

Taming Volatile Food Prices: A Prerequisite for Improving Nutrition



Joachim von Braun

Director of the Center for Development Research (ZEF)
Professor for Economic and Technological Change,
University of Bonn, Germany



“We have the resources and the knowledge to end hunger. We know how to protect the poorest from the impact of rising prices. We know how to tame volatile prices. Every child, woman and man has a right to enough nutritious food for an active and healthy life. Let us act – now.”

Ban Ki-moon, World Food Day Commemoration, 2011

Key messages

- Food prices today are not only set by supply and demand but also influenced by financial markets.
- Sudden price rises, or ‘spikes’, cause big problems for nutrition of the poor.
- Healthy diets need to be affordable, and that requires increased productivity in the food system to prevent high prices.
- Poor countries are hit worst as they cannot afford adjustment measures.
- The solution needs to be worked on globally, and the issue taken more seriously.

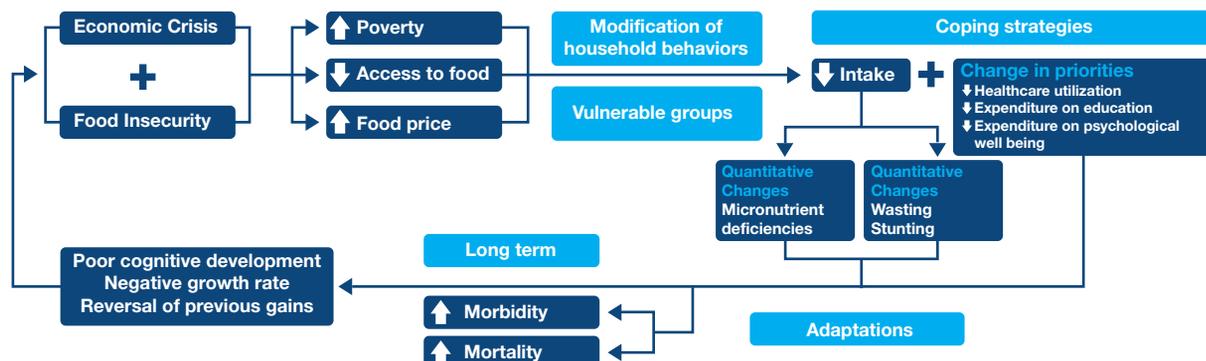
There are more than 800 million people seriously undernourished in the world today, and two billion suffering from hidden hunger. The price of food is a key factor in this situation.

Recent years have witnessed extreme fluctuations in the prices of food commodities. The basic cause is lack of agricultural productivity; additional factors include financial market volatility, political instability, and armed conflict. Others are scarcity of natural resources such as land and water, and rising energy prices.

The situation becomes even more complex when agricultural subsidies provided by governments in the West to their own farmers are considered – a factor that played an important role in the past – or when exports are restricted, which in recent years led to further scarcity and sudden price hikes in the global market. And it seems the countries giving out the subsidies are not without their problems either. In the US and Egypt, it has been argued that the artificially low prices can lead to unhealthy incentives for consumers. When energy-dense foods such as grains and sugar become cheaper, it is argued that these attract low-income families, leading to problems with overweight and obesity.

All of these factors and the price fluctuations that result have put pressure not just on individuals but on entire social groupings and, indeed, societies as a whole. Dramatic increases – or ‘spikes’ – in the cost of commodity foods have not only impoverished the diet and constrained the possibilities of many of the world’s poorest and most vulnerable populations; they have in some instances actually led to food riots which have triggered major political and societal changes. The ‘Arab Spring’ that commenced on 18 December 2010 had complex causes, but food prices did play some role in triggering the violent change.

This chapter examines the various factors that influence food pricing, the repercussions experienced when price rises are deemed excessive, and solutions that could help alleviate the problem. Food price volatility is an issue that needs to be addressed on a global scale, rather than by individual countries only, for it is the poorer nations that suffer most in the wake of a food pricing crisis, as they are unable to fund the social and economic mitigation. Furthermore, not



The vicious cycle of the economic crisis

Source: *Maternal and Young Child Nutrition Adversely Affected by External Shocks Such as Increasing Global Food Prices*, Ian Darnton-Hill and Bruce Cogill, *Journal of Nutrition* 2010

only do the sudden or short-term crises need to be addressed, but also the chronic situation that needs a coordinated and long-term response. One feature of that is the relative price

increase of pulses, animal products and vegetables compared to calorie-dense foods, which leads to unhealthy diets of poor consumers, for instance in South Asia.

The effect of food price increases

Food prices around the globe are tracked by the Food Price Index, managed by the FAO (Food and Agricultural Organization). Strange as it may sound, the fact that food prices are either high or low in absolute terms is not the main destabilizing factor. The most serious problem occurs when a sudden change or ‘spike’ in prices occurs, for countries whose nutrition security is already compromised find it very hard to cope with these changes. Traditionally, such sudden price increases have been attributable to natural disasters such as droughts and floods, and to man-made disasters such as wars. Such occurrences limit the supply of food available. As supply dwindles but demand grows due to population and income growth, the result is inevitably higher prices for such produce.

If this is a phenomenon as old as money itself, there are also more recent factors that play a significant role in triggering food price spikes. One is the growing demand for high-end foods such as meat and dairy products on the part of the burgeoning middle classes of China and India. Another is the high price of oil in our oil-based global economy, which drives up the cost of every type of economic activity. A third was the global decline of food stocks in the last decade, for agricultural productivity growth had been declining worldwide for a number of years. Perhaps the most important, however, is the nature of the global commodities market.

During the past decade, there have been notable spikes in the period of 2007–8 and again in 2011. In certain

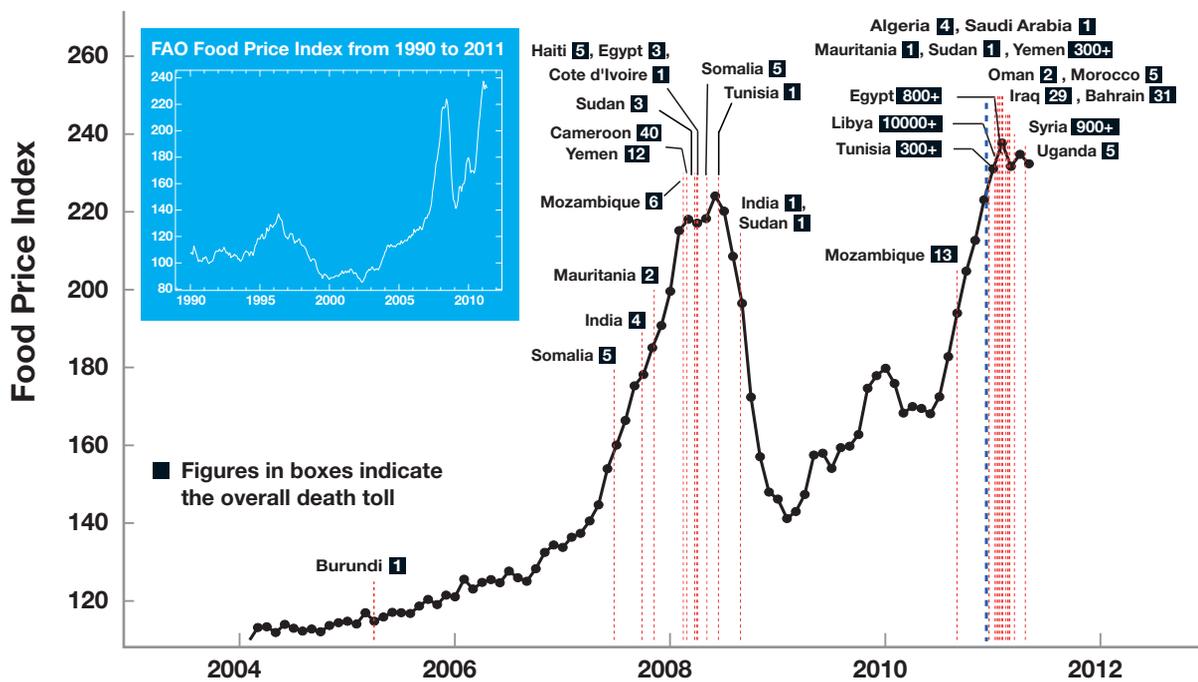
countries, food prices were found to be three times as high in mid-2008 as the five-year average for that particular time of year. Prices rose again in mid-2010 because fears regarding droughts in Russia and parts of Asia affected stock levels.

The relationship between food production and pricing has a number of important dynamics:

- 1) When prices rise, the cost of acquiring food poses a growing problem. This is the most obvious effect. In order to prioritize the purchase of food within the framework of an unchanged budget, cuts have to be made elsewhere. On a household level, this can result in a general lowering of living standards, while governments may have to reduce funding for certain initiatives not related directly to the provision of food.
- 2) If the food in question becomes unobtainable on account of its increased price, the quality of the diet will deteriorate. Malnutrition leads to short-term health problems, but it also lays the foundation for long-term problems such as stunting and an increased predisposition to non-communicable diseases such as cardiovascular disease and type 2 diabetes. The undernutrition rate of the under-fives also rises, and the increased prevalence of these conditions has a lasting negative influence not only on the individuals affected but also upon the entire societies of which they form a part.

- 3) Changes in the price of food can also impact the macro-economy and labor markets, causing wages to rise or fall concomitantly. The worst-case scenario is when a drop in job opportunities is accompanied by a rise in food prices, as was the case in parts of the Arab region in recent years.
- 4) Difficulties caused by rising food prices will prompt a reaction from government. One response is to widen the

social safety net, putting emergency schemes in place for the most economically vulnerable, but poor countries lack the resources for that and the effectiveness and coverage of such measures is often limited. Another response is to tax or otherwise legislate for the import or export of food, which has adverse effects for reliable trade flows.



Time dependence of FAO Food Price Index from January 2004 to May 2011. Red dashed vertical lines correspond to beginning dates of "food riots" and protests associated with the major recent unrest in North Africa and the Middle East. The overall death toll is reported in parentheses. The blue vertical line indicates the date, December 13, 2010, on which we submitted a report to the U.S. government, warning of the link between food prices, social unrest and political instability. Inset shows FAO Food Price Index from 1990 to 2011. From *The Food Crises and Political Instability in North Africa and the Middle East*, Marco Lagi, Karla Z. Bertrand and Yaneer Bar-Yam, New England Complex Systems Institute, Cambridge, US

Double blow to the poor

In the wake of a food pricing crisis, it is the poor that suffer most. In fact, poor people spend an estimated 50–70 percent of their wages on food, and are unable to adapt to price rises, with wages for unskilled labor also unlikely to rise. The result is that households tend to limit their food consumption, eat less balanced diets, and spend less on goods and services. A vicious cycle of nutritional and economic deprivation is thus initiated.

The current economic climate can pose further problems, with falling wages and unemployment widespread in many parts of the world. Some three quarters of the world's poor live in rural areas. They are therefore more exposed to the impact of commodity price increases occurring in the global economy. China and India both attempted after 2008–9 to combat the problem of food price spikes by shielding themselves from the international market, and keeping all their national produce for domestic use. While successful in the short term, protectionist measures of this kind can negatively affect a country's global trading position, and therefore its wealth, in the longer term.

Food prices and the Arab Spring

While there were other contributing factors to the recent Arab Spring uprisings, food prices and the inability of governments to react to their increase were definitely part of it. The Middle East and North Africa are more dependent on imported food than other regions, and in 2007–8 when global food prices spiked, countries like Egypt were faced with rises in local food prices of 37 percent. With unemployment in the country rising also, people depended on the government to supply subsidies, but it was widely felt that not enough was being done. Food inflation in Egypt continued to rise, and was 18.9 percent when President Mubarak gave up his seat.

Other countries experienced difficulties, with Bahrain, Yemen, Jordan and Morocco all staging food demonstrations during 2008. Many governments offered subsidies, but as in the case of Egypt, these were deemed low quality and not enough. In Egypt and Yemen, over 40 percent of the population live below the poverty line and suffer malnutrition, while 30 percent of Egyptian adults and 35 percent of Jordanians are obese. According to the Gallup World Poll, between half and three quarters of the Arab population say they are unhappy with their government's poverty reduction efforts. "The food-price spike was the final nail in the coffin for regimes that were failing to deliver on their side of the social contract," Jane Harrigan of London's School of Oriental and African Studies told the Economist.

Sources: <http://www.economist.com/node/21550328>, <http://www.guardian.co.uk/lifeandstyle/2011/jul/17/bread-food-arab-spring>



Can containing fortified vegetable oil

Source: Mike Bloem Photography

How are food prices set?

Food pricing today is no longer set by the straightforward dynamics of supply and demand only. A report published by the United Nations Conference on Trade and Development in 2000 and entitled *Commodity Exchanges in a Globalized Economy* provides an introduction to the topic.

“Modern commodity exchanges date back to the trading of rice futures in the 17th century in Osaka, Japan, although the principles that underpin commodity futures trading and the function of commodity markets are still older. The first recorded account of derivative contracts can be traced to the ancient Greek philosopher Thales of Miletus in Greece, who, during the winter, negotiated what were essentially called options on oil presses for the spring olive harvest. The Spanish dramatist Lope de Vega reported that in the 17th century options and futures were traded on the Amsterdam Bourse [Stock Exchange] soon after it was opened.”

It continues:

“Futures’ trading is a natural application to the problems of maintaining a year-round supply of seasonal products like agricultural crops. Exchanging traded futures and options provides several economic benefits, including the ability to shift or otherwise manage the price risk of market or tangible positions. With the liberalization of agricultural trade in many countries, and the withdrawal of government support to agricultural producers, there is a new need for price discovery and even physical trading mechanisms, a need that can often be met by commodity exchanges. Hence, the rapid creation of new commodity exchanges.”

Commodity exchanges are places where commodities and derivatives are traded. This generally covers agricultural produce and other raw materials (e.g. wheat, sugar and maize) and contracts based on them. These contracts may be the basis for a range of sophisticated financial products including, for instance, futures, interest rates and swaps. Futures are future contracts on a crop that has not yet been harvested. They set the sale price in advance for both the producer (the farmer) and the purchaser (e.g. a food processor). Both producer and purchaser are thereby protected from potential price fluctuations at the moment of sale. The price of grain crops – especially of wheat, corn and soy – is set in this manner. Food commodities are assets worth investing in, and are treated in the same way as stocks or bonds. Investors will buy a package of food commodities through a hedge fund, and ask them to be traded at a time that is financially opportune.

Milk prices, by contrast, are derived from feed prices, while rice prices are set at a national level, as rice is such an important staple food in so many parts of the world.



Case study

Case study: Guatemala

A study conducted in Guatemala in 2008 revealed that the price of a diet based on a corn tortilla, vegetable oil, vegetables and beans – containing key recommended micronutrients – is twice the cost of a less nutritious diet based only a tortilla and oil. The cost of the diet for one person with beans and vegetables is also around a third of the total household income of a family living on \$1 a day.

If a person were to eat the diet based only on the tortilla and oil, they would receive no vitamin A and C, and very low levels of other essential nutrients. This will put them at risk in terms of health problems and illnesses, some of which can be long term.

Source: Erick Boy, IFPRI, based on Guatemala City market prices in November 2008; and data from FAO/WHO 2002

Abstract

A food crisis occurs when rates of hunger and malnutrition rise sharply at local, national, or global levels. This definition distinguishes a food crisis from chronic hunger, although food crises are far more likely among populations already suffering from prolonged hunger and malnutrition. A food crisis is usually set off by a shock to either supply or demand for food and often involves a sudden spike in food prices. It is important to remember that in a market economy, food prices measure the scarcity of food, not its value in any nutritional sense. Except in rare circumstances, the straightforward way to prevent a food crisis is to have rapidly rising labor productivity through economic growth and keep food prices stable while maintaining access by the poor. The formula is easier to state than to implement, especially on a global scale, but it is good to have both the objective, reducing short-run spikes in hunger, and the deep mechanisms, pro-poor economic growth and stable food prices, clearly in mind. A coherent food policy seeks to use these mechanisms, and others, to achieve a sustained reduction in chronic hunger over the long run while preventing spikes in hunger in the short run.

Source: J. Nutr. 140: 224S–228S, 2010.

It is ironic that the prices of many food commodities are today partly decided by financial markets that have nothing to do with the process of producing food by agriculture or with the procedure for distributing it physically within an economy. Cuts in food prices can have a drastic effect on the farmers who actually grow the food. At the same time, sharp increases in food prices can threaten the well-being of the poorest sections of society, who have no means to increase their income in response to the rising cost of food.

Links between the food and financial crises

Looking at the dates where the worst spikes in rising food prices occurred recently, in 2007–8 and 2011, one could easily assume that a direct connection must exist between the rise of food commodity prices and the more widespread global economic crisis which occurred during the same period. The relationship is somewhat more complex, however.

Before the global recession, the consumption of agricultural products increased in line with income and population figures, rising energy prices and subsidized biofuel production. Pressure was placed on production, however, by natural resource constraints, underinvestment in rural infrastructure and agricultural science, and weather disruptions.

The much wider financial crisis of 2008, which started in the USA and resulted in the collapse of the housing and financial markets in many parts of the world, led to increased speculation surrounding agricultural commodities, introducing volatility and making prices rise further.

Global Food: Waste Not, Want Not

Feeding the 9 Billion: The Tragedy of Waste

By 2075, the United Nations' predicts human numbers will peak at about 9.5 billion people – an extra 3 billion mouths to feed. Substantial changes are anticipated in the wealth, calorific intake and dietary preferences of people in developing countries. However 30–50% (or 1.2–2 billion tons) of all food produced never reaches a human stomach.

Developing nations

In less-developed countries, wastage occurs primarily at the farmer-producer end of the supply chain due to inefficient harvesting, inadequate local transportation and poor infrastructure. As development increases, the problem generally moves further up the supply chain with regional and national infrastructure deficiencies having the largest impact.

Developed nations

In fully developed countries such as the UK, a larger proportion of the food produced reaches markets and consumers. However produce is often wasted through retail and customer behavior.

Major supermarkets often reject crops because they do not meet exacting marketing standards. Up to 30% of the UK's vegetable crop is never harvested as a result of such practices. Globally, retailers generate 1.6 million tons of food waste annually in this way.

Sales promotions encourage customers to purchase excessive quantities, which generates wastage of perishable foodstuffs. Between 30% and 50% of food bought in developed countries is thrown away.

Better use of our finite resources

Wasting food is a waste of land, water and energy. Tackling of food waste involves addressing key resource issues:

Effective land usage

Over the last five decades, improved farming techniques and 12% expansion of farmed land have increased crop production. Further expansion of crop land would impact on the world's natural ecosystems. Per capita calorific intake from meat consumption is set to rise 40% by mid-century, and meat products require significantly more resources and land to produce. Considerable tensions are likely to emerge, as the need for food competes with demands for ecosystem preservation and biomass production as a renewable energy source.

Water usage

Over the past century, fresh water withdrawal for human use has increased at more than double the rate of population growth. The demand for water in food production could reach 10–13 trillion m³ annually by mid-century. This is 2.5 to 3.5 times greater than the total human use of fresh water today.

About 40% of the world's food supply is currently derived from irrigated land. However, water used in irrigation is often sourced unsustainably, and we continue to use wasteful systems. While drip or trickle irrigation methods are more expensive to install, they can be 33% more efficient and carry fertilizers directly to the root.

In the production of foods besides crops, especially in meat production, there are large additional uses of water. More effective procedures, and recycling and purification of water will be needed to reduce wastage.

Energy usage

An average of 7–10 calories of input is required in the production of one calorie of food. This varies dramatically depending on crop, from three calories for plant crops to 35 calories for beef.

High productivity in agricultural crops requires appropriate fertilizer use. In the modern industrialized agricultural process the making and application of agrochemicals such as fertilizers and pesticides represents the single biggest energy component. Wheat production takes 50% of its energy input from these two items alone. Fertilizer manufacturing consumes 3–5% of the world's annual natural gas supply. With production anticipated to increase by 25% between now and 2030, sustainable energy sourcing will become an increasingly major issue.

Source: Aggdis G, Arbon I, Brown, C et al, Global Food – Waste Not, Want Not, The Institution of Mechanical Engineers, January 2013

The long-term health risks of rising food prices

Micronutrient deficiencies can lead to a wide number health problems, including impaired cognitive development, lower resistance to disease, and increased risks during childbirth for both mothers and children.

It is essential that governments do not undervalue or underestimate the long-term effects to the population caused by rising food prices. There is a short-term effect that food will be hard for the population to budget for and that bad diets may be eaten, with a serious risk of long-term problems arising from this situation. Careful monitoring and assistance should be provided by governments when a food pricing crisis is under way, and also for a suitable length of time afterwards.

This would require funds set aside by the government to ensure its recovery from the crisis and also that of the population. Data will need to be collected, and assessed, in addition to the right aid and support, and potentially supplementary foods provided, to limit any long-term effects.

Source: Overcoming the World Food and Agriculture Crisis through Policy Change, Institutional Innovation, and Science, Joachim von Braun, TAAS Lecture. New Delhi, March 6, 2009. http://www.taas.in/documents/fdl4_jvbraun.pdf

How does climate change affect food prices?

Food production is very sensitive to climate change, and a small crop yield as the result of drought, too much rainfall, or extremes like flooding or storms, can push prices up. The effect of global warming is resulting in greater weather extremes than ever before, with bigger impacts on food production, felt around the world. In Russia in summer 2012, a heat wave destroyed around a third of its crop yield, while in the US, the worst drought experienced by the country in 50 years destroyed almost half the corn crop and a third of the soya bean crop.

Richard Tiffin, director for the Centre of Food Security at the University of Reading in the UK said:

“It should be a major warning that climate change is increasingly having a global impact on the food supply. If the problems in Russia and the US were combined with a failure of the Indian monsoon, we could see a major global food crisis that would have an enormous impact on food prices and badly affect poor people around the world.”

A recent study by Stanford University suggests that the global production of maize and wheat since 1980 would have been 5% higher if not for climate change. Increases in carbon dioxide in the atmosphere is actually said to be beneficial to the production of certain crops, such as rice, soybean and wheat, but climate change will affect the length and quality of the growing season, and the overall effect of climate change on world agricultural production is clearly negative.

*Sources: <http://www.guardian.co.uk/environment/damian-carrington-blog/2012/oct/10/food-price-rise-uk-crop-harvest>
<http://www.guardian.co.uk/environment/2012/sep/19/climate-change-affect-food-production>*

What happens next?

While challenges regarding food reserves and pricing have populated the headlines in recent years, many experts believe that more risks are on the way.

Food consumption is said to have exceeded growth for six of the past 11 years, with yields of most crops, excluding rice, falling. According to the FAO, food prices rose 1.4 percent in September and 6 percent in July.

The key to solving the global food crisis and preventing prices from escalating further lies at a global level. It is important that all countries come together and accept shared responsibility. The risks regarding food price spikes and their repercussions were known many years before the dangerous increases occurred, but governments failed to give them sufficient credence. For example, only twice in the past 10 years has food been listed in the top five factors for the Global Risk Report.

A potential solution to rising food prices lies in the following areas:

1. Promote sustainable intensification of agriculture growth

Governments should increase their investments in R&D, rural infrastructure, rural institutions, and information monitoring and sharing of scientific insight. Smallholders need improved access to affordable finance. Investments in agriculture would increase output, helping countries to emerge from poverty.

2. Reduce market volatility

A lack of information can lead to market inefficiencies and reduce the extent of mutually beneficial exchanges. Investors need more transparency about market information and stocks. Appropriate regulation of commodity exchanges is called for.

3. Expand social protection and child nutrition action

Preventative actions are needed to address both short-term and long-term issues. This could include conditional cash transfers, pension systems and employment programs, while children could benefit from supplementary feeding in the first two years, school feeding, and increased food education.

In addition to this framework, borders must remain open, and sharing scarcity through trade should not be reduced. Export restrictions should be avoided, as this leads to a smaller import/export market, which keeps prices high. Food aid should be allowed to flow freely between countries. The solution to the problem of food price spikes lies in our hands, but it will take a global effort of concentrated willpower to make those hands work effectively together.

My personal view

Joachim von Braun

Director of the Center for Development Research (ZEF)
Professor for Economic and Technological Change,
University of Bonn, Germany



Food security – the availability of and access to sufficient and healthy foods and good nutrition – is central to the well-being of nations and people. Food insecurity has increased in the context of the inter-linked food price and economic crises of 2007–08 and again in 2010–11. The food price crisis is mainly a consequence of neglected investment in agriculture in many developing countries, inappropriate agriculture energy subsidization policies in industrialized countries, and then triggered by adverse weather events and exacerbated further by export restrictions. The consequences are volatile and spiking food prices that undermine food and nutrition security of the poor. A comprehensive assessment of the costs of price volatility is called for; including human costs, adverse investment effects, macro-economic and fiscal effects, and market distortions such as speculation. Empirical analysis of the inter-linkages of food, energy and financial markets suggests that food security policy needs to go beyond traditional mitigation of demand- and supply-side shocks. And a comprehensive portfolio of policy actions for prevention of price spikes is proposed here, including better regulation of commodity exchanges and innovative food reserves policies.

Further reading

IFPRI website: www.foodsecurityportal.org

Food and Agriculture Organization. *The State of Food Insecurity in the World*. Rome: FAO 2012.

von Braun J. *Increasing and More Volatile Food Prices and the Consumer*. In: *The Oxford Handbook of the Economics of Food Consumption and Policy*, 2012. DOI:10.1093/oxfordhb/9780199569441.013.0025