
FOOD FOR THOUGHT: GLOBAL AND NATIONAL CHALLENGES OF FOOD SECURITY

AN IPPR TRADING LTD REPORT FOR
THE NATIONAL FEDERATION OF WOMEN'S INSTITUTES

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theWI
INSPIRING WOMEN

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The National Federation of Women's Institutes (NFWI) is an educational, social, non-party political and non-sectarian organisation. It was established to ensure that women are able to take an effective part in their community, to learn together, widen their horizons, improve and develop the quality of their lives and those of their communities and together influence local, national and international affairs on issues that matter to members.

The NFWI is the largest women's organisation in the UK with some 210,000 members in 6,500 Women's Institutes across England, Wales and the Islands. The NFWI has a long history of undertaking educational work and campaigning on a diverse range of issues. The first NFWI mandate was passed in 1918, and since then the organisation has accumulated a wide-ranging portfolio of policy concerns on a local, national and international level. The NFWI resolution process means that members play a central role in defining organisational policy and bringing issues onto the organisation's national agenda.

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SUMMARY

Food security is...

‘When all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.’

World Food Summit, 1996

Food security has, in recent years, become a concern for people across the UK and around the world. Two main trends have driven the current debate:

- > rising and volatile food prices, particularly in tough economic times
- > increasing concerns about the security and sustainability of food supplies at the local, national and international levels, particularly given environmental concerns.

As food prices continue to rise, the total number of people living in hunger is increasing, and passed 1 billion in 2009. This is in spite of significant economic growth and development, and an overall reduction in the number of people living in extreme poverty – food insecurity threatens to undermine global efforts to tackle poverty.

Food security isn't only an issue for those in developing countries. As food prices increase, more and more people in the UK are struggling to feed their families healthy and nutritious meals, and an increasing number are relying on food banks.

This short report sets out the key debates and evidence about food security. It will set out to explain two things. First, the key question on the minds of many people in the UK and elsewhere: what is driving rising food prices? Second, we explore how and why the sustainability and security of our food supply (locally, nationally and globally) is potentially at risk, exploring a range of factors covering the whole food production chain, from field to plate.

To address these two issues, the report looks at how population growth and changing consumption patterns are driving global demand for food. We then go on to examine food production processes, the dynamics of the global marketplace and food supply chains. A final chapter considers questions for the future.

By 2050, the global population is predicted to stand at nearly 9 billion people, almost a third more people than there are today. The UK population is projected to increase by over 10 million in the same

period. This will place a huge stress on our food production systems in years to come. This is only one of many factors that will play a role in the availability and sustainability of food supplies.

Economic development is also significantly raising the global demand for food, particularly in emerging markets like China and Brazil. This is, of course, a good thing – increased incomes and better nutrition should be welcomed.

The average person in a rich country receives significantly more food than they need, and consumes a high level of meat and dairy products, which are resource intensive to produce. These patterns of consumption not only put pressure on food supplies, but can also cause health problems. However, the most substantial increase in demand for food crops from rich countries is now not for food, but for fuel. An increasing proportion of global food crop production is used to make biofuels, and many are concerned that the food needs of poor people are now in direct competition with the energy needs of rich people. Increased demand for food crops for fuel drives up prices for everyone.

Chapter 3 of the report focuses on the limits of supply and food production processes. In recent decades, increased agricultural productivity has been the most important factor in increasing the supply of food. Land use for crops only grew by 8 per cent between 1967 and 2007, but crop yields expanded by 115 per cent in the same period.

However, the challenge of sustainably increasing the supply of food to meet demand is becoming ever more difficult in the face of clear environmental limits. Climate change is already, and will increasingly, challenge (and perhaps limit) our ability to increase food production. But the relationship between climate change and food production is two-way: food production also makes a significant contribution towards greenhouse gas emissions and climate change.

In the UK, much of the debate about increasing agricultural productivity revolves around arguments about large-scale intensive farming, but wider questions about technology and food production also need to be brought into the discussion. For example, in the face



of climate change and other environmental pressures, some argue that an expansion in the use of genetically modified (GM) crops is essential for achieving food security.

The future of the debate appears to lie with the concept of *sustainable intensification* (producing more food from the same land in a sustainable way). The question of what this would look like in practice, in the UK and elsewhere, is still an open one. If regulated appropriately to prevent environmental damage, sustainable intensification might involve more large-scale intensive farming and the use of GM crops, but there are also strong arguments for development and investment in food production systems that better support diversity and innovation from small farmers and producers, both in the UK and overseas.

Chapter 4 examines the dynamics of the food market at global, national and local levels. Food crops and products are traded with little regulation or transparency on the global market. Although global markets have an important role in setting prices and channelling investment into food production, unregulated speculation can increase the volatility of prices.

Although food commodities are traded on international financial markets with little regulation, governments intervene substantially in the market for ‘real life’ food products, via tariffs and trade restrictions and agricultural subsidies. Agricultural and trade policies in developed countries (including the EU’s common agriculture policy [CAP]) have significant impacts on global food prices and sustainability. The CAP is often justified as a way for the EU to achieve a higher level of food self-sufficiency, rather than relying too heavily on food imports from outside Europe.

However, it is not necessarily the case that a more self-sufficient EU (or UK) would actually have better food security. Increased self-sufficiency could make food production levels (and prices) more volatile (for example due to weather events affecting all European producers). International trade has an important role to play in spreading and sharing risk and volatility. Farm subsidies and trade restrictions in the EU and US have also been criticised for hurting farmers in developing countries by denying them a level playing field in the world’s largest agricultural markets. In fact, there is evidence to suggest that freeing up agricultural trade further, along with reducing subsidies, would reduce food prices and increase global production and productivity, something that would be good for European consumers as well as for producers and consumers in developing countries.

“The average person in a rich country receives significantly more food than they need”

Below the level of global trade, the nature of the food supply chain has changed radically in recent years. Retailers have a direct impact on both the price and sustainability of food. The UK's four largest supermarkets (Tesco, Asda, Sainsbury's and Morrisons) make up a combined 62 per cent of the grocery market. They provide cheaper food by increased efficiency in procurement practices and the ability to acquire food more cheaply through economies of scale. However, the market power of large supermarkets has emerged as a concern for both producers and consumers in the UK. Ultimately, although supermarkets can help drive productivity and efficiency in the food supply chain, this may come at a cost for food security if it reduces the diversity and number of producers and suppliers at the local, national or international level.

Chapter 5 sets out options and questions for the future. It is clear that the food security challenge is a complex one, involving many different actors from the local to the global level. This complexity can make change seem impossible, but also provides a wide range of opportunities for action. However, there are no easy answers, and there are difficult tensions and trade-offs which need to be confronted head-on.

1. INTRODUCTION

Food security has, in recent years, become a concern for people across the UK and around the world. Two main trends have driven the current debate:

- > rising and volatile food prices, particularly in tough economic times
- > increasing concerns about the security and sustainability of food supplies at the local, national and international levels, particularly given environmental concerns.

‘Food security’ means different things to different people, but was defined at the World Food Summit 1996 as:

‘When all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.’

In practice, this means that food should be available and affordable to everyone, both now and into the future. Food security issues affect food producers, as well as consumers. Securing our food supply must also involve securing the livelihoods of farmers and others working in the food industry.

Food facts

- > In 2009, the number of people living in hunger passed 1 billion, while 1 billion people globally are obese.
- > In the UK, 128,687 people used food banks in 2011–2012, nearly double the previous year.
- > The number of people who achieve the ‘five-a-day’ fruit and vegetable guideline in the UK has declined by more than 900,000 in the past two years.

In 2011, in an influential report, the Government Office for Science outlined the case for urgent action in addressing food security.¹ The report argues that increased public discussion must play a role in finding solutions to the challenges of food security. This paper is a modest contribution to that objective.

2012 has been a particularly difficult year for global food supply. In July 2012 alone, food prices leapt by 10 per cent, with wheat and maize prices rising 25 per cent. This was in large part due to reduced supply caused by adverse weather events, in particular droughts

¹ Foresight (2011) *The Future of Food and Farming: Challenges and Choices for Global Sustainability*, London: Government Office for Science

and poor harvests in the US (the world's largest food exporter) and eastern Europe.

Wheat and maize production are expected to continue falling through 2013, while world consumption, driven in part by demand from countries like China, continues to increase in line with growing affluence. In November 2012, the UN Food and Agriculture Organization (FAO) estimated that the 2012–2013 global wheat supply will be 661 million tonnes, well below the consumption level of 688 million tonnes, forcing wheat prices to further record highs.

The poor harvests of 2012 come on top of a run of bad years: Australia experienced harsh droughts right through 2009 to 2012; 2011 saw the worst famine in the Horn of Africa for over 60 years, and in 2008 food price increases led to widespread riots throughout Africa.

As food prices continue to rise, the total number of people living in hunger is increasing, and passed 1 billion in 2009.² This is in spite of significant economic growth and development, and an overall reduction in the number of people living in extreme poverty. Food insecurity threatens to undermine global efforts to tackle poverty. A big increase in the price of maize in the coming decades (with less dramatic price rises predicted for rice and wheat) will have a disproportionate effect on the poor, particularly in Africa where maize is an important staple everyday food. The proportion of people in Africa suffering from hunger could rise from 24 per cent, at current figures, to between 40 and 50 per cent, despite strong overall economic performance in the region.³

While it is clear that the most serious effects of food insecurity are felt by people in the world's poorest countries, food prices are a significant and increasing concern in the UK, particularly given the current economic conditions and a longer-term stagnation of wages for low to middle earners. A 2011 survey by Which? showed that 92 per cent of the British public had noticed an increase in food

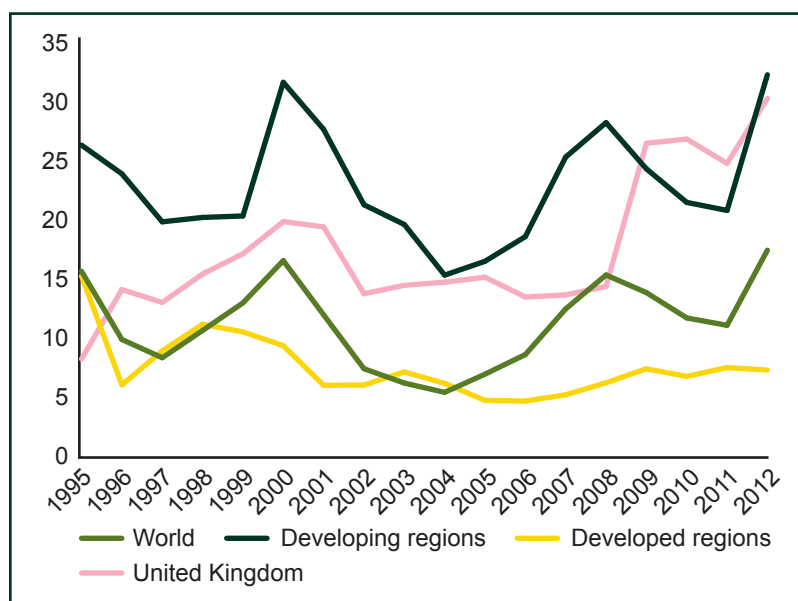


Figure 1: Domestic food price volatility, 1995–2012 (%)

Data: FAOSTAT

Note: Price volatility shows the range of how much prices move up and down in a given year. If the price for food moves up and down rapidly within a given year there is high volatility. If the price changes only slowly, there is low volatility.

2 Oxfam (2011) *Not a Game: Speculation vs Food Security. Regulating Financial Markets for a Better Future*, Oxfam briefing, Oxford

3 Nelson GC, Rosegrant MW, Palazzo A, Gray I, Ingersoll C, Robertson R, Tokgoz S, Zhu T, Sulser TB, Ringler C, Msangi S and You L (2010) *Food Security, Farming, and Climate Change to 2050: Scenarios, Results, Policy Options*, Washington: IFPRI

prices in the previous 12 months, while 84 per cent said they were worried about the increase.⁴ Incomes are no longer keeping pace with food prices. In the 1990s, food price rises were moderate in relation to income. In the 2000s, however, the trend has reversed, with food prices now increasing at a faster rate than incomes.⁵ Food prices in the UK have risen by over 30 per cent in the past five years.

That food insecurity is becoming a real issue in the UK is demonstrated by the number of families using food banks. According to the Trussell Trust (the UK's main food bank provider) 128,687 people were fed using food banks in 2011–2012, nearly double the previous year.⁶ Recent research for *The Guardian* newspaper suggests that the UK has entered a 'nutritional recession' in which people's diets become less healthy as they seek out cheap and filling foods at the expense of healthy diets. An estimated 900,000 fewer people were eating the recommended five daily portions of fruit and vegetables in May 2012 than two years previously, while consumption of fats and sugars has soared.⁷

Food prices in the UK are also becoming more volatile (see figure 1), with significant impacts caused by exchange rate fluctuations after 2008. Price volatility can be at least in part attributed to Britain's dependence on importing food. Government statistics show that the UK is now 74 per cent self-sufficient in foods that can be produced in the UK, and a little over 60 per cent self-sufficient overall; that is, approximately 40 per cent of the food we eat is imported. Figure 2 shows the UK food self-sufficiency ratio (the proportion of food consumed in the UK that is produced in the UK) from 1970 to 2011. The UK produces less food than it consumes, and despite a slight increase in recent years (likely due to exchange rate movements and the economic recession making imported food more expensive), the overall trend since the early 1990s is that the UK has been consuming more food, but producing less.

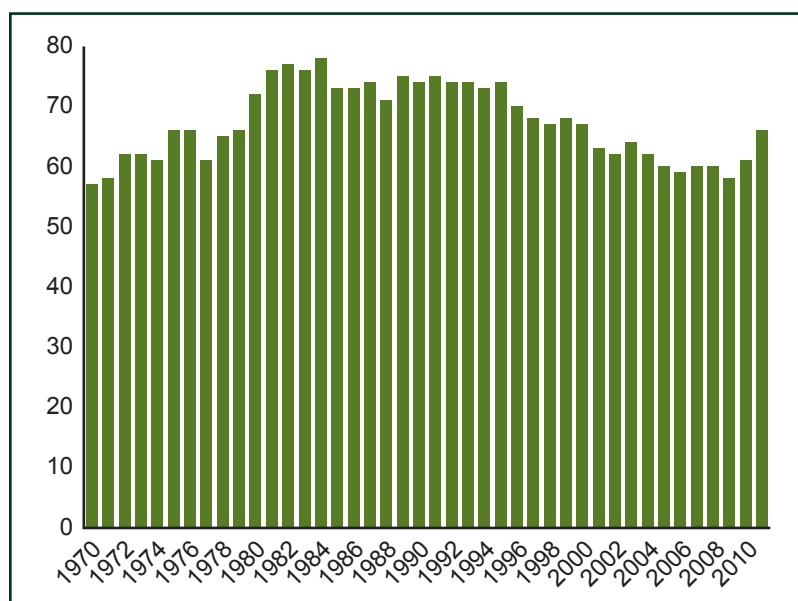


Figure 2: UK self-sufficiency ratio, 1970–2011 (%)

Data: Defra

Note: The self-sufficiency ratio is the proportion of food consumed in the UK that is produced in the UK.

4 Which? (2011) *The Impact of Rising Food Prices*, London

5 Hirsch D, Plunkett J and Beckhelling J (2011) *Priced Out: The New Inflation and its Impact on Living Standards*, London: Resolution Foundation

6 More information available at <http://www.trusselltrust.org/foodbank-projects>

7 Butler P (2012) 'Britain in nutrition recession as food prices rise and incomes shrink', *Guardian*, 18 November 2012

Questions of rising prices (and falling incomes) often dominate debates about food in the UK, but questions about the security and sustainability of food supply are also linked to a range of high-profile issues around climate change, conservation, and our rural economy and landscape which are of direct concern to people in the UK.

This short report will set out the key debates and evidence about food security and why it matters to people in the UK, as well as those in developing countries. It will try to explain two things. First, the key question on the minds of many people in the UK and elsewhere: what is driving rising food prices? As figure 3 shows, prices are affected by a wide range of international and domestic factors. Second, we explore how and why the sustainability and security of our food supply (locally, nationally and globally) is potentially at risk, examining a range of factors covering the whole food production chain, from field to plate.

To address these two issues, chapter 2 of the report looks at how population growth and changing consumption patterns are affecting global demand for food. Chapter 3 focuses on the food production process, including debates about the use of new technology and changing farming practices, and how climate change could affect our food supply. Chapter 4 examines the dynamics of the food market and supply chain at global, national and local levels. Chapter 5 sets out options and questions for the future.



Figure 3

2.

POPULATION GROWTH, DEVELOPMENT AND CONSUMPTION: THE DEMAND FOR FOOD

- > Global population is growing, and is expected to level off at over 9 billion around 2050.
- > In emerging economies, food consumption is increasing rapidly.
- > Food consumption in developed countries is significantly higher than in developing countries. People in rich countries consume on average almost three times the amount of meat and dairy products as those in poor countries.
- > Estimates suggest that the production of food must be nearly doubled by 2050 in order to meet demand.
- > The use of food crops to produce biofuels is creating a new source of demand, and driving up prices. In the US it is estimated that by 2013, 40 per cent of all corn yields will be used for biofuel.

Global demand for food is high and rising, for three main reasons. The first, and most obvious, is population growth. However, the relationship between population growth and the demand for food is not as straightforward as it might seem: food consumption levels and patterns vary considerably between countries and regions, so the impact of population growth on food demand depends on where it occurs.

Global population is set to increase significantly over the next half century, although the rate of growth is declining, and it is expected to level off within 50 years. Nonetheless, the UN estimates that the world's population will reach 9.1 billion by 2050, 2 billion more mouths to feed than today.⁸

Figure 4 compares population projections in Europe with Asia and Africa, the two continents with the largest predicted growth. Estimates for the coming decades show Europe's population to be in a stable decline while Asia and Africa expand at a more rapid pace. Nearly half of the estimated 2 billion additional people in 2050 will be in Africa alone, which is expected to more than double its population from roughly one billion in 2010 to nearly 2.1 billion people in 2050.

As noted above, the number of people suffering from hunger in Africa is also projected to increase substantially in the coming years. It is tempting to conclude that population growth is the cause of this increase in hunger, but the relationship between the two is not so

“The UN estimates the world’s population will reach 9.1 billion by 2050, 2 billion more mouths to feed”

⁸ UN News Centre (2005) ‘World population to reach 9.1 billion in 2050, UN projects’, press release, 24 February 2005

simple. While it is certainly true that rapid population growth makes securing the food supply more difficult (because economic growth and food production must keep pace with population growth to maintain living standards and food supplies), it does not follow that population growth is the only (or even the main) driver of food insecurity; or that tackling population growth would, in and of itself, solve problems of hunger. Even if population growth were slowed, poverty would still result in food insecurity and hunger. In fact, rapid population growth itself is often caused by poverty – reducing poverty would slow population growth, as well as directly helping to deliver food security.

Despite a stable or declining population in Europe as a whole, the population of the UK is expected to increase in the coming decades. By 2035, the British population is projected to be 73.2 million, more than 10 million more people than in 2010. A large proportion of this increase is due to net migration, which does not of course add to total global population, but the UK population is also increasing due to a relatively high (by European standards) fertility rate of 1.94 births per woman (compared to 1.59 in 27 EU member countries, 2009)⁹ and increasing life expectancy. If UK food production and consumption continue at their current rates we can expect the gap between domestic food production and consumption to widen.

The second reason for increasing demand for food is economic development: people in developing countries and emerging economies are consuming more food. This is, of course, a good thing. Increased incomes and better nutrition should be welcomed. However, it is important to understand the

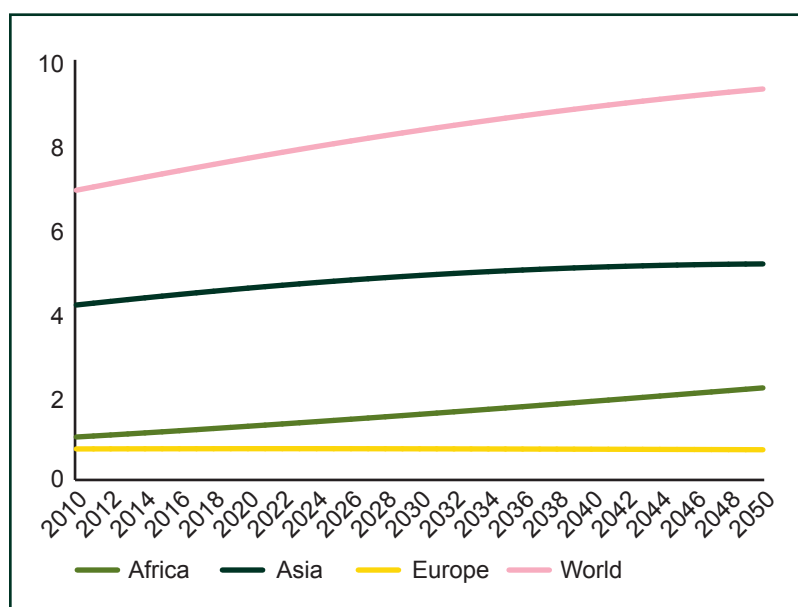


Figure 4: Total population projections for Africa, Asia and Europe, 2000–2050 (bn)
Data: FAOSTAT

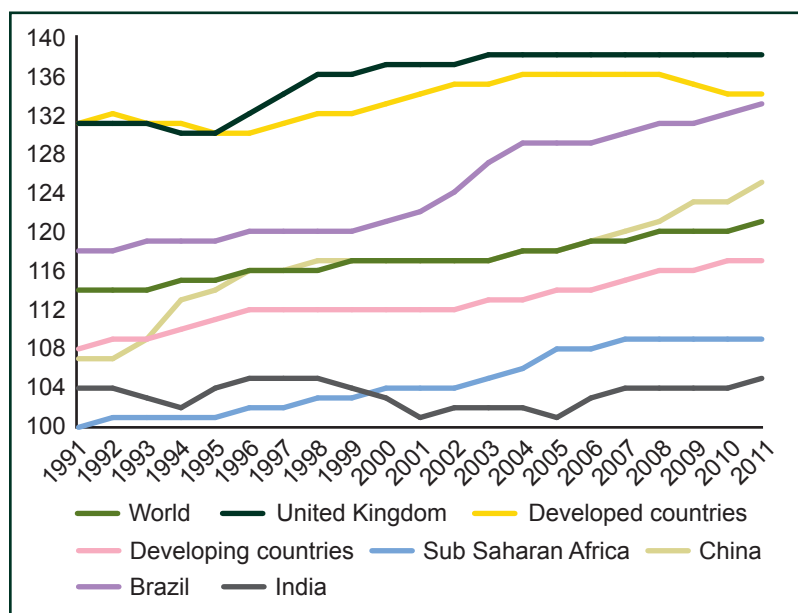


Figure 5: Average dietary supply adequacy, 1991–2010 (%)
Data: FAOSTAT

⁹ See <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdde220>

implications of this economic development both on overall food demand and on patterns of consumption.

Figure 5 shows average dietary supply adequacy for a number of areas, including the UK. This measure shows the percentage of the food required for health that the average person receives, so values under 100 would suggest that people are on average not getting enough food, while values above 100 suggest that people are on average receiving more than they need. In fact, on average, people in all regions receive enough food (although people in developed countries receive significantly more than those in developing countries). We know that food is distributed highly unevenly, with some getting more than they need while others go hungry, so countries where average food supply is only a little above what is needed for health will in most cases have significant numbers of people who are not getting enough to eat. The FAO estimate that nearly 870 million people in the world are chronically undernourished; 850 million of these people live in developing countries.¹⁰

While average per person food consumption seems to have peaked in most developed countries, it is increasing steadily in developing countries, increasing by 8.3 per cent between 1991 and 2010. Most notably, average food consumption has risen very rapidly in fast-growing emerging markets like China and Brazil. In China, the average dietary supply has increased by 18 percentage points in the past 20 years. The proportion of children in China who are underweight has declined from 25 per cent in 1990 to 16 per cent in 2010.¹¹

Rising incomes don't just affect the *amount* of food that people consume; they also change the *kind* of food that they consume. Most significantly, economic development disproportionately increases demand for meat and dairy products, which are very resource-intensive to produce. Farming livestock is a resource-intensive form of agriculture, and meat consumption is an inefficient way of providing nutrient energy, primarily due to the amount of grain needed to feed animals. On average it takes nearly 7kg of grain to produce 1kg of beef; 4kg of grain for 1kg of pork; 2kg of grain for 1kg of poultry.¹² This means that an increased global demand for animal products has significant consequences for the demand for grain, and consequently on grain prices, which affect even poor people who can afford to eat very little meat.

“Rising incomes don’t just increase the amount of food that people consume, they also change the kind of food that they consume”

10 FAO (2012) *The State of Food Insecurity in the World 2012*, Rome

11 *ibid*

12 Sustain (2011) *Meat and Dairy Products: Less is More*. http://www.sustainweb.org/sustainablefood/meat_and_dairy_products_less_is_more

Figure 6 shows the average amount of animal protein consumed per person in a range of countries. The gap between developed and developing countries is striking: people in rich countries consume almost three times the amount of meat and dairy products as those in poor countries. However, the rate of meat consumption in developing countries is growing at an even faster rate than the average rate of general food consumption, increasing by 2.8 per cent each year between 1991 and 2008. In rapidly growing economies, the rate of growth is even faster. The protein intake from animal products in China rose by an average rate of 4.5 per cent a year between 1991 and 2008.

It is clear that population growth and rising consumption in developing countries is a key driver of increased global demand for food. But consumers in rich countries must also take responsibility for their consumption patterns: high (and in some cases rising) rates of food consumption in rich countries are a major factor in explaining global food demand, alongside overconsumption of resource-intensive products such as meat and dairy.

Quite aside from the impacts of this consumption on the global demand for food, these patterns of consumption can of course lead to severe health consequences. Figure 7 shows the proportion of adults over 20 who are considered obese. The UK has an even higher obesity rate than the average European with 24.4 per cent of adult men and 25.2 per cent of women in the population being categorised as obese. This relatively new health crisis, which started in the US, then Europe, is at least in part the result of the availability of cheap, highly refined, fats, oils and carbohydrates (alongside reduced physical

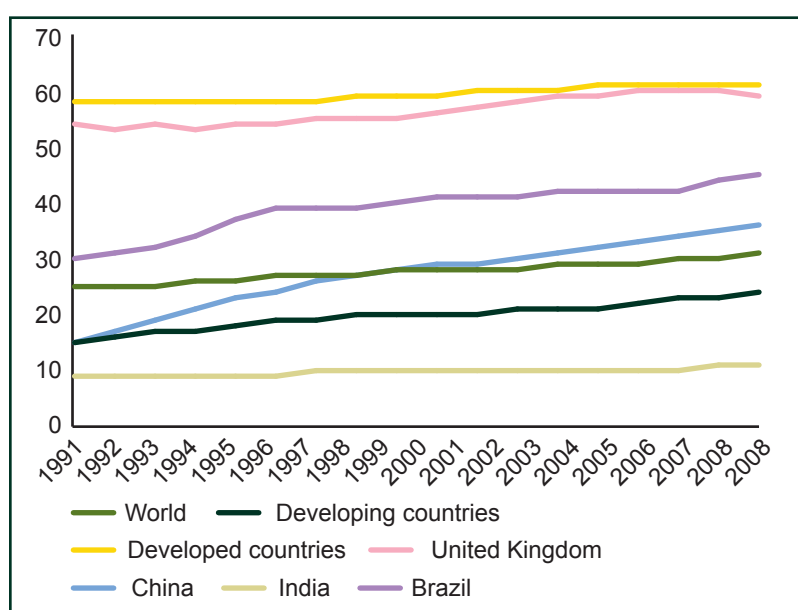


Figure 6: Average supply of proteins of animal origin (grams per person, per day), 1991–2008
Data: FAOSTAT

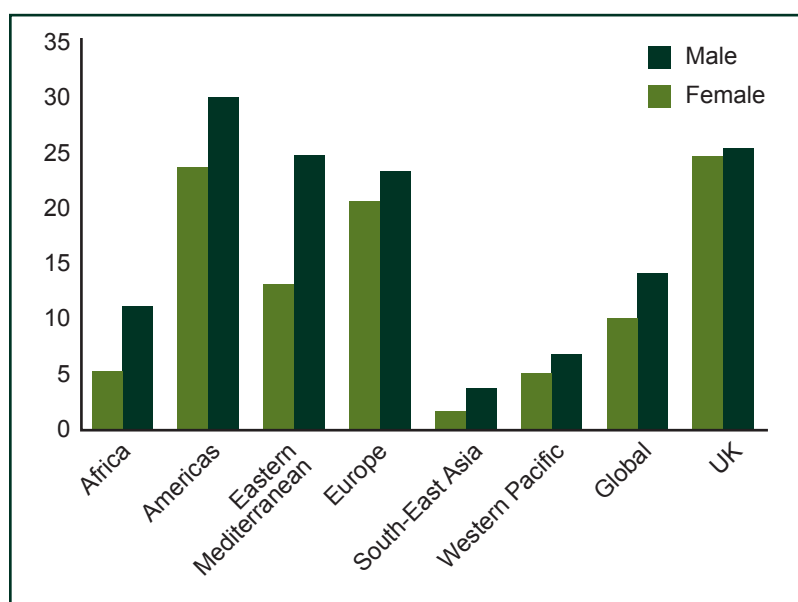


Figure 7: Adult male and female obesity rates as percentage of population, 2008
Note: BMI ≥ 30 (age-standardised estimate)
Data: WHO

activity); and is now making its way into developing countries.¹³

But the major increase in demand for food crops from rich countries is not now for food, but for fuel: an increasing proportion of global food crop production is used to make biofuels. In the US, it is estimated that by 2013, 40 per cent of all corn yields will be used for biofuel.¹⁴ In 2006, the European Union adopted a biofuel strategy that aimed to promote the use of biofuels within Europe. The strategy included an increased aid programme to help developing countries produce biofuels. The use of imported biofuels in Europe is increasing dramatically, and rose from just 24,000 tonnes in 2001 to 5,814,000 tonnes in 2010 (see figure 8 below).¹⁵

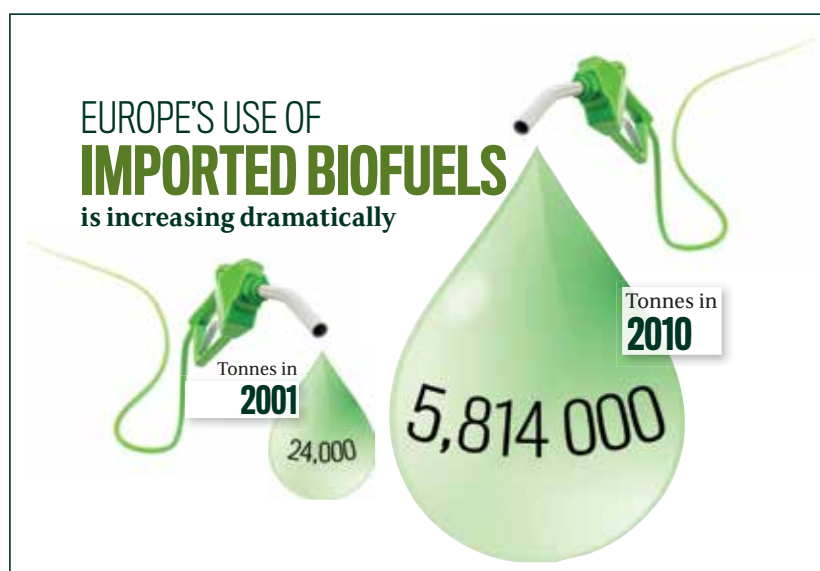


Figure 8

Although biofuels were seen by many as a way to reduce dependence on fossil fuels and contribute to the fight against climate change, the evidence is that they may actually increase global carbon emissions (see chapter 3 below), and many are now concerned that the move to biofuels has put the food needs of poor people in direct competition with the energy needs of rich people, as increased demand for food crops for fuel drives up global prices for everyone. In 2011, the International Centre for Trade and Sustainable Development estimated that the price of corn in 2009 would have been 21 per cent lower if the production of ethanol (fuel, produced from corn) in the US had been capped at 2004 levels.¹⁶

Putting these three factors together, it is clear that global demand for food (and food crops) is increasing significantly, and seems likely to continue doing so. In fact, estimates suggest that the production of food must be nearly doubled by 2050 in order to meet demand.¹⁷ More could no doubt be done to stabilise population growth in developing countries, although this is happening rapidly in any

13 Prentice A (2006) 'The emerging epidemic of obesity in developing countries', *International Journal of Epidemiology*, 35(1): 93–99

14 Knight B (2010) *Biofuels: Their Impact on Crop Production Worldwide*, London: Innovation Management

15 Data available at Eurostat: <http://eurostat.ec.europa.eu>

16 Babcock B (2011) *The Impact of US Biofuel Policies on Agricultural Price Levels and Volatility*, Geneva: ICTSD

17 Johnson R (2009) *Food Security: The Role of Agricultural Trade*, Washington: International Food and Agricultural Trade Policy Council

case, and population growth is already levelling off. Economic development and better nutrition in developing countries is of course to be welcomed, and should be accelerated, not reversed. This means that the most scope to slow the increasing demand for food lies with consumption (and waste) in rich countries like the UK, a theme that we will return to in chapter 5 below.

3.

PRODUCING FOOD IN A CHANGING ENVIRONMENT: THE SUPPLY OF FOOD

- > Globally, scope to increase significantly the amount of land under production is limited. The increases in food supply that are needed must come from raised agricultural productivity.
- > Increasingly frequent extreme weather events have already demonstrated the potential of climate change to reduce and disrupt food supply.
- > Farming and food production also contribute to climate change, and deforestation for agriculture (including for biofuels) is a particular concern.
- > ‘Sustainable intensification’ (increasing outputs within environmental limits) is required. This might involve more large-scale intensive farming and the use of GM crops, but there are also strong arguments for food production systems that support diversity and innovation from small farmers and producers.

Increasing demand for food is not new: the philosopher Thomas Malthus believed that population growth would get the better of humanity through famine and disease. But these dire predictions never came to pass. This was due both to a rise in the amount of land under production and to massive increases in agricultural productivity. In recent years, increased agricultural productivity has been the most important factor in raising the supply of food; land use for crops has only increased by 8 per cent between 1967 and 2007, while crop yields grew by 115 per cent in the same period.¹⁸ New machinery to help cultivate and harvest the land for crops, crossbreeding (of plants and animals), and new agricultural chemicals have all helped expand food production. However, the challenge of increasing sustainably the supply of food to meet demand is becoming ever more difficult.

Given rapid urbanisation in both developed and developing countries, and the need to reduce land conversion from forest to agriculture (see below), it seems unlikely that increases in the amount of land under production will be able to contribute significantly to growing global food supply in the coming years. This means an increased supply of food to meet demand will require further rises in agricultural productivity.

“Land use for crops has only increased by 8 per cent between 1967 and 2007, while crop yields grew by 115 per cent in the same period”

In the UK (and elsewhere), this debate has become rather polarised and often revolves around arguments about large-scale intensive farming. The argument in favour of large-scale intensive farming is largely based on economies of scale: simply put, large farms have the ability to invest in the latest technology and methods to produce more food per hectare of land, at lower prices. Opponents argue that so-called ‘mega farms’ would eliminate small farmers, increase disease risk among livestock animals and plants (something that is itself a threat to food security). The issue of intensive farming also raises a range of environmental concerns: about waste, energy-intensive production methods, and the increased use of agricultural chemicals. It seems likely that it is these critical environmental concerns that will impose the most significant limits on our ability to raise food production in the coming years.

While large-scale intensive farming regulated appropriately no doubt has a role to play in securing the world’s future food supply, there is also a clear role for small farmers and producers, not least because diversity of supply is itself important for food security. This means increasing the productivity of small farms in both developed and developing countries. This need is particularly urgent in developing countries, where large numbers of very poor people depend on small-scale farming to survive, and will continue to do so for the foreseeable future. In fact, there is good evidence to suggest that the output of small farmers in developing countries can be substantially increased with packages of low-technology and low-environmental impact measures.¹⁹ In the UK, innovation from small farmers has been important in increasing both the diversity of products available to consumers and the output of small farms.

Opposition to intensive farming in the UK

In 2009, two British dairy farmers announced plans to build an 8,000 cow dairy at Nocton. The issue gained much attention from the media, NGOs and other public advocacy groups, igniting a debate about the direction of farming in the UK. Arguments in favour of the farm centred on the need to maintain UK milk production in a competitive global market (a challenge illustrated by a 50 per cent reduction in the number of UK milk farmers in the previous 10 years). Opponents argued that large-scale intensive farming models presented a risk to both the environment and animal welfare, and would accelerate the decline of smaller family farms. Although the farmers were willing to commit in excess of £40 million to the project, the Nocton Dairies’ planning application was eventually withdrawn, following an official objection to the proposed plans from the Environment Agency amid concern about the risk to the water supply.²⁰

19 Bailey R (2011) *Growing a Better Future: Food Justice in a Resource-constrained World*, Oxford: Oxfam International

20 Alvis D, Jackson A and Allen J (2012) *Can Big be Beautiful? The Relationship Between Size of Unit and Sustainability in Housed Livestock Systems*, Oxford: Worshipful Company of Farmers

Climate change is already, and will increasingly, challenge and perhaps limit our ability to expand food production. There are several reasons for this. The first is that climate change will have a direct impact on agricultural productivity, potentially reducing supply and increasing food prices. For example, it seems likely to lead to a reduction in the supply of viable agricultural land in some regions (for reasons such as desertification), and to increase the number of sudden ‘shocks’ to the food system caused by extreme weather events (including floods and drought). Countries in the southern hemisphere are likely to experience the most dramatic impacts: in Africa, the negative impact of climate change on agricultural output could be anywhere between 15 and 30 per cent in the years up to 2100.²¹

Although it is difficult to link any single weather event to climate change there is clear evidence that climate change will increase the incidence of extreme weather. The recent US drought offers a sobering insight into the potential impacts of climate change on both underlying food prices and their volatility. A lack of snow in the winter of 2011–2012, followed by a spring heat wave, left little water for the soil to absorb in the midwestern states, the agricultural heartland of the US. The lack of water to irrigate crops led to farmers abandoning cornfields the size of Belgium and Luxembourg combined. This also had a knock-on effect for livestock production and prices, as feed became more expensive.

Climate change seems certain to have negative consequences on agriculture in the southern hemisphere and in southern Europe, but some argue that it may have some positive consequences for agricultural production in northern Europe, including in the UK. Higher temperatures may allow the UK to extend the range of crops it produces, and to lengthen growing seasons, producing higher yields. However, it seems likely that the unpredictable weather patterns that also result from climate change will negate any positive aspects of a warmer climate.

The impacts of climate change on fisheries are likely to be even more severe than those on crop and livestock yields. Climate change is leading not only to increasing sea temperatures, but also to the



21 FAO (2011) *How to Feed the World in 2050*, FAO expert paper, Rome

oceans becoming more acidic as greenhouse gases are absorbed by sea water. The combined impact on marine life could be devastating, and this comes on top of existing concerns about overfishing. Some predict that if business-as-usual fishing continues, stocks of all fish species currently used for food will collapse by 2048.²²

It is clear that climate change has the potential to have significant negative impacts on future food production. But the relationship between climate change and food production is two-way, as food production also makes a significant contribution towards greenhouse gas emissions and climate change. In the UK, food production and consumption amounted to 13.5 per cent of greenhouse gas emissions in 2008, largely from agriculture.²³ Food production and consumption contribute to climate change in a number of ways, all along the production chain.

> **Land conversion to agriculture:**

Land conversion from forest to agriculture is a major source of greenhouse gas emissions as the carbon 'locked up' in trees is released, with the knock-on result of a reduction in the potential to absorb future CO₂ emissions. In the UK, land conversion now occurs infrequently (having occurred extensively in the past), but deforestation for agriculture is a major issue in developing countries and emerging markets. In 2006, between 25 and 30 per cent of global greenhouse gas emissions were a result of deforestation.²⁴ The need to limit deforestation for agriculture in effect limits the degree to which the amount of land under production globally can be increased.

> **Livestock production:** Ruminant livestock produce methane, a potent greenhouse gas. Meat production is also energy intensive: on average it takes 2.2kcal of fossil fuel energy to produce 1kcal of grain protein, but 25kcal of fossil fuel energy for every 1kcal of



22 Worm B, Barbier EB, Beaumont N, Duffy JE, Folke C, Halpern BS, Jackson JB, Lotze HK, Micheli F, Palumbi SR, Sala E, Selkoe KA, Stachowicz JJ and Wabon R (2006) 'Impacts of biodiversity loss on ocean ecosystem services', *Science*, 314(5800): 787–790

23 Cabinet Office (2008) *Food Matters: Towards a Strategy for the 21st Century*, London

24 FAO Newsroom (2006) 'Deforestation causes global warming', press release, 4 September 2006

meat protein.²⁵ The increased consumption of animal products in emerging markets and developing countries, and continued high rates of consumption in developed countries like the UK means that emissions from livestock seem likely to increase rapidly in coming years.

- > **Transport:** An increasingly globalised food production system has raised emissions from food transport. Transport accounts for nearly 15 per cent of all greenhouse gas emissions in the food supply chain.²⁶
- > **Waste:** Methane is released when food decomposes in landfills. In the UK, 3 per cent of total national greenhouse emissions come from food waste.²⁷ Waste will be considered further in chapter 4 below.



The UK has made considerable efforts to tackle climate change. In 2008, the Labour government passed the Climate Change Act with cross-party consensus, setting out ambitious targets to reduce carbon emissions. In 2009, the UK government published the UK Low Carbon Transition Plan outlining how government will attempt to meet its target of reducing carbon emissions by 34 per cent from 1990 levels by 2020.²⁸ In 2011, the Coalition government updated the Carbon Transition Plan with the Carbon Plan which setting out a path to achieving an 80 per cent cut in emissions levels by 2050 including better energy efficiency and more diversification in the UK electricity supply. The Carbon Plan recognises the difficulties in reducing carbon emissions in agriculture, when compared to other industrial sectors, given its biological nature. The plan also supports the diversification of energy supply, including an increase in biofuels. While biofuel might seem to be a promising idea to help sustain energy security, this may come at the expense of food security as food crops are used to produce fuel, as noted in chapter 2 above. The expansion of biofuel plantations has the potential to reduce food crop production through competition for both land and water.

25 Pimentel D and Pimentel M (2003) 'Sustainability of meat-based and plant-based diets and the environment', Bethesda: American Society for Clinical Nutrition

26 DECC (2010) *Food 2030*, London

27 Defra (2010) *UK Climate Change Risk Assessment (CCRA)*, London

28 DECC (2009) *The UK Low Carbon Transition Plan*, London

There is also strong evidence that the net global impact of biofuels may in fact be to increase emissions of greenhouse gases, via land conversion. Large-scale deforestation has occurred in recent years to make way for biofuel crop plantations. In Indonesia alone it is estimated that more than 2 million hectares of forest – including some areas which are protected or conserved – have been illegally converted into palm oil plantations. The carbon emission rates from deforestation for biofuels are so large that it is estimated it would take between 86 and 423 years of biofuel production before they are cancelled out by replacement of fossil fuels by biofuels.²⁹

“Water use has increased at twice the rate of population growth in the last century”

Beyond climate change impacts, food production has wider impacts on the environment which may limit our ability to increase production sustainably in the future. For example, the direct use of water in agriculture, as well as pollution from agricultural chemicals, contributes significantly to water stress around the world. It takes between 1,000 and 3,000 litres of water to produce just one kilo of rice and between 13,000 and 15,000 litres to produce one kilo of grain-fed beef.³⁰ The imbalance between the supply and demand of water is a serious concern for food security. Water use has increased at twice the rate of population growth in the last century, and an increasing number of regions around the world are becoming chronically short of the water needed to produce food.

In the face of climate change and other environmental pressures, some argue that an expansion in the use of GM crops is essential for achieving food security. GM technology allows the possibility of developing crops that can withstand changes in the environment and which can be produced more intensively with fewer inputs (such as water and fertilisers), or on otherwise ‘unviable’ agricultural land. On the other hand, some argue that the use of GM crops risks reducing the genetic diversity of crops, making them more susceptible to disease. There are also concerns that the way that GM technology is often developed and managed (that is, through large agricultural corporations) makes farmers, consumers, and the global food supply dependent on a small number of companies who control seeds and other inputs for profit.

Production of GM crops in the UK is limited currently to a very small number of highly-regulated test sites, due in large part to substantial public concerns about the technology. However, there is evidence that opinion is starting to change. In July 2012, an opinion poll published by *The Independent* newspaper reported that 64 per cent

29 Friends of the Earth (2010) ‘Sustainable’ Palm Oil Driving Deforestation, Brussels: FOE Europe

30 FAO Newsroom (2007) ‘FAO urges action to cope with increasing water scarcity: Improving agricultural practices key’, press release, 22 March 2007

of the public now support the idea of using GM crops so farmers could reduce the amount of pesticides they use.³¹ It may be that the UK public could now be convinced of the benefits of (appropriately regulated) GM crops, in light of concerns about food prices and security, and a wider awareness of the challenges of climate change and other environmental issues.

It is clear that no single technology or policy change will be sufficient to ensure that food production at the global or national level can be increased in order to meet demand in sustainable way – a complex set of technological, economic and environmental changes must be balanced. The future of the debate may well lie with the concept of *sustainable intensification* (producing more food from the same land in a sustainable way). The question of what this would look like in practice, in the UK and elsewhere, is still an open one, but it is clear that a range of technological and practical changes to farming and food production are needed to deliver this vision. If they can be appropriately regulated, sustainable intensification might involve more large-scale intensive farming and the use of GM crops, but there are also strong arguments for food production systems that support diversity and innovation from small farmers and producers while also increasing productivity.

31 Grice A (2012) 'Dramatic change as two-thirds now support GM crop testing', *Independent*, 25 July 2012

4.

CONNECTING DEMAND AND SUPPLY: GLOBAL MARKETS, TRADE AND SUPPLY CHAINS

- > International investors are increasingly trading in commodities, including food. There is a risk that speculation on international markets accentuates underlying volatility in food prices.
- > The US and the EU are the largest subsidisers of farming in the world. In 2011, the US paid just under US\$31 billion in producer support while the EU paid US\$74 billion.
- > There is strong evidence to suggest that freeing up agricultural trade and reducing subsidies would reduce food prices and increase global production and productivity.
- > The UK's four largest supermarkets (Tesco, Asda, Sainsbury's and Morrisons) make up a combined 62 per cent of Britain's grocery market.
- > Each year, UK households throw away 8.3 million tonnes of food, but nearly 60 per cent of all food waste occurs before it even reaches supermarket shelves.

Chapter 2 set out a range of factors leading to increased demand for food (and food crops), while chapter 3 outlined some of the factors affecting the production of food in the face of climate change and environmental degradation. In practice though, the price, security and sustainability of food does not just depend on demand and supply. The complex chain of institutions and actors that make up the global food market and food supply chains from producer to consumer also have significant impacts on prices, security and sustainability of supply, and on the distribution of food between rich and poor.

The trading of food crops and products on the global market is increasingly attracting debate, and is seen by some as a key driver of rising and more volatile food prices. As other financial investments have become less lucrative during the global downturn, concern has been raised in some quarters about the fact that investors are increasingly trading in commodities, including food, and in financial products based on commodities (such as derivatives, or betting on future prices). Financial companies which invest in agricultural commodities have made record profits during times of food crises and have even argued that crisis is good for business.³²

³² The director of agriculture trading at the world's largest commodities trading company was quoted in August 2012 as saying: 'The environment is a good one. High prices, lots of volatility, a lot of dislocation, tightness, a lot of arbitrage opportunities' (see Cusick J (2012) 'We'll make a killing out of food crisis, Glencore trading boss Chris Mahoney boasts', *Independent*, 23 August 2012).

Well-functioning financial markets have an important role in setting prices for food products and directing investment. As the food supply chain becomes increasingly globalised, international trading of food crops and products (and financial products based on them) can help to make sure that prices reflect global demand and supply changes, which in turn helps to encourage and direct investment into farming and food production to increase production.

However, there is a risk that speculation on international markets accentuates underlying volatility in food prices caused by demand and supply variations (and indeed that key actors in the international markets develop a vested interest in price volatility). This is a particular concern when international trading is of derivatives and other ‘bets’ on future prices, rather than in commodities themselves. As the 2008 financial crisis demonstrated, these kinds of financial instruments can have unpredictable and damaging consequences. When food products are traded as investments on the global market their prices can also become disconnected from the reality of supply and demand. There is good evidence that commodity prices, including food prices, are now more connected to the prices of other investments (such as European and US stock markets) than they are to underlying supply and demand changes.³³ This exposes food consumers and producers around the world to risks ‘imported’ from other sectors of the global economy, and makes international markets ineffective in setting prices and directing investment to food production. The structure of global markets also gives huge power to a small number of large commodity companies which can affect global prices.

This affects people in developing countries and in countries like the UK, and food producers as well as consumers. Although the high prices that are a problem for consumers around the world are potentially a boon to food producers, price volatility driven by financial speculation affects all actors in the market, and small and medium-sized producers in particular. Large food producers have access to financial products (provided in part through the very same international financial markets) that allow them to manage the risk of price falls for their outputs. However, these products are not generally available to smaller producers. Small and medium-sized producers are also less likely to benefit from international investment directed through global markets.

Although food commodities are traded on international financial markets with little regulation, governments intervene substantially in the market for ‘real life’ food products, via tariffs and trade

“Trading food crops and products on the global market is increasingly attracting debate, and is seen by some as a key driver of rising and more volatile food prices”

33 UNCTAD (2012) ‘Don’t blame the physical markets: Financialization is the root cause of oil and commodity price volatility’, policy brief no 25, Geneva

restrictions and agricultural subsidies. Agricultural and trade policies in developed countries have significant impacts on global food prices and sustainability.

The US and EU are the largest subsidisers of farming in the world. Official figures show that in 2011 the US paid just under US\$31 billion in producer support while the EU paid US\$74 billion.³⁴ The EU's CAP is one of the largest protectionist trade blocs influencing the global market. The CAP, which accounts for more than 40 per cent of the EU budget, subsidises food production in the EU, and the EU also applies restrictions on products imported into the EU from other countries. Although the CAP was created at least in part to secure the EU's food supply and to maintain stable and affordable food prices, its usefulness and ethics are open to much debate.



The CAP (as with similar agricultural and trade policies in the US and elsewhere) is often justified as a way for the EU to achieve a higher level of food self-sufficiency (as discussed above), rather than relying too heavily on food imported from outside Europe. However, it is not necessarily the case that a more self-sufficient EU (or UK) would actually have better food security. For example, increased self-sufficiency could make food production (and prices) more volatile – for example, due to weather events affecting farmers across the region.

Farm subsidies and trade restrictions in the EU and US have also been criticised for hurting farmers in developing countries by denying them a level playing field in the world's largest agricultural markets. Food subsidised by the CAP also enters global markets at a lower price than it would if not subsidised. While this may be seen as a means of allowing European farmers to compete in a global market, critics suggest that it inhibits agricultural development (which is essential to poverty reduction) as farmers in developing countries must compete with subsidised European food imports. Access to the European market has been freed up for some of the least developed countries in recent years, but the issue remains fraught. Nevertheless, there is evidence to suggest that freeing up agricultural trade further,

34 Data is available at <http://www.oecd.org/agriculture/agriculturalpoliciesandsupport/producerandconsumersupportestimatesdatabase.htm>

along with reducing subsidies, would reduce food prices and increase global production and productivity, something that would be good for European consumers as well as for producers and consumers in developing countries.

Within Europe, the financial incentives offered through the CAP are considered by many to make European farmers too dependent on state subsidies and discourage real market competition, a concern which has recently instigated calls for both budget cuts to the CAP and a fairer distribution of direct payments. The lack of focus on improving environmental standards within agriculture through the CAP is also a concern although there have been some attempts to reform the policy. Recently, the European Commission has set out a new plan for CAP reform including more environmental initiatives. Under this proposed plan, member states would be required to use 30 per cent of their CAP budget to make payments to farmers who respect certain agricultural practices beneficial to the environment.³⁵

The increased ‘financialisation’ of food and resulting price volatility discussed above may add to government incentives to seek to protect their domestic food producers and consumers from external shocks in the world markets via trade restrictions and subsidies. Agriculture has so far proved largely resistant to international efforts to liberalise trade through institutions such as the World Trade Organisation (WTO), and there are no signs of this state of affairs changing substantially in the near future. While the economic case for agriculture and food trade liberalisation is strong, the demand and supply pressures outlined above, combined with volatility caused by financial speculation, may mean that the prospect of achieving international agreement is weakened.

Although the economic evidence for the benefits (particularly for developing countries) of freer trade in food and agricultural products is strong, some would argue still that countries like the UK should be seeking to reduce reliance on imported food. Indeed, they argue that food markets within the UK should also be more localised, in order to reduce the environmental impacts of food transport, and stimulate the UK’s economy (and particularly the rural economy). Public opinion polling by Defra shows that more than two-thirds of the public believe buying British produce is of high importance.³⁶ In fact, increasing consumption of locally or UK-produced food need not mean resorting to trade protection or agricultural subsidies as currently configured. Strategic investments (for example in research

“Financial incentives through the CAP are considered by many to make European farmers too dependent on state subsidies and discourage real market competition”

35 European Commission (2011) *Amending Council Regulation (EC) No 1234/2007 as regards the regime of the single payment scheme and support to vine-growers, COM(2011) 631 final*, Brussels

36 Defra (2011) *Attitudes and Behaviours around Sustainable Food Purchasing*, London

and development or infrastructure) to increase the productivity and efficiency of UK farming and food production would make UK-made products more competitive in both UK and international markets, and changes to the UK food supply chain could offer more support to UK producers at both local and national levels.

Below the level of global trade, the nature of the food supply chain has changed radically in recent years. Retailers have a direct impact on both the price and sustainability of food. The UK's four largest supermarkets (Tesco, Asda, Sainsbury's and Morrisons) make up a combined 62 per cent of Britain's grocery market.³⁷ The importance of supermarkets in the food economy is nothing new in most developed countries, and they are also increasingly important players in developing countries too. Supermarkets bring significant benefits to consumers. They provide cheaper food by increased efficiency in procurement practices and the ability to acquire food more cheaply through economies of scale. They also provide a wide variety of food choices.

However, the market power of large supermarkets has emerged as a concern for both producers and consumers in the UK (similar debates are taking place around the world). While many supermarkets do have policies in place to support local producers and build investment in UK sourcing, most tend to buy their food products from large scale producers. As a result small-scale farmers face significant competition in their own countries. This is of particular concern for small farmers in developing countries who are most likely to be living within poverty, but also affects small farmers and producers in developed countries like the UK. Supermarket buying power can have a negative impact even on large farmers and producers. This has been recognised by the Competition Commission and now by the government, who are in the process of passing legislation for the creation of a regulator, the Groceries Code Adjudicator, to monitor and enforce fair practice towards suppliers. An investigation by *The Observer* in 2011 revealed that many of the deals on offer to consumers in supermarkets came at the expense of farmers, rather than retailers' profit margins. Attempts to hold small famers and producers to unwritten contracts, and other 'coercive' practices, have put them off challenging the supermarkets.



37 Defra (2011) *Food Statistics Pocketbook 2011*, London

Coercive behaviour by the supermarkets is blamed for pushing over 3,000 UK farmers either into poverty or out of business over the past decade.³⁸ Ultimately, although supermarkets can help drive productivity and efficiency in the food supply chain, this may come at a cost for food security if it reduces the diversity and number of producers and suppliers at the local, national or international level.

The food supply chain also has a significant impact on the amount of food that is wasted. Many people think of waste as a consumer problem, and it is indeed the case that much food waste occurs in homes. Each year UK households throw away 8.3 million tonnes of food, 65 per cent of which is believed to be avoidable waste.³⁹ This equates to nearly £10.2 billion worth of good food not eaten every year. On average, each person in the UK throws away roughly 70kg of food each year, almost the weight of the average British person.⁴⁰ In addition to the food itself, nearly 4.9 million tonnes of food packaging is also thrown into landfill in the UK each year.⁴¹

Although much waste occurs at home, retailers have an important role to play in tackling the problem. Supermarkets have already started to make some effort to reduce both food and packaging waste. Forty-nine retailers have signed up to Courtauld Commitment 2, an agreement to work towards reducing household food waste by 4 per cent and a 10 per cent reduction in the carbon impact of grocery packaging through more efficient and recyclable packaging methods.⁴² But there is more to be done as retail practices (such as use of 'best before' dates or 'buy one get one free' offers) can influence consumer behaviour in ways that might encourage waste.

Retailers also have an important role to play in tackling food waste that occurs earlier in the production chain. It is estimated that nearly 60 per cent of all food waste occurs before it even reaches supermarket shelves. This is due in part to the contract agreements that the supermarkets have with their suppliers. To meet consumer demand, supermarkets require their contracted farmers to produce their contracted tonnage exactly. Given the unpredictable nature of food production, this often leads farmers to overproduce, on average growing about 140 per cent of the required produce.⁴³

Milk price protests

In 2012, the price of milk again hit the headlines. This provided a stark illustration of the impact of global markets on the food system, following a collapse in the international cream market which led processors to announce planned reductions in the price they paid for milk. The move was hotly contested by British dairy farmers, many of whom would face significant losses. Campaigning brought scrutiny to the supply chain, highlighting the important role that retailers have to play in ensuring the sustainability of UK dairy. Successful protests (supported by the National Federation of Women's Institutes and Women's Institute members) led to several supermarket chains agreeing to increase the premium they pay on milk to ensure a fairer price for farmers.

38 Renton A (2011) 'British farmers forced to pay the cost of supermarket price wars', *Observer*, 2 July 2011

39 Defra 2010

40 WRAP (2008) *The Food We Waste*, Banbury

41 Data available on WRAP factsheet http://www.wrap.org.uk/sites/files/wrap/LA_FactSheet_3_Supermarkets.pdf

42 *ibid*

43 Centre for Alternative Technology (2011) 'Why does 60 per cent of all food waste happen before the food reaches consumers?' Centre for Alternative Technology blog, 4 October 2011. <http://blog.cat.org.uk/2011/10/04/why-do-we-throw-away-over-half-of-what-we-grow-before-we-even-have-a-chance-to-buy-it>

The complex interplay of consumer and supplier factors is well illustrated by the issue of how food appears. High standards for ‘appearance’ of fruit and vegetables were famously implemented by the EU but were dropped in 2009. The disposing of unattractive meat, vegetables and fruits are a common practice within the supermarket industry and calls have been made by the NFU and others for supermarkets to relax their cosmetic standards to stock perfectly edible produce. The relationship between producer, retailer and consumer over food cosmetics, however, is clearly mutually reinforcing. Are the supermarkets simply responding to consumer behaviour or is consumer behaviour being shaped by what the supermarkets choose to sell?

“Nearly 60 per cent of all food waste occurs before it even reaches supermarket shelves”

The UK consumer is merely the last link in a complex global food supply chain that involves actors ranging from international banks, governments, food producers around the world, retailers, and many others. The complexities of the global food market, trade relationships between countries and government agricultural policies all contribute to the challenges of food security faced by the UK and the world at large. Changes – both big and small – need to take place at all levels to better manage the future of our food supply and to assure that what we eat remains affordable to all.

5.

WHAT CAN BE DONE? THE FUTURE OF FOOD SECURITY

The discussion above has set out the scale of the food security challenge: increasing demand, environmental limits on supply, volatile international markets, and significant imbalances of power in supply chains. It is clear that the food security challenge is a complex one, involving many different actors from the local to the global level. This complexity can make change seem impossible, but also provides a wide range of opportunities for action. However, there are no easy answers, and there are difficult tensions and trade-offs which need to be confronted directly.

Ensuring global food security will be one of the biggest challenges we will face in the 21st century, requiring changes in our consumption habits, in farming and food production, and in the markets and institutions that bring our food from field to plate. The complexity of this issue requires action at the local, national and international levels. Groups like the WI are in a unique position to explore possible solutions, inform the wider public and lead campaigns to encourage all actors to do their part in ensuring that everyone, at all times, has access to safe and nutritious food.

The role of women in food security

Food security has a gender dimension in both developed and developing countries. Women play different roles from men both as producers and consumers. There are missed opportunities for involving women in maintaining global food security particularly in the developing world where women are less likely to have the same access to education and labour opportunities as men.

The Food and Agriculture Organization (FAO) estimates that if women in developing countries had access to the same education and farm inputs as men they could increase their yield by 20–30 per cent.⁴⁴ This could increase agricultural output in developing countries by between 2.5–4 per cent and reduce global hunger by more than 10 per cent. The empowerment of women in farming can also help lift rural families out of poverty.

44 FAO (2011) *How to Feed the World in 2050*, FAO expert paper, Rome

Key question: what could be done to encourage people in the UK to eat healthier diets, reduce consumption of animal products, and reduce food waste?

Reducing demand for food in rich countries like the UK must be part of the answer to the challenge of food security. Changing diets and consumption behaviour (including reducing waste) would help reduce the amount of food we demand, which would help to relieve pressures on global supply. Eating healthier diets and particularly reducing our consumption of animal products would decrease demand for a number of key food products including grains which are currently required for livestock feed. This doesn't mean we should all become vegetarians but we should rather be encouraged to eat animal products less often, and use them more efficiently.

- > Evidence suggests that UK diets are becoming less healthy during the recession. How can consumers, community groups, public services, retailers and government work together to support people to eat healthily on a limited budget?
- > Local campaigns on reducing home food waste – through awareness and education on better food preparation – have proven to be successful for those who participate. How can we make the step from small-scale campaigns to initiatives which change wider consumer behaviour?
- > Meat production is one of the most environmentally intensive ways to produce food. How can UK consumers be persuaded to eat less meat and dairy products? Can today's consumers be encouraged to eat the less attractive parts of the animal (such as cheaper cuts or offal)?

Case study: the Love Food Hate Waste campaign

In 2007, the Waste and Resources Action Programme (WRAP) launched the Love Food Hate Waste Campaign to help raise awareness on food waste and to provide easy-to-action advice for consumers. Supported by the NFWI, a pilot was run with WI members which helped provide advice for families to become more confident about better managing their food, wasting less and saving money on bills. Each Love Food group – lead by a 'food champion' – would meet monthly to discuss a range of topics on preparing food, reducing waste, portion sizing, storage, meal planning and using leftovers. The results were impressive: out of the 81 households involved, the average food waste was reduced by 50 per cent. The sample group's average weekly avoidable food waste was 2.2kg after the pilot, down from 4.7kg per week.⁴⁵

45 WRAP and the NFWI (2008) *Love Food Champions, Final Report*, Banbury

Key question: what role should supermarkets play in reducing food waste in the supply chain and support changes in consumer behaviour?

There is also the potential for supermarkets to take an active part in managing the demand for food, particularly by reducing waste in food supply chains, but also in encouraging changes in consumer behaviour. This might include changes to cosmetic standards for food, changes in supermarket procurement processes and contracting, more direct local supply to stores, or work by supermarkets to promote healthier and more environmentally-friendly foods to consumers.

- > Voluntary standards for supermarkets – for example for front-of-pack nutritional labelling – have by and large been shown not to work. Should new regulations be imposed to ensure that supermarkets help cut consumer food waste (for example, by changing food labelling, restricting ‘buy one get one free’ offers)?
- > A grocery market watchdog is also in the process of being introduced to reduce coercive behaviour by supermarkets towards suppliers. Should there be tougher regulation on contracts between farmers and retailers to assure farmers don’t produce an oversupply of food which often goes to waste? Would consumers be willing to make do without certain foods if farmers were unable to generate enough of a certain crop to meet demand?
- > Public campaigning can be an effective way of bringing about positive change. Could the experience of the WI Packaging Day of Action (see case study) be extended to campaign for the reduction of waste at the production level? Could a WI call to action push supermarkets to be more responsible for any excess supply of food caused as a result of their contracts with farmers?

Case study: WI Packaging Day of Action

At the 2005 NFWI AGM, WI members passed a resolution calling for action to reduce waste primarily in unnecessary packaging of food products, for example, shrink-wrapped cucumbers and coconuts, bananas found in plastic bags, and courgettes on plastic trays and in plastic bags. This packaging was not only unnecessary but in many cases unable to be recycled. More than 100 events took place as part of the WI Packaging Day of Action on 20 June 2006 which saw WI members from across the country return unnecessary and excess packaging to supermarkets. Members called on supermarkets to:

- > get rid of unnecessary and excessive packaging on food products
- > use only compostable and recyclable materials where packaging is required
- > set an example by either charging for plastic carrier bags or offering financial incentives to those who reuse their own bags
- > donate their food waste to charities where possible and ensure that the remainder is composted
- > purchase more local foods (within a 30-mile radius of the store) to cut down on food miles and reduce the need for packaging.

Key question: how can we balance the need for food and energy security?

Perhaps a more challenging way to reduce our demand for food crops is to rethink our need for biofuels. While biofuel once appeared to be an innovative way to reduce our energy dependency on fossil fuels, there is now strong evidence that the demand for biofuels is driving increases in food prices, and that the net impacts on climate change may also be negative.

- > Given the pressures on the global food system, and the mixed evidence on climate change impacts, should the UK and the EU's move towards biofuels be abandoned completely? If so, how can the UK government and the EU be persuaded to change their policies? What alternative sources of energy would need to be developed as a result?
- > Some biofuel plantations are created as a result of (sometimes illegal) deforestation in developing countries and emerging economies. Is there potential to develop 'ethical standards' for biofuels? Could the international market for biofuels be regulated to ensure that it is not based on deforestation?

Key question: how can the supply of food be increased within environmental limits?

At the same time as we manage the demand for food and food crops, we also need to increase food supply sustainably, in the face of significant environmental challenges. Part of this is about the wider challenge of preventing, and mitigating the effects of climate change. Changes to the way food is produced and transported can make a significant contribution to this. But the need to increase global food supply is pressing, and will require more intensive production of food on limited land. This may entail the use of new farming models (large and small), and new technology.

- > Transport and packaging for shipping food over long distances is a major contributor to climate change. Equally the use of heated greenhouses in countries such as the UK is energy intensive. One way to reduce greenhouse gas emissions from the food supply chain is for consumers to buy more locally sourced *seasonal* food. Can consumers be encouraged to buy more locally grown food even if that means they won't have certain products all year round? Can supermarkets play a role in encouraging this change in consumer behaviour? How can supermarkets be encouraged to buy more from local producers?
- > Agriculture around the world needs to become more productive if food supplies are to be increased to meet demand, and UK farming needs to become more productive if we want to maintain current levels of food self-sufficiency. Are larger, more resource-intensive farming models the only answer? What can small farmers do to increase productivity and efficiency? How can models of productive environmentally sustainable farming be expanded?
- > GM crops could help the world face environmental challenges while increasing food supply. Should the UK and the EU revise their positions on GM crops? Could the UK public be persuaded to accept well-regulated GM crops and food?

Case study: Nant-yr-Efail Farm

The *Tir Gofal* scheme (the Welsh higher-level agri-environment scheme) and the organic farming scheme helped the Nant-yr-Efail Farm in North Wales diversify its farming approach. Originally a lowland all-grass beef and sheep farm, they have switched to a mixed-farming system implementing a more agro-ecological and sustainable approach. They've been able to grow their own feed and bedding, helping to restore the farm's landscape and environmental features. The farm is now more profitable, biodiverse and better enabled to meet the demands of population and climate change.⁴⁶

Key question: should global markets and trade in food be reformed?

As set out above, the commodity market in food can have a significant impact on price and volatility. Many believe that the largely unregulated international trade of agricultural products and food is being hugely affected by trade barriers and agricultural subsidies and that a fundamental change in approach is needed. However, there appears to be limited suggestions or consensus on what this change might look like and little appetite amongst policy makers to lead such a change.

- > Britain has one of the largest financial centres in the world and could take a lead into changing how food is traded on the global market. As a key member of the EU, and with discussions about CAP reform well underway at EU level, should the UK be taking a more radical stance on its approach to the CAP as part of wider reform efforts?
- > Some of the UK's international development NGOs have already started campaigning for increased transparency and regulation of international commodity markets, and for limits on speculative trading. How can the UK work with other countries to regulate international commodity markets and reduce volatility in food markets?
- > Agricultural trade protection and subsidies help countries like the UK to increase their food self-sufficiency, but harm farmers in developing countries, and may also have a negative overall impact on the UK's food security by increasing prices and reducing global food production. Should the UK be pushing to reduce or reform European agricultural subsidies, and open up global trade in food? Would we be prepared to become less self-sufficient in food in order to do this?

Case study: Food sovereignty

Food sovereignty is an alternative to the current global food supply model. It encourages small scale sustainable farming. The idea is to empower local people in determining crop production through small-scale sustainable farming rather than through large corporations. This is promoted through collective farms where farmers are better equipped to share techniques with each other making production more efficient and better enabled to provide the food needs of those locally. Evidence from Mozambique and Brazil has shown that creating a new global food supply model can be possible.⁴⁷

47 War on Want (2011) *Food Sovereignty: Reclaiming the Global System*, London

Key question: how can the future of UK farming and food production be secured?

It is important for UK farmers and food producers to thrive, not only to secure the UK's own food supply, but also to manage rural landscapes and our environment. In the long run, UK food production will need to be competitive if UK farmers and food producers are to survive in an international market.

- > Recent controversy around the price that dairy farmers are paid for their milk showed how many farmers are struggling to survive, let alone compete. What should farmers, food producers, retailers and government be doing to ensure the long-term viability of UK farming and food production? How can farmers and producers break out of the cycle of low prices?
- > In order to have the best farming techniques and technologies to make production less costly and more productive, Britain needs to have 'the brightest and the best' working in the industry. How can young people be encouraged to follow careers in agriculture and food?

Case study: Food and Drink Federation (FDF) initiatives

The FDF has developed three new initiatives to promote career growth in the agricultural industry. In 2012 they doubled their apprenticeship scheme from 1,700 to 3,400. They launched Taste for Success – A Future in Food which promotes careers in the food industry in schools and colleges. Students learn about possibilities in engineering, product development and coming up with new packaging technologies. Lastly the FDF have helped create the Graduate Excellence Programme joined with the National Skills Academy and UK Commission for Employment and Skills to produce the first food engineering degree course which will commence September 2014.⁴⁸

FURTHER READING

- Alvis D et al (2012) *Can Big be Beautiful? The Relationship between Size of Unit and Sustainability in Housed Livestock Systems*, Oxford: Worshipful Company of Farmers.
<http://www.farmerslivestock.org.uk/NR/rdonlyres/6CD553BD-3E40-47E7-8453-BD11B81F023A/0/LivestockReportFullOct2012.pdf>
- > This report investigates the arguments surrounding the current debate around large-scale intensive milk production in the UK. It examines the impact of increasing scale on the sustainability of such farming systems.
- Barling D (2008) *Rethinking Britain's Food Security*, Bristol: Soil Association.
<http://soilassociation.org/LinkClick.aspx?fileticket=wCYoHYSHsy8%3D&tabid=387>
- > This report commissioned by the Soil Association provides a good introduction to the food security discussion in the UK. It highlights the history of debate in Britain as well as providing useful policy reviews.
- Defra (2012) *Food Statistics Pocketbook 2012*, London.
<http://www.defra.gov.uk/statistics/files/defra-stats-foodfarm-food-pocketbook-2012-121005.pdf>
- > This is an excellent place to find data relating to Britain's food security. It provides statistics relating to the food chain (beyond agriculture), prices and expenditure, global and UK supply, environment, waste, dietary health and safety, and confidence.
- Diaz-Bonilla E and Ron J (2010) *Food Security, Price Volatility and Trade: Some Reflections for Developing Countries*, Geneva: International Centre for Trade and Sustainable Development.
<http://ictsd.org/downloads/2011/12/food-security-price-volatility-and-trade.pdf>
- > This report takes a technical look at the economic aspects of food security. It reflects on the global food trade system and how it affects some of the poorest people around the world. It also reviews international and national trade policies.
- Foresight (2011) *The Future of Food and Farming: Challenges and Choices for Global Sustainability*, London: Government Office for Science. <http://www.bis.gov.uk/assets/foresight/docs/food-and-farming/11-546-future-of-food-and-farming-report.pdf>
- > This comprehensive report explores the pressures on the global food system between now and 2050. It identifies five key challenges for the future: balancing supply and demand; assuring adequate stability in food supply; achieving global access to food and ending hunger; managing the contribution of the food system to the mitigation of climate change; and maintaining biodiversity and ecosystem services while feeding the world.
- Food and Agriculture Organization of the United Nations [FAO] (2011) *The State of Food and Agriculture: Women in Agriculture – Closing the Gender Gap for Development*, Rome.
<http://www.fao.org/docrep/013/i2050e/i2050e.pdf>
- > This report by the FAO discusses the importance of women in agriculture and how closing the gender gap in food production can help sustain our food supply. It outlines the gains that can be made from empowering more women in agriculture in terms of food productivity, as well as other social and economic benefits.
- Food and Agriculture Organization of the United Nations [FAO] (2012) *The State of Food Insecurity in the World 2012*, Rome.
<http://www.fao.org/docrep/016/i3027e/i3027e00.htm>
- > This paper provides up-to-date estimates on the number and proportion of undernourished people around the world, and discusses possible policy responses.
- Global Food Security (2012) *Global Food Security Programme: Exploring Public Views*, Swindon.
<http://www.foodsecurity.ac.uk/assets/pdfs/gfs-exploring-public-views.pdf>
- > This paper provides a useful insight into British public perceptions surrounding food security. The report includes results from a large-scale survey and from qualitative workshops.
- Herman M-O (2011) *Not a Game: Speculation vs Food Security: Regulating Financial Markets to Grow a Better Future*, Oxford: Oxfam International.
<http://www.oxfam.org/sites/www.oxfam.org/files/ib-speculation-vs-food-security-031011-en.pdf>
- > This report addresses how financial speculation on food commodities plays an important role in global markets but has the potential to harm millions of people if it is not properly regulated.
- War on Want (2011) *Food Sovereignty: Reclaiming the Global Food System*, London.
<http://www.waronwant.org/attachments/Food%20sovereignty%20report.pdf>
- > This report produced by War on Want goes a step beyond more conventional discussions on food security. It discusses possible ways the global food market could be changed for the better. Using case study examples from Brazil, Sri Lanka and Mozambique, the report demonstrates that a fundamental change to the way we produce and distribute food around the world is possible.

Food for thought:
Global and national
challenges of food security

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