

Cooking up a storm

The climate threat to food supply chains in UK, Germany & Italy

September 2023



Above: Monicah Wandia Nzangi, 57, irrigates crops in Makueni County, Kenya, one of the climate vulnerable countries that the UK's food supply chain relies on. Credit: *Felixie Kipng'etich/Christian Aid*



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Christian Aid exists to create a world where everyone can live a full life, free from poverty. We are a global movement of people, churches and local organisations who passionately champion dignity, equality and justice worldwide. We are the change makers, the peacemakers, the mighty of heart.

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Foreword

Over the last year, as drought and then flooding has gripped East Africa, fires raged across Europe and temperature records hit new highs in Asia and the Americas, the reality of climate breakdown has never been clearer.

These impacts are being felt most intensely in the poorest parts of the world, which have contributed least to the climate crisis, and have the fewest resources to adapt to it. Without concerted action to support adaptation efforts in climate-vulnerable countries, millions of livelihoods will be on the line.

Supporting the poorest countries to adapt to climate change is the right thing to do. As a major per capita emitter, and as the home of the first industrial revolution, the UK must work with climate-vulnerable countries to ensure that the funding and technology are available to transition to a greener and more equal future.

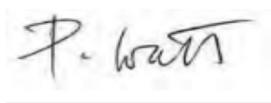
This report also shows that decisive climate action is the smart thing to do. Although Britain is physically an island, it is deeply connected to the rest of the world, including through its reliance on significant food imports from climate-vulnerable countries. The climate crisis is already disrupting many food supply chains and threatens to add to the cost of living crisis.

There is a longstanding Christian tradition – shared by many other religions – of giving thanks before eating for the bounty of creation, and for the hands that helped produce the food. Saying grace before a meal is a way of recognising that the earth is our common home. Irrespective of people's beliefs, we all need to recognise that in an increasingly climate-volatile world, we cannot insulate ourselves from the impacts of a changing climate on those who grow our food.

As we approach COP28, there's a need both for existing climate commitments – many of them long overdue – to be met, and for adoption of a more effective framework to address future adaptation needs and compensate communities experiencing irreparable loss and damage.

Actions in one part of the world have consequences in another. Carbon-intensive economic growth is reaping a painful harvest in climate vulnerable countries, which now threatens our own food supply.

The case for a step change in climate finance for the poorest countries has never been clearer or more urgent.



Patrick Watt

Chief Executive Officer, Christian Aid

Below: Patrick Watt, Chief Executive Officer, Christian Aid.



Climate change and Europe's food supply chains

Summary

- Harvests are being destroyed by climate change-fuelled extremes, with major growing countries seeing the effects of drought, heat and floods. The cost of these impacts is already being felt by farmers and consumers across the world, who are seeing how the price of everyday foods soars.
- A closer examination of a representative grocery list from households in the United Kingdom, Italy, and Germany reveals that of the top 25 UK import trade partners, 32% face a high climate risk. Italy and Germany have 28% of their respective trade partners falling into the category of high climate risk.
- A significant portion of the fruit, vegetables, and protein products — specifically, 22% (UK), 15% (Germany), and 23% (Italy) — originate from countries with high climate change vulnerability and low climate readiness levels.
- At present, main meat and dairy exports come from countries with moderate climate change vulnerability, within the EU. However some of the fruit and vegetable products such as avocados, grapes, berries and bananas are exported from countries with high climate vulnerability and low climate readiness
- Key household staples such as tea, cocoa and coffee are mainly exported from countries with high climate vulnerability and low climate readiness which threatens their production. Climate change may contribute to a significant rise in the prices of these commodities if we do not support adaptation measures of the poorer, climate vulnerable countries.

Methodology

- The latest food import data (2021) was retrieved from the World Integrated Trade (WITS) database, an online open-access data source reporting global and national trade values and quantities of different products from 1992–2022.¹
- WITS provides information on food and non-food items, which can be customised based on country and product. For this study, searches were performed by product, and the results were customised to find gross imports into the UK, Italy and Germany from all countries. The nomenclature chosen is HS 1988/92
- Three sample grocery lists were created for each country of interest. Each list reflects a 5-day diet typical for a 4-person family from the UK, Germany and Italy.
- Grains and cereals were scoped out of the investigation because they are traded on the grains commodity market which is incredibly volatile making analysis difficult.
- The historical trade data for the grocery list products was retrieved for 2022
- A top trade partner was selected for each product based on the highest trade value. Monetary value (trade value) was used since the larger the percentage of gross domestic product (GDP) invested in climate-vulnerable countries, the greater the vulnerability to indirect climate impacts (Benzie et al. 2019)
- The severity of climate risk was then assigned to each exporting country based on the ND-GAIN index, assessing climate vulnerability and readiness of each country²

Yadira Lemus

Yadira Lemus, a coffee farmer born from generations of coffee producers in Honduras, is part of a women's group working with the support of Christian Aid partners to implement climate adaptation projects and improve the income of women.

“As a coffee producer, it is more and more difficult to produce,” Yadira Lemus explains. “And yes, that is obviously related to climate change, because before we would plant coffee and it produced almost by itself.”

She adds: “With regard to climate change, we are seeing an increase in temperature. It is harder to predict the weather. Before we could say which is winter or summer, and when we can plant. Not anymore. We cannot say that because it changes from one year to the other, and it is not easy to predict. Who was going to predict that we were going to have the storms and hurricanes we had last year. Now you see there is a lack of rain. We are more vulnerable to these types of changes.

“Each time we have to search for higher places to produce. People are now deforesting higher zones, which generally are recharge zones for springs, which in the end are the water sources we take the supply from. They are also contaminating them because they are not implementing good agricultural practices.”

Data

2023 WITS Import Data for IT, DE & UK

The spreadsheet above contains data from the WITS website: top trade partners by gross imports to Germany, Italy and the UK per product.

2023 ND Gain Index data

The spreadsheets contain climate risk assessment scores for the UK, Italy and Germany's trade partners.

ND-GAIN Country Index

Notre Dame Global Adaptation Initiative (ND-GAIN) Country Index³ summarises a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. It aims to help governments, businesses, and communities better prioritise investments to respond more efficiently to the immediate global challenges ahead. The ND-GAIN Country Index is composed of two key dimensions of adaptation: vulnerability and readiness.

The Notre Dame Global Adaptation Initiative is a part of Notre Dame Research.⁴

Recommendations

To protect the UK's food supply chain from the impact of climate change, much greater support needs to be provided to farmers working to grow food in perilous climatic conditions.

- 1). Rich countries need to finally deliver on their long promised, but undelivered, pledge to provide \$100billion of climate finance to developing countries.
- 2). In particular they need to close the 'adaptation gap' and invest funds to ensure farmers can adapt to the changing climate, enabling them to continue to grow food and protect their livelihoods. At COP26 in Glasgow, hosted by the UK Government, rich countries agreed to double adaptation funding by 2025 but countries have so far failed to act on this promise.
- 3). As of September 2023, the UK Government has failed to address concerns that it will break its promise on climate finance and breach its pledge to deliver £11 billion in climate funding commitments. The Government needs to show this is not the case otherwise it risks undermining the international climate talks taking place this year at COP28 in Dubai.

Below: Yadira Lemus, 31, from Quebrada Honda, Gracias Lempira is a dedicated producer of quality coffee, and member of WLSEE IXIK Organic.



4). The UK should also publish how it plans to raise its contribution to the Loss and Damage Fund, agreed by all countries at COP27 last year in Egypt. This finance is a vital to help the world's most vulnerable people, many of them farmers, rebuild their lives after losing their homes, farms and livelihoods.

1. Food Supply Chain Climate Vulnerability In UK

Domestic food supply in the UK has continued to decrease⁵, causing groceries to be increasingly reliant on imports from climate-vulnerable countries.⁶ Drought⁷, heavy rain⁸ and extreme temperatures⁹ fuelled by climate change have already pushed up prices of many staples, including sugar, olive oil, coffee, pasta and risotto rice.

A sample grocery list from a typical shopping family shows that 22% of fruit, vegetables and protein products come from high-risk climate change countries. In addition, 8 out of 25 (32%) of the UK's top import trade partners are countries with high climate vulnerability and low climate readiness. These include Brazil, South Africa, India, Vietnam, Peru, Colombia, Cote d'Ivoire and Kenya.

As the UK's food supply chain is increasingly dependent on countries prone to significant climate risks¹⁰, supporting climate adaptation efforts in these regions is crucial.

In June 2023, the cost of food in the European Union increased by 13.81%¹¹ over the same month last year and climate change has the potential to exacerbate already growing food prices. Current climate forecasts indicate Europe will continue to experience higher heat levels. The mean land temperatures in Europe are projected to increase further by 1.2C to 3.4C (by 2071-2100, compared to 1981-2010)¹², together with extreme weather events which can cause repeats of "heatflation" experienced in 2022.¹³

Table 1 Sample grocery list of a typical family in the UK

This sample grocery list was created based on a typical 5-day diet for a 4-member family in the UK.

Groceries - UK			
Apples	Eggs	Carrots	Oranges
Bananas	Lettuce	Cheese	Lemons
Berries	Beef	Cashews	Tea
Grapes	Honey	Tomatoes	Yoghurt
Avocado	Peas	Chicken	Cucumbers
Broccoli/Cauliflower	Canned Tuna	Cocoa	

Table 2: Climate Change Risk of UK's Food Imports by Trade Partner in 2022

Product	Top importer to the UK (per trade value)	Climate Change Risk (2020 ND-GAIN score)	Commentary
Apples	France	Moderate climate change risk	Warmer winters in Europe are posing a severe threat to fruit trees. ¹⁴ Many European varieties need a long cold winter to produce good fruit in summer, and climate change is disrupting their natural cycles.
Bananas	Colombia	High climate change risk	To produce fruit, bananas need a long, sunny growing season of nine to 15 months, with temperatures at least above 15°C but ideally 27 °C ¹⁵
Berries	Morocco	Moderate climate change risk	Climate change and putting increased pressure on agriculture in Morocco, which has already been attributed to fruit and vegetable shortage in the UK ¹⁶
Grapes	South Africa	High climate change risk	Fruit production in tropical regions, such as South Africa, is more vulnerable to climate change as the region already experience hot and dry climate, hence the need to

			implement different strategies for climate change adaptation in these regions ¹⁷
Avocado	Peru	High climate change risk	Both too wet and too dry climates are incompatible with avocado growth: according to the projections of various climate models, Peru, could lose 55 to 70% of their areas suitable for this crop by 2050 ¹⁸
Broccoli/Cauliflower	Spain	Moderate climate change risk	Adverse weather connected to climate change led to a contraction in the volume of Spanish fruit and vegetable exports of between 8 and 10 per cent in 2022 ¹⁹
Carrots	Italy	Moderate climate change risk	Unpredicted weather patterns, including heavy rainfall have historically delayed sowing and harvesting of carrots in Italy ²⁰
Dairy (yoghurt, cheese)	France	Moderate climate change risk	Adaptation challenges still exist, however the agriculture capacity is not projected to decrease
Cashews	Cambodia (exported via Vietnam)	High climate change risk	Erratic weather patterns connected to climate change, have slashed yields for cashew farmers by up to 60% in Cambodia, in 2022 ²¹
Tomatoes	Netherlands	Moderate climate change risk	
Chicken	Poland	Moderate climate change risk	
Cucumbers	Spain	Moderate climate change risk	Adverse weather connected to climate change led to a contraction in the volume of Spanish fruit and vegetable exports of between 8 and 10 per cent in 2022 ²²
Cocoa	Cote d'Ivoire	High climate change risk	Côte d'Ivoire ²³ and Ghana ²⁴ , supply about 60% of the world's cocoa, some reports show current cocoa-producing regions may no longer be suitable for cocoa production in the next 30 years if we don't take action ²⁵
Eggs	Ireland	Moderate climate change risk	
Lettuce	Spain	Moderate climate change risk	Adverse weather connected to climate change led to a contraction in the volume of Spanish fruit and vegetable exports of between 8 and 10 per cent in 2022 ²⁶
Beef	Ireland	Moderate climate change risk	

Honey	China	Moderate climate change risk	Climate change is expected to impact honey production in China by altering floral resources, disrupting pollination patterns, and potentially increasing the prevalence of pests and diseases. ²⁷
Peas	Peru	High climate change risk	
Canned Tuna	Ecuador	High climate change risk	Ecuador is already affected by declining catches, either due to reduced fish populations or altered distribution of fish as they move away from the coast towards deeper and colder waters ²⁸
Oranges, Lemons	Spain	Moderate climate change risk	Adverse weather connected to climate change led to a contraction in the volume of Spanish fruit and vegetable exports of between 8 and 10 per cent in 2022 ²⁹
Tea	Kenya	High climate change risk	Tea grows best in regions which are warm and humid with a rainfall measuring at least 100 centimetres a year. Rising temperatures, droughts, and unpredictable weather patterns in Kenya are already disrupting tea production.

2. Food Supply Chain Climate Vulnerability In Germany

The cost of food in Germany increased by 16.8% in April of 2023 over the same month in the previous year. Prices for dairy products (+34.8%); bread and cereals (+21.3%); fish and seafood (+19.7%); and sugar, jam, and honey (+19.6%) recorded the most significant increases, according to the Federal Statistical Office.³⁰ The price of coffee imported from Brazil has also increased substantially due to a combination of drought and frost, attributed to climate change which contributed to the lowest global coffee reserves in over twenty years.³¹

A sample grocery list from a typical shopping family in Germany shows that 15% of fruit, vegetables and protein products come from high-risk climate change countries. In addition, 7 out of 25 of Germany's top import trade partners are countries with high climate vulnerability and low climate readiness. This includes Brazil, Vietnam, Peru, Colombia, India, Cote d'Ivoire, and South Africa

Table 3 Sample Grocery list of a typical family in Germany

This sample grocery list was created based on a typical 5-day diet for a 4-member family in Germany

Groceries - Germany			
Apples	Berries	Almonds	Lemons
Bananas	Sugar	Cabbage	Chicken
Beer	Potatoes	Cocoa	Cheese
Eggs	Tomatoes	Coffee	Pork meat
Avocado	Pasta	Plums	Oranges

Table 4: Climate Change Risk of Germany's Food Imports by Trade Partner in 2022

Product	Top importer to Germany (per trade value)	Climate Change Risk (2020 ND-GAIN score)	Commentary
Apples	Italy	Moderate climate change risk	Warmer winters in Europe are posing a severe threat to fruit trees. Many European varieties need a long cold winter to produce good fruit in summer, and climate change is disrupting their natural cycles. ³²
Bananas	Costa Rica	Moderate climate change risk	To produce fruit, bananas need a long, sunny growing season of nine to 15 months, with temperatures above 15°C and ideally 27°C
Beer	Denmark	Moderate climate change risk	Of the Danish company Carlsberg's 84 global breweries, 16 are in areas of high water stress, and several are "at high risk of barley sourcing" ³³
Eggs	Netherlands	Moderate climate change risk	-
Avocado	Peru	High climate change risk	Both too wet and too dry climates are incompatible with avocado growth: according to the projections of various climate models, Peru, could lose 55 to 70% of their areas suitable for this crop by 2050 ³⁴
Almonds	United States	Moderate climate change risk	Almond orchards are all-year crops that need a substantial amount of water. In 2021, climate change already posed stress on California's six million almond industry due to drought ³⁵

Cabbage	Spain	Moderate climate change risk	Adverse weather connected to climate change led to a contraction in the volume of Spanish fruit and vegetable exports of between 8 and 10 per cent in 2022 ³⁶
Cocoa	Cote d'Ivoire	High climate change risk	Côte d'Ivoire and Ghana, supply about 60% of the world's cocoa, some reports show current cocoa-producing regions may no longer be suitable for cocoa production in the next 30 years if we don't take action ³⁷
Coffee	Brazil	High climate change risk	Price of coffee, imported from Brazil, has also increased substantially, due to a combination of drought and frost, attributed to climate change which contributed to the lowest global coffee reserves in over twenty years. ³⁸
Cheese	Netherlands	Moderate climate change risk	-
Pork meat	Denmark	Moderate climate change risk	-
Oranges	Spain	Moderate climate change risk	Adverse weather connected to climate change led to a contraction in the volume of Spanish fruit and vegetable exports of between 8 and 10 per cent in 2022 ³⁹
Plums	Spain	Moderate climate change risk	Adverse weather connected to climate change led to a contraction in the volume of Spanish fruit and vegetable exports of between 8 and 10 per cent in 2022
Berries	Morocco	Moderate climate change risk	Since 2020 several agricultural areas in Morocco experienced shortages of rainfall and draught impacting the crops ⁴⁰
Sugar	Mauritius	Moderate climate change risk	-
Potatoes	Netherlands	Moderate climate change risk	-
Tomatoes	Netherlands	Moderate climate change risk	-
Pasta	Italy	Moderate climate change risk	The production of durum wheat used to make pasta in Italy has already been impacted in 2021 and the impact is projected to continue ⁴¹
Lemons	Spain	Moderate climate change risk	Adverse weather connected to climate change led to a contraction in the volume of Spanish fruit and vegetable exports of between 8 and 10 per cent in 2022 ⁴²
Chicken	Austria	Moderate climate change risk	-

3. Food Supply Chain Climate Vulnerability - Italy

Looking at a sample grocery list from a typical shopping family in Italy, 23% of fruit, vegetables and protein products come from high-risk climate change countries. In addition, 7 out of 25 of Italy's top import trade partners are countries with high climate vulnerability and low climate readiness. This includes Brazil, Vietnam, Ecuador, India, Argentina, Uganda, and Colombia.

Table 5 Sample Grocery list of a typical family in Italy

This sample grocery list was created based on a typical 5-day diet for a 4-member family in Italy.

Italy - Groceries			
Almonds	Cucumbers	Eggs	Lettuce
Apples	Grapes	Blue-veined cheese	Oranges
Asparagus	Beef	Carrots	Pistachio
Aubergines	Salmon	Cauliflowers, broccoli	Canned tuna
Avocados	Chicken	Cheese	Tomatoes
Bananas	Lemons	Cocoa	Pasta
Coffee	Virgin olive oil		

Table 6 Sample Grocery list of a typical family in Italy

Product	Top importer to Italy (per trade value)	Climate Change Risk (ND-GAIN score)	Commentary
Almonds	France	Moderate climate change risk	-
Apples	Chile	Moderate climate change risk	Starting in 2010 Chile experienced an environmental crisis connected to a drought that lasted ten years, impacting crops in different areas of the country
Asparagus	Germany	Moderate climate change risk	-

Aubergines	Germany	Moderate climate change risk	-
Avocados	France	Moderate climate change risk	Warmer winter temperatures may disrupt agriculture in France: fruit tree growers must manage the impacts of shorter cold spells and temperature shocks. ⁴³
Bananas	Colombia	High climate change risk	Banana production is projected to be affected in Colombia, even up to approx. -6% of yield in 2050 scenario ⁴⁴
Eggs	Poland	Moderate climate change risk	-
Blue-veined cheese	France	Moderate climate change risk	-
Carrots	Belgium	Moderate climate change risk	-
Cauliflowers, broccoli	France	Moderate climate change risk	In 2022, France's worst drought in 60 years led to severely reduced harvests for several fruit and vegetables
Cheese	Czech Republic	Moderate climate change risk	-
Cocoa	Cote d'Ivoire	High climate change risk	Côte d'Ivoire and Ghana, supply about 60% of the world's cocoa, some reports show current cocoa-producing regions may no longer be suitable for cocoa production in the next 30 years if we don't take action ⁴⁵
Coffee	Brazil	High climate change risk	Price of coffee, imported from Brazil, has also increased substantially, due to a combination of drought and frost, attributed to climate change which contributed to the lowest global coffee reserves in over twenty years. ⁴⁶
Cucumbers	Germany	Moderate climate change risk	-
Grapes	Egypt, Arab Rep,	High climate change risk	The effect of climate change on grapes is challenging to predict as some of its effects do favour crop yield, while others have a damaging impact
Beef	Ireland	Moderate climate change risk	-
Salmon	France	Moderate climate change risk	Atlantic salmon stocks (<i>Salmo salar</i>) are declining. The species is sensitive to the direct impacts of human activities (e.g. exploitation) and to the indirect effects such as climate change. It is already on the red list of endangered species in Europe ⁴⁷
Chicken	Netherlands	Moderate climate change risk	-
Lemons	France	Moderate climate change risk	In 2022, France's worst drought in 60 years led to severely reduced harvests for several fruit and vegetables
Lettuce	France	Moderate climate change risk	In 2022, France's worst drought in 60 years led to severely reduced harvests for several fruit and vegetables
Oranges	Netherlands	Moderate climate change risk	-
Pistachio	Cote d'Ivoire	High climate change risk	Drought conditions and water concerns are significant risks and threats to the pistachio industry
Canned tuna	Cote d'Ivoire	High climate change risk	Climate change and fishing pressure will affect main commercial tuna species in the future and the productivity may be affected even by 36% by 2050. ⁴⁸

Tomatoes	Belgium	Moderate climate change risk	-
Pasta	Greece	Moderate climate change risk	-
Virgin olive oil	Austria	Moderate climate change risk	-

Endnotes

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