ Ethiopia, Bellemare et al (2011, [P&E; OBS; →])

²⁴ For example see Zezza et al (2009 [P&E; OBS; →]), Attanasio et al (2013 [P&E; OBS; →]) and Naylor and Falcon (2010 [S;OR])

²⁵ For example see Dessus et al (2008 [P&E; OBS; →]), Wodon et al (2008 [P&E; OBS; →]), and Ticci (2011 [P&E; OBS; ↓])

coping strategies employed in response to a food price shock include switching to less preferred meals and cutting back on the number of meals.

D'Souza and Joliffe (2010 [P&E; OBS; →]), using nationally-representative data from Afghanistan find that the price elasticity of calorie consumption is much smaller than the price elasticity of food consumption. This is consistent with the argument that, when faced with higher prices, households switch to cheaper sources of calories. Further empirical evidence of food substitution amongst urban poor in two provinces of China was found by Jensen and Miller (2008 [P&E; OBS; →]), and in Bolivia by Perez et al (2011 [P&E; OBS; ↓]).

Some evidence suggests that food price volatility results in an overall welfare loss, but implications are likely to be less severe for net buyers when volatility is uncorrelated across substitute food types.

In an investigation of the welfare impact of commodity price volatility in Ethiopia, Bellemare et al (2001 [P&E; OBS; →]) find that the aggregate impact of food price volatility on welfare is negative. However, the welfare gains from eliminating the volatility would be concentrated in the top 40% of the income distribution, whilst 30% of the poorer population would experience a welfare loss. Poorer households may be more responsive to changes in relative prices, switching to relatively cheaper foods, whereas wealthier households may still choose preferred foods. Simultaneous increases in all available food types do not offer this opportunity. It is not clear that the results of a single country study can be generalized to other contexts.

Access to land has been identified as a consistent determinate of household vulnerability to the effects of food price spikes.

Zeza et al (2009 [P&E; OBS; →]) identifies key determinants of household vulnerability, finding that the most vulnerable households are: urban or non-farm rural; larger; have less access to land and agricultural inputs (in rural areas); and tend to be less educated. Kumar and Quisumbing (2011 [P&E; OBS; ↑]) using panel data from Ethiopia, find that access to land, particularly better quality land, has a protective effect against the impact of food price shocks, therefore the landless poor are more vulnerable to food price vulnerability. This is consistent with the predictions from general equilibrium simulations, which show the returns to land ownership increasing with higher food prices.²⁶ Secondary literature indicated strong consensus on this issue.²⁷

In the context of substantial market failures, public food stocks may be an effective way of improving the food security of the most vulnerable, but widespread price manipulation imposes costly distortions.

Myers (2006 [TC]) argues that standard welfare analysis potentially underestimates the welfare gains of food price stabilisation. The paper shows that if the potential for price volatility to undermine investment and therefore to reduce growth, and food security considerations are taken into account, welfare gains could potentially be large. However, this implication is tempered by acknowledgement that analysis did not take account of second-round effects, existing household coping mechanisms, or the cost of stabilisation programs. The author stresses that even if the cost of food price volatility is high, it does not necessarily follow that stabilisation schemes are the only, or best, policy response.

²⁶ Diao, Doukkali and Yu (2008 [P&E; OBS; →]) for Morocco, and Dyer and Taylor (2011 [P&E; OBS; →]) for Mexico

²⁷ Compton et al (2010 [S; OR]), FAO (2011 [S; OR])

In a review of evidence from a sample of Asian countries²⁸, Cummings et al (2006 [S; OR]) conclude that whilst food price stabilisation has been successful in improving welfare outcomes, this success was dependent on a specific set of conditions that no longer hold in the countries in question. Specifically, interventions were justified in the context of market failures in Asia in the 1960s: markets were poorly integrated, insurance and credit markets were missing or incomplete and new technologies brought uncertainties.

World Bank (2012 [S; OR]) primarily reviews evidence from three sub-Saharan African countries (Kenya, Malawi, and Zambia) and three Asian countries (India, Indonesia, and the Philippines). Overall, the use of grain stocks to stabilise domestic price is not found to be an effective means of improving food security outcomes. In Africa and Asia, they were found to be frequently associated with a crowding out of public investment in agriculture that would be necessary to improve productivity. Furthermore, unpredictable purchases and releases were found to suppress private investment in both production and storage.

This is consistent with findings from Mexico. Avalos-Sartorio (2006 [P&E; OBS;→]) reviews the impact of a set of policy changes with regard to domestic staple food price stabilisation in Mexico. Food price volatility in a pre-NAFTA characterised by CONASUPO (a food marketing parastatal intervening directly in production, storage, and distribution) is compared to a post-NAFTA period with no direct state trading in agricultural commodities. Both inter- and intra-year variability in real maize prices were found to be higher in the pre-NAFTA period.

However, World Bank (2012 [S; OR]) did find that food stocks could be more effective as an instrument to provide targeted support to the most vulnerable in the short term. Effective targeting was found to allow protection to be offered to the poorest, which is more cost-effective than across-the-board distribution, with less negative consequences for production and storage incentives. The paper acknowledges that, in most cases, cash transfers are likely to be more effective than food transfers in economic crises, but in situations of severe market failures, there may be strong case for in-kind transfers.

²⁸ Bangladesh, India, Indonesia, Pakistan, and the Philippines.

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Annex 1: Summary of evidence appraisal notes

Study	Research type	Research design	Transparency	Rigour	Validity	Reliability	Cogency	Quality	Relevance
Minot, 2011	P&E	OBS	Mod.	Mod.	Mod.	Mod.	Mod.	→	Mod.
Ivanic, Martin and Zaman, 2011	P&E	OBS	Mod	Mod.	Mod.	Low	Mod.	→	High
Ivanic and Martin, 2008	P&E	OBS	Mod	Mod	Mod.	Low	Low	→	High
Aksoy and Isik-Dikmelik, 2008	P&E	OBS	Mod	Mod.	Mod.	Low	Low	↓	High
Wodon et al, 2008	P&E	OBS	Mod	Mod.	Mod.	Low	Mod.	→	High
Headey, 2011	P&E	OBS	High	High	Mod.	Mod.	High	↑	High
Zeza et al, 2009	P&E	OBS	High	Mod.	Mod.	Low	Mod.	→	High
Lasco et al, 2008	P&E	OBS	Mod	Mod.	Mod.	Mod.	Mod.	→	Mod.
Rios et al, 2008	P&E	OBS	Mod.	Mod.	Low	Low	Mod.	→	High
Dessus et al, 2008	P&E	OBS	Mod.	Mod.	Mod.	Low	Mod.	→	High
D'Souza and Joliffe, 2010	P&E	OBS	Mod.	Mod.	Mod.	Mod.	Mod.	→	High
Hella et al, 2011	P&E	OBS	Mod.	Low	Low	Low	Low	↓	High
Hossain and Green, 2011	P&E	OBS	Low	Low	Low	Low	Low	↓	High
Kumar and Quisumbing, 2011	P&E	OBS	High	Mod.	Mod.	Mod.	Mod.	↑	Mod.
Perez et al, 2011	P&E	OBS	Mod.	Low	Mod.	Low	Low	↓	High
Ticci, 2011	P&E	OBS	Low	Mod.	Mod.	Low	Mod.	↓	Mod.
Jensen and Miller, 2008	P&E	OBS	Mod.	Mod.	Mod.	Mod.	Mod.	→	High
Jensen and Miller, 2011	P&E	EX	Mod.	High	Mod.	Mod.	Mod.	↑	Mod.
Diao, Doukkali and Yu, 2008	P&E	OBS	Mod.	High	Mod.	Mod.	High	→	High
Valero-Gil and Valero, 2008	P&E	OBS	Mod.	Mod.	Mod.	Low	Mod.	→	High
Dyer and Taylor, 2011	P&E	OBS	Mod.	High	Mod.	Mod.	High	→	High
Wood et al, 2012	P&E	OBS	Mod.	High	Mod.	Mod.	High	→	High
Bellemare et al, 2011	P&E	OBS	Mod.	Mod.	Mod.	Mod.	Mod.	→	High
Attanasio et	P&E	OBS	Mod.	Mod.	Mod.	Mod.	Mod.	→	High

al, 2013									
Robles, 2011	P&E	OBS	Mod.	Mod.	Mod.	Low	Mod.	→	Mod.
Jacoby, 2013	P&E	OBS	High	High	Mod.	Mod.	Mod.	→	High
Arora, 2012	P&E	OBS	High	Mod.	High	Mod.	High	↑	High
Avalos-Sartorio, 2006	P&E	OBS	Low	Mod.	Mod.	Mod.	Mod.	→	Mod.
Arndt et al, 2008	P&E	OBS	Mod.	Mod.	Mod.	Mod.	High	→	High
Swinnen, 2011	TC	n/a	n/a	n/a	n/a	n/a	n/a	n/a	High
Swinnen and Squicciarini, 2012	TC	n/a	n/a	n/a	n/a	n/a	n/a	n/a	High
Abbott and Battisti, 2011	TC	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Mod.
Dorward, 2012a	TC	n/a	n/a	n/a	n/a	n/a	n/a	n/a	High
Poulton et al, 2006	TC	n/a	n/a	n/a	n/a	n/a	n/a	n/a	High
Dorward, 2012b	TC	n/a	n/a	n/a	n/a	n/a	n/a	n/a	High
Timmer, 2010	TC	n/a	n/a	n/a	n/a	n/a	n/a	n/a	High
Myers, 2006	TC	n/a	n/a	n/a	n/a	n/a	n/a	n/a	High
Torrero, 2011	S	OR	n/a	n/a	n/a	n/a	n/a	n/a	Mod.
Abbott, 2009	S	OR	n/a	n/a	n/a	n/a	n/a	n/a	High
FAO, 2011	S	OR	n/a	n/a	n/a	n/a	n/a	n/a	Mod.
von Braun, 2009	S	OR	n/a	n/a	n/a	n/a	n/a	n/a	Mod.
Compton et al, 2010	S	OR	n/a	n/a	n/a	n/a	n/a	n/a	High
Brinkman et al, 2010	S	OR	n/a	n/a	n/a	n/a	n/a	n/a	Mod.
Headey and Fan, 2008	S	OR	n/a	n/a	n/a	n/a	n/a	n/a	High
Von Braun and Tadesse, 2012	S	OR	n/a	n/a	n/a	n/a	n/a	n/a	High
Naylor and Falcon, 2010	S	OR	n/a	n/a	n/a	n/a	n/a	n/a	High
World Bank, 2012	S	OR	n/a	n/a	n/a	n/a	n/a	n/a	High
Cummings et al, 2006	S	OR	n/a	n/a	n/a	n/a	n/a	n/a	High
Green et al, 2013	S	SR	n/a	n/a	n/a	n/a	n/a	n/a	High

Annex 2: Literature search methodology

The interrogation of the evidence base for this paper was built on an iterative process designed to ensure that the paper covers a range of evidence that was indicative of the scope of the evidence base for each of the sections (that is, the full range of arguments and empirical research was represented). This included:

A structured literature search of the following databases and repositories:

- SviVerse Scopus
- Web of Knowledge
- Google Scholar
- DFID's research repository R4D
- International Initiative for Impact Evaluation (3ie) systematic review and impact evaluation databases.

The search was designed around search strings created for each of the sections. Further inclusion criteria for this rapid search were:

- Date: after 2000 – present - unless considered seminal.
- Languages - English
- Population - developing countries
- Region - no regional limitations.

Focused searches by authors - The results of this search were used by authors to construct their theoretical and conceptual arguments. Once constructed the theoretical and conceptual sections of the paper formed a framework for a further literature search to identify further sources of the empirical evidence that underpins the arguments presented.

Peer review – The development of the paper is supported by a steering group and each section has both DFID peer reviewers and external peer reviewers. At each stage of the process – from the identification of the focus areas to the drafting of the final documents the peer reviewers have contributed their assessments and suggestions relating to the representativeness and strength of the evidence base that we are drawing from.

Annex 3: Critical appraisal

For a full description of the methods used for critical appraisal in this paper please refer to the ***DFID How to note on Assessing the strength of evidence***.

The basic criteria for assessing the quality of the studies cited in this paper are summarised in the table below:

Principles of quality	Associated principles	YES/NO
Conceptual framing	Does the study acknowledge existing research?	
	Does the study construct a conceptual framework?	
	Does the study pose a research question?	
	Does the study outline a hypothesis?	
Openness and transparency	Does the study present the raw data it analyses?	
	Does the author recognise limitations/weaknesses in their work?	
Appropriateness and rigour	Does the study identify a research design?	
	Does the study identify a research method?	
	Does the study demonstrate why the chosen design and method are good ways to explore the research question?	
Validity	Has the study demonstrated measurement validity?	
	Is the study internally valid?	
	Is the study externally valid?	
Reliability	Has the study demonstrated measurement reliability?	
	Has the study demonstrated that its selected analytical technique is reliable?	
Cogency	Does the author 'signpost' the reader throughout?	
	Are the conclusions clearly based on the study's results?	

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