

# Oxford Research Group

*Sustainable Security Programme*

**ORG EXPLAINS #8**

## UK FOOD SECURITY AND CLIMATE CHANGE



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## Subject:

This primer explains the current situation concerning the United Kingdom's food supply and how this is likely to change in the medium and long term as a result of climate change. It discusses likely threats to UK food security emerging from a range of potential warming scenarios and the current policy debate on how to address them effectively.

## Context:

Acute food insecurity has been in the news as the UK heads towards a post-EU rupture with the European Common Market but there is also a chronic threat to UK food security posed by climate change and disruption. The most prominent discussions concerning the potential security implications of a changing climate tend to focus on its potential to exacerbate international conflict (its role as a threat multiplier), the challenges it poses to international development efforts, and the ways in which it could limit or complicate military operations. The direct threat climate change poses to the UK itself has not received enough attention, nor the domestic threat to the UK of climatic impacts on international supply chains, upon which it is highly dependent. This is doubly perverse. On the one hand, in terms of evidence, academic analysis of how a warming world will affect fragile, interconnected and interdependent human systems becomes more sure-footed and confident as it "zooms in" from the global level to smaller regional and sub-regional units of analysis. On the other, from the standpoint of UK national security planners, direct impacts on the home islands and British citizens are of paramount importance.

## Key Points:

- Currently 50% by value of all food consumed in the UK is imported. 60% of this is from the EU, with a heavy concentration on suppliers in Spain and the Netherlands.
- Securing greater diversity of international suppliers has been identified as a priority by the UK Government, particularly in the context of Brexit.
- UK food supply chains currently have limited direct exposure to the closure of global supply choke-points; however, this may change should the pursuit of diversification of imports away from western European suppliers succeed.
- Regardless, the UK is as exposed as the rest of the world to food price volatility and potential long-term food price inflation. A changing climate is likely to reduce the amount of arable land available in the UK and make international disruptions more likely.
- The UK Government has rejected the advice of the Independent Committee on Climate Change to adopt more proactive measures to manage food price volatility, choosing to pursue this policy goal through diplomacy within the G-20.
- There is a geopolitical dimension to the intergovernmental management of food supplies in a context of global food scarcity. Developing world food exporters, including within the G20, that have contributed relatively little to climate change may be less inclined to cooperate with the UK.

## What is food security?

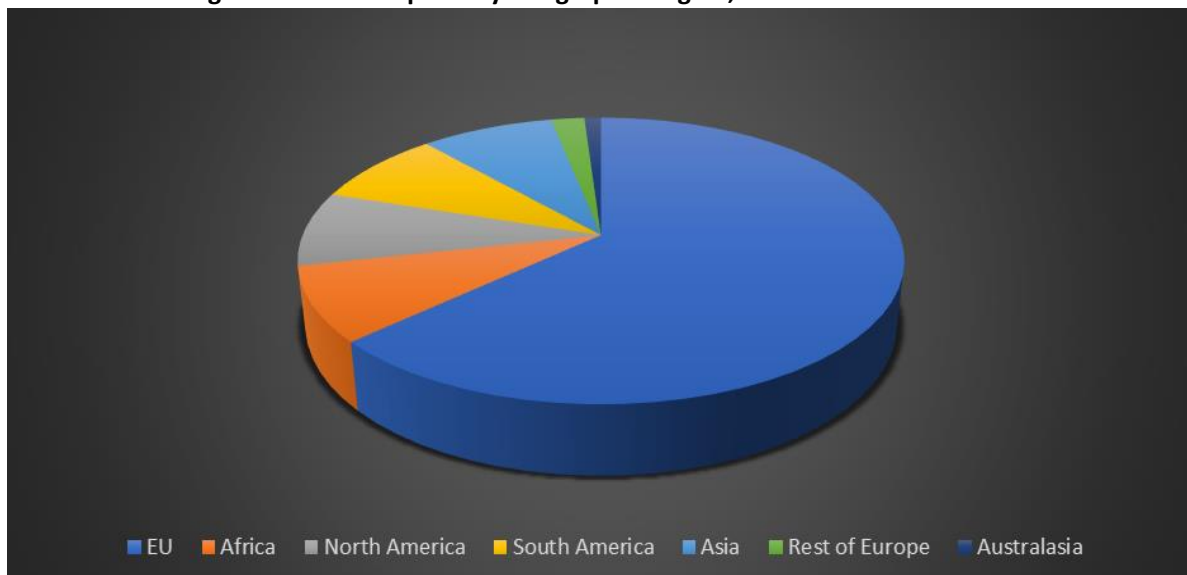
The UK's Department of Environment, Food and Rural Affairs (Defra) defines food security as "access ... to sufficient, safe, sustainable and nutritious food, at affordable prices." The UK's food security is affected by a large number of inter-related variables and processes. These range from global food availability, subject to the growth of population and consumption, oil shocks, and land-use change, to domestic factors like the resilience of the UK's strategic road network and consumer confidence in food supply and availability. Equity is an important consideration, as those UK households with the lowest incomes are invariably the most vulnerable to disruptions to supply and higher prices. This primer focuses on reliance on

imports, international and domestic food production and the food and energy supply chains.

## How "food secure" is the UK currently?

The UK is highly dependent on food imports; 50% of food is imported, of which 60% comes from the EU (see Chart 1). This overall statistic masks the fact that the UK is reliant on a handful of countries for supplies of key food stuffs. For example, the Netherlands and Spain alone accounted for 46% of edible vegetable imports in 2017, while the same two countries together with Germany and South Africa supplied 38.5% of edible fruit and nuts. These two food groups are essential for an adequate nutrition intake, a key component of food security.

**Chart 1: Percentage of UK Food Imports by Geographic Region, 2017**



**Source: UK Government, "Food Statistics in your pocket 2017: Global and UK supply," Department of Environment and Rural Affairs (09 October 2018)**

Historically this high level of import dependency has been a consistent feature of UK food security, although it worsened markedly during the mid-1990s to 2007 economic boom years. The food production to supply ratio (farmgate value of food production divided by the value of domestic raw food consumption) has fallen from around 75% in the early 1990s to 60% in 2017. This represents a substantial decrease in UK food security, even if production-for-export were diverted back to UK consumers.

Food price volatility has the potential to emerge from shocks to food production and supply because of, *inter alia* natural disasters, a breakdown in trade relations and the temporary closure of one or more of fourteen global "choke points" identified in a 2017 Chatham House report by Bailey and Wellesley. Access to food is also highly dependent on energy supply; UK Government analysis suggests, for example, that the 2008 energy price spike was the main driver of the contemporaneous surge in food

prices and that a doubling of the price of oil would increase the cost of food to the consumer by 5–10%. In 2016 the UK relied on imports to meet 35% of its energy requirements of which the most important components were natural gas imports and primary oils (46% and 28.9% of total usage respectively). [See [ORG Explains #3: UK Energy Security and Climate Change](#)]

In total, from production and processing to transport and consumption, the food chain accounts for 18% of total UK energy use.

Under status quo arrangements, the UK is relatively well insulated from supply shocks resulting from the closure of global choke points with certain exceptions. These include imports from South Africa and also Brazil, which in 2017 supplied 67% of soya bean imports, an important source of animal feed. However, it is UK Government policy to actively pursue a more diverse range of food suppliers, not least because of uncertainties surrounding the final trading arrangements with the EU that will replace UK membership. To the extent that such diversification is successful, it may increase UK exposure to supply shocks emerging from global choke-point closure. It may also increase energy usage in the food chain, through importing goods from greater distances. In turn, depending on how the UK energy mix evolves, it may increase UK vulnerability to energy supply shocks. Regardless, as long as the current UK dependence on food and energy imports persists, it will remain exposed to global volatility in the food and energy markets.

In terms of equity, there is increasing evidence that the poorest UK households do not enjoy food security. A 2017 study by the Food Standards Agency found that a quarter of low-income households struggle to eat healthily or regularly because of a lack of money. This rises to one third for the unemployed. The report's findings suggest that this is also highly gendered, with 10% of women living without food security, compared with 6% of men.

## How will a changing climate impact UK food security?

In general, a warming climate will alter agricultural land availability, potentially leading to increased yields in upper northern latitudes in the short-term but threatening them in the long-term. Climate change threatens to reduce yields in other developing regions in the short-term. A higher incidence of more severe extreme weather events (droughts and storms, for example) poses risks to harvests and also to infrastructure in the energy and food supply chains, including key “choke-points” such as the Dover straits, the Suez Canal and Brazil's southern ports. There is also a higher risk to harvests from pests and to meat supplies from animal diseases. The aggregate impact of these risks is likely to be higher food price volatility and, potentially, persistent food price inflation over the medium term.

National and regional projections are more concrete than parallel global efforts due to their far more modest geographical scope. The most robust exercise in the case of the UK is the risk assessment carried out by the statutory Committee on Climate Change (CCC). The committee's 2017 report highlighted a number of risks to UK food security. Without additional action, by the 2050s the UK is projected to run a water deficit equivalent to between 5 and 16% of demand, comprising a serious limiting factor for agricultural production. Flooding of agricultural areas will require strategic choices to be made about how far to protect such sites, taking into account the attendant risks of increasing run-off, downstream flooding and silt deposition in rivers. Higher temperatures may lead to infestation by the Asian tiger mosquito, a vector for dengue fever and the Zika and Chikungunya viruses, as well as the further spread of Lyme disease across the UK. Small changes in climatic conditions, the Committee concluded, may also result in dramatic changes in parasitic nematodes (e.g. whipworms, hookworms, etc.) in livestock

To the extent that all countries will be facing impacts of at least comparable scale, it is

unclear whether the UK will be able to address shortfalls in agricultural production through increasing imports. If current plans to diversify food supply countries of origin results in a greater reliance on imports from developing regions, where the impacts of climate change will be far more severe, this prospect seems less likely. Such diversification efforts also will leave the UK more exposed to the greater likelihood of supply shocks caused by more regular and more severe extreme weather events hitting global choke-points.

A 2010 Defra report stated that in the “unlikely event of extreme isolation, the overall calorific potential of UK agriculture would be more than sufficient [to compensate for loss of food imports], assuming a very substantial reduction in livestock production”. This would almost certainly entail a far more intrusive role for the UK Government in managing national food production. In addition, this analysis did not have the benefit of the CCC’s 2017 conclusion that, in higher warming scenarios, the proportion of high-quality arable land in England and Wales is projected to shrink from 38% of the total to 9% by the 2050s. It is unclear if the CCC’s new evidence has led to a revision of Defra’s earlier confidence in the UK’s potential to feed its population in the future.

In the absence of more stringent policies to ensure equity of food access, it can be assumed that poorer households will disproportionately suffer the effects of these changes. This problem is quite likely to be compounded by limitations on public spending arising from a “stagflation” effect caused by a combination of climate change-induced reductions in economic growth and inflation linked to higher overall global food prices.

### **What are the possible policy responses?**

The UK government is considering a number of policy options to improve food security. This includes investments in resilient infrastructure, particularly transport and water facilities, and pursuing reductions in the estimated 10 million tonnes of food wasted in the UK annually:

equivalent to 3 kg per person per week. This includes encouraging farmers to use waste food as animal feed, reducing the reliance on commercial equivalents. Another recommendation is encouraging UK citizens to change consumption patterns with an emphasis on seasonal produce. Reducing the consumption of ruminant meat has the potential to significantly reduce Green House Gas emissions, as well as enhancing food security. A range of technical solutions to increase productivity are in the pipeline, with UK “Agri-Tech” strategy focusing on crop genome editing, precision agriculture and innovative food production approaches, such as controlled environment farming. According to a recent report by the UK Houses of Parliament, it is unclear whether current levels of investment in this technological effort are sufficient.

Continuing reform of the way the UK produces and uses energy has the potential to further two policy goals. Any increase in domestic energy self-sufficiency will reduce the exposure of the food chain to price shocks, particularly in the global oil and gas markets. Achieving this through developing renewables and enhancing energy efficiency will simultaneously reduce GhG emissions. The food sector itself has a major role to play in increasing energy efficiency through pursuing numerous avenues in parallel. These include switching to higher efficiency, decentralised boiler plants in agriculture; improved heat recovery and energy recycling in food manufacturing; the development of better integrated procedures in manufacturing and processing infrastructure; optimising supply chains and fuel efficiency in food transport; and better energy monitoring and control systems in the retail and hospitality industries.

In its 2017 Evidence Report, the CCC recommended that the UK Government develop new policies to manage food price volatility. The Government rejected this recommendation, in favour of supporting ongoing initiatives to manage food prices diplomatically, chiefly through supporting a protocol with partner countries developed during the UK Chairmanship of the G20 Agricultural Markets

Information Systems in 2014/2015. This assumes institutionalised intergovernmental collaboration will remain effective as the impacts of a changing climate increase in number and severity, being disproportionately felt by those countries who have contributed the least to the stock of GhG in the atmosphere. Cleavages in climate negotiations between

major developing countries, including India, China, Indonesia and Brazil, and developed countries are replicated in a number of intergovernmental fora, not least the G20. As the situation deteriorates, the risk of a breakdown in international co-operation, and the individual pursuit of “beggar thy neighbour” policies cannot be ruled out.

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