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How Fragile Is Our Food System?



***Chris Elliott,
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Food Security by numbers

World Population Milestones

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10 Billion (2057)

The United Nations projects world population to reach 10 billion in the year 2057.

9 Billion (2037)

World population is expected to reach 9 billion in the year 2037.

8 Billion (2023)

World population is expected to reach 8 billion people in 2023 according to the United Nations (in 2026 according to the U.S. Census Bureau).

7.9 Billion (2022)

The current world population is **7.9 billion** as of April 2022 ^[1] according to the most recent United Nations estimates elaborated by Worldometer. The term "World Population" refers to the human population (the total number of humans currently living) of the world.

7 Billion (2011)

According to the United Nations, world population reached **7 Billion on October 31, 2011**.
The US Census Bureau made a lower estimate, for which the 7 billion mark was only reached on **March 12, 2012**.

6 Billion (1999)





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The coming food catastrophe



Ricardo Rey



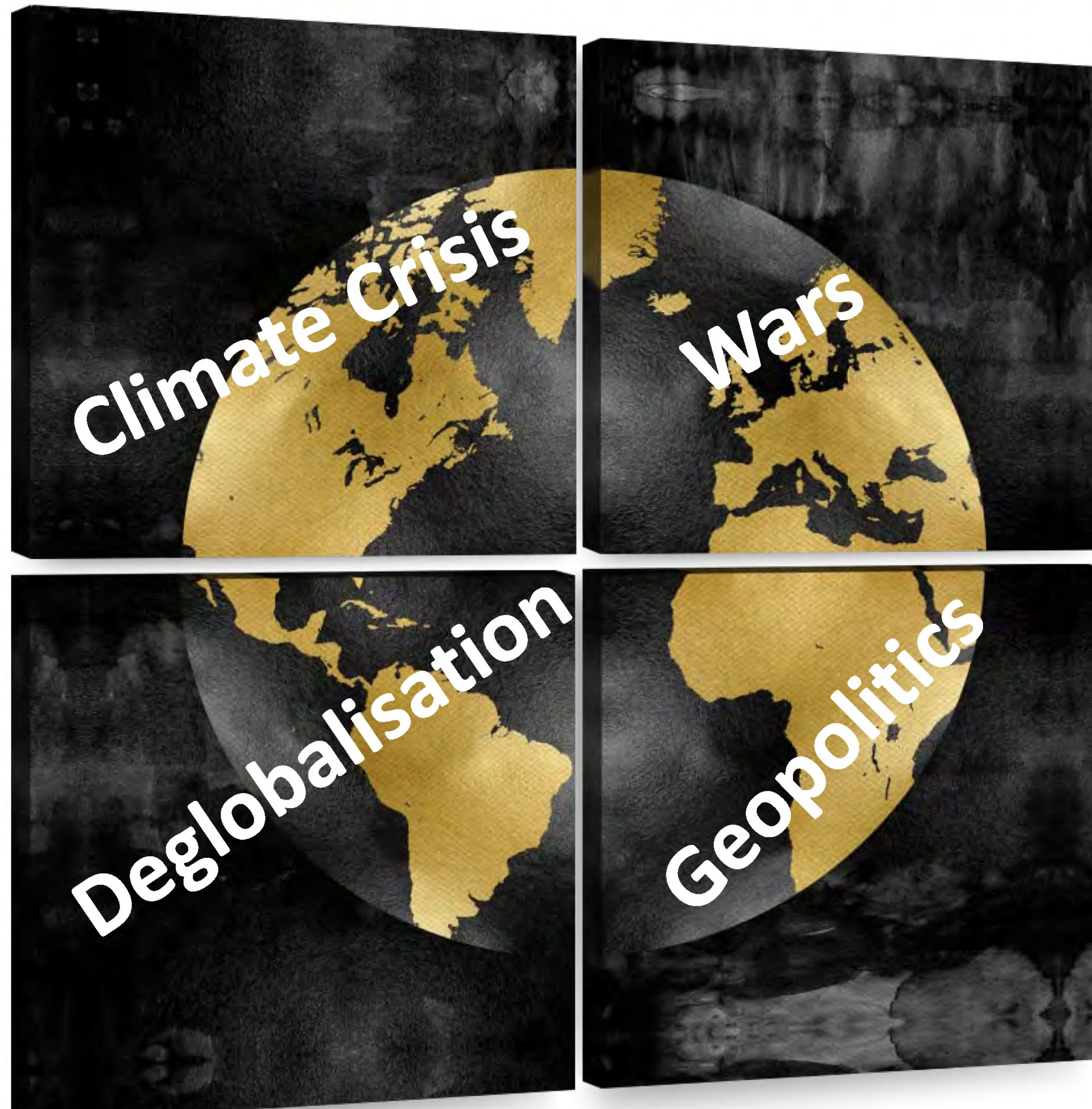


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The four big drivers of changes to the global food supply system.





World

Joint Statement by the Heads of the Food and Agriculture Organization, International Monetary Fund, World Bank Group, World Food Programme, and World Trade Organization on the Global Food Security Crisis

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World + 1 more

G7 Statement on Global Food Security, Elmau, 28 June 2022

News and Press Release • Sources: [EU Govt.](#), [Canada Govt.](#), [France Govt.](#), + 5 more • Posted: 28 Jun 2022 • Originally published: 28 Jun 2022 • Origin: [View original](#)

FOOD ECONOMICS

FOOD ECONOMICS

The food security crisis could kill more people than Covid has, says Senegal minister at G-20

PUBLISHED MON, JUL 18 2022 9:17 PM EDT | UPDATED TUE, JUL 19 2022 9:31 AM EDT

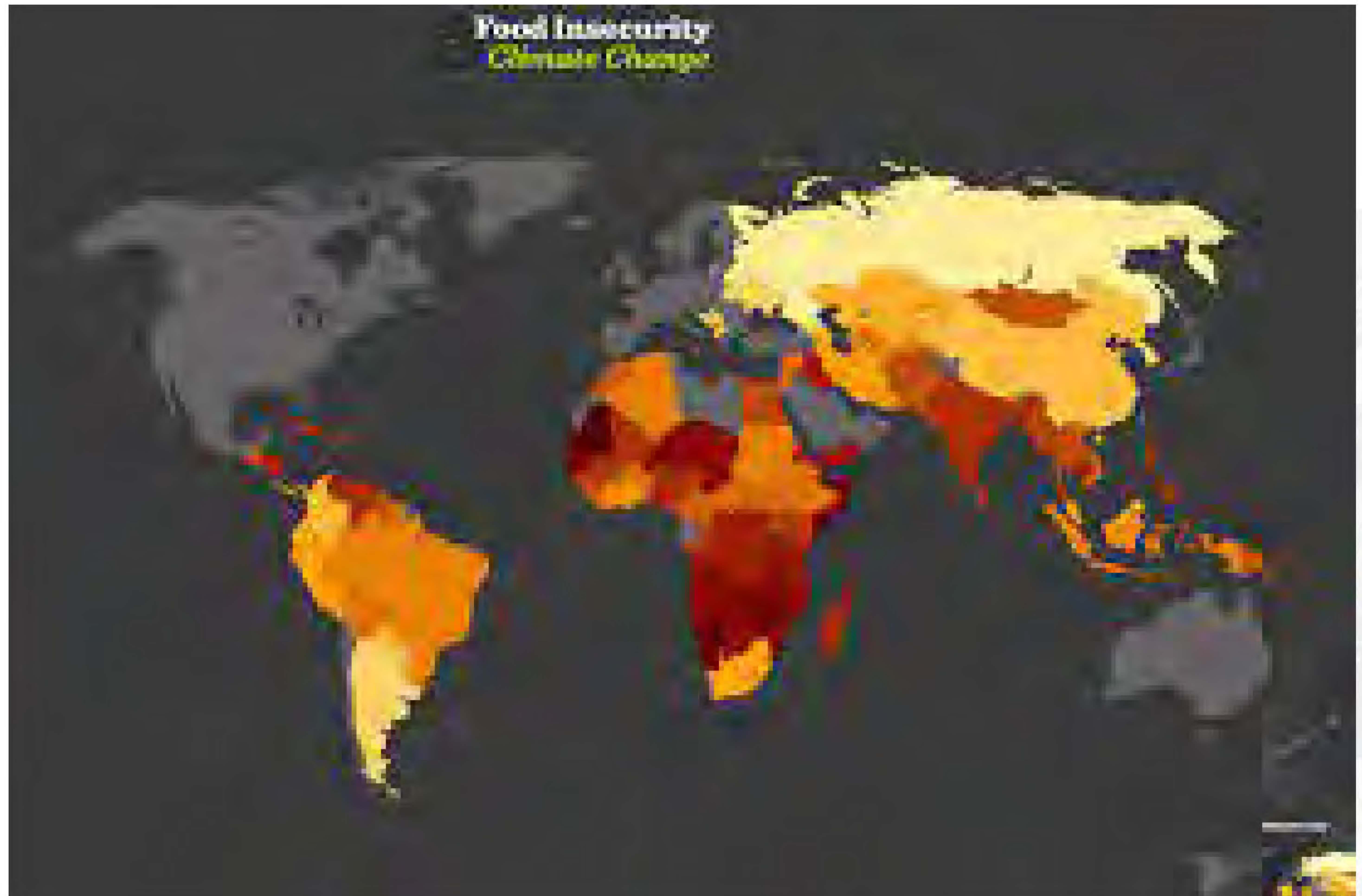


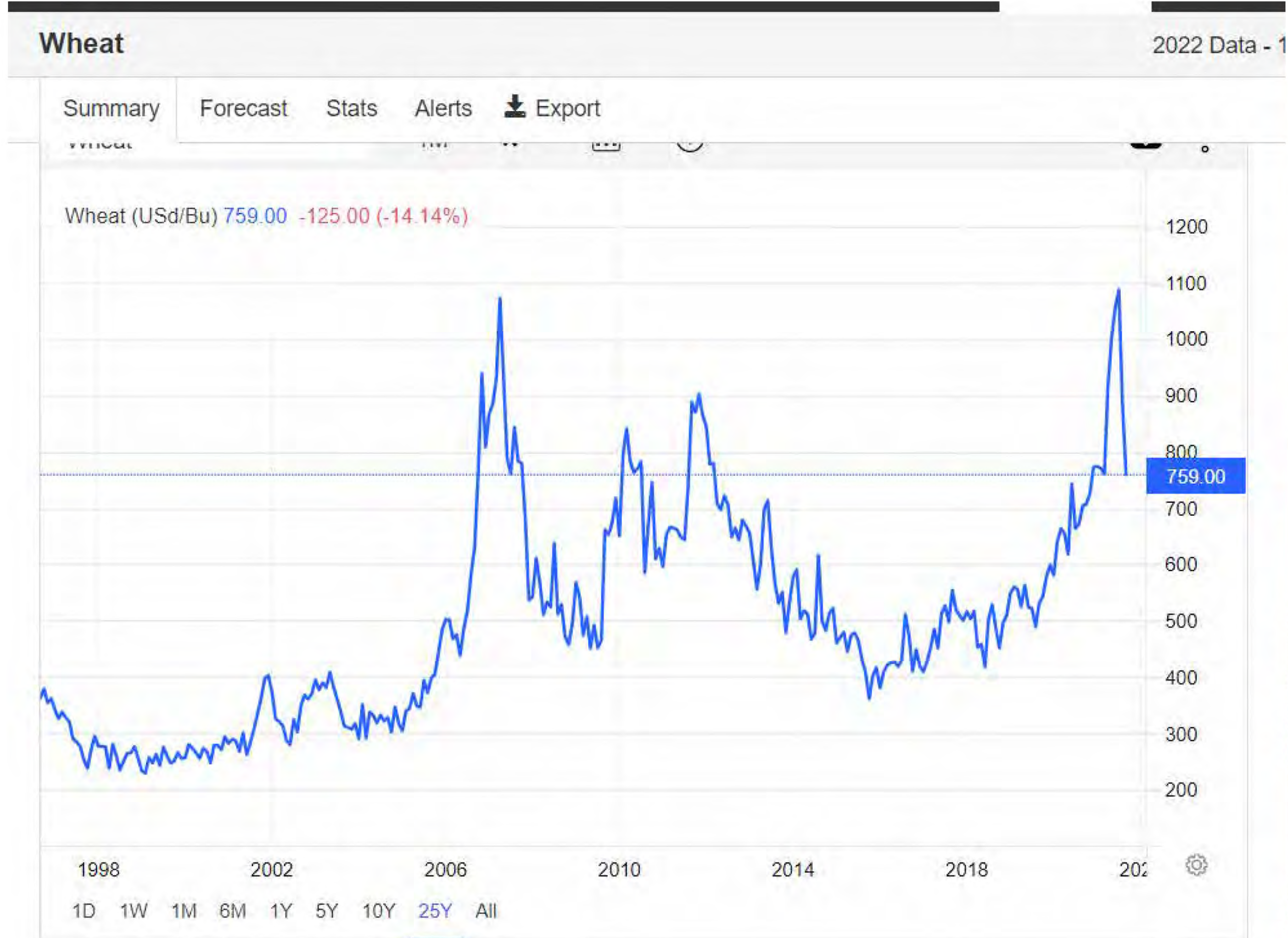
The COVID-19 pandemic, interruption in international supply chains, and the war in Ukraine have severely disrupted food, fuel, and fertilizer markets, which are interlinked. By June 2022 the number of acute food insecure people – whose access to food in the short term has been restricted to the point that their lives and livelihoods are at risk – increased to 345 million in 82 countries according to WFP. Making matters worse, around 25 countries have reacted to higher ↗ food prices by adopting export restrictions affecting over 8 percent of global food trade.[1] ↗ In addition, complicating the food supply response is the doubling of fertilizer prices over the last twelve months, ↗ reflecting record-high costs of inputs such as natural gas. Global stocks, which steadily increased over the last decade, need to be released to bring prices down. All this is happening at a time when fiscal space for government action is already severely constrained ↗ following the COVID-19 pandemic. Beyond the short term, climate change is structurally affecting agriculture productivity in many countries.



Food insecurity linked to climate change is a complex and multifaceted issue

- **Extreme Weather Events:**
- **Shifts in Growing Seasons:**
- **Temperature Increases:**
- **Water Scarcity:**
- **Sea-Level Rise:**
- **Reduced Fisheries:**
- **Displacement and Conflict:**
- **Rising Food Prices:**
- **Reduced Food Nutrient Content:**
- **Food System Vulnerability:**

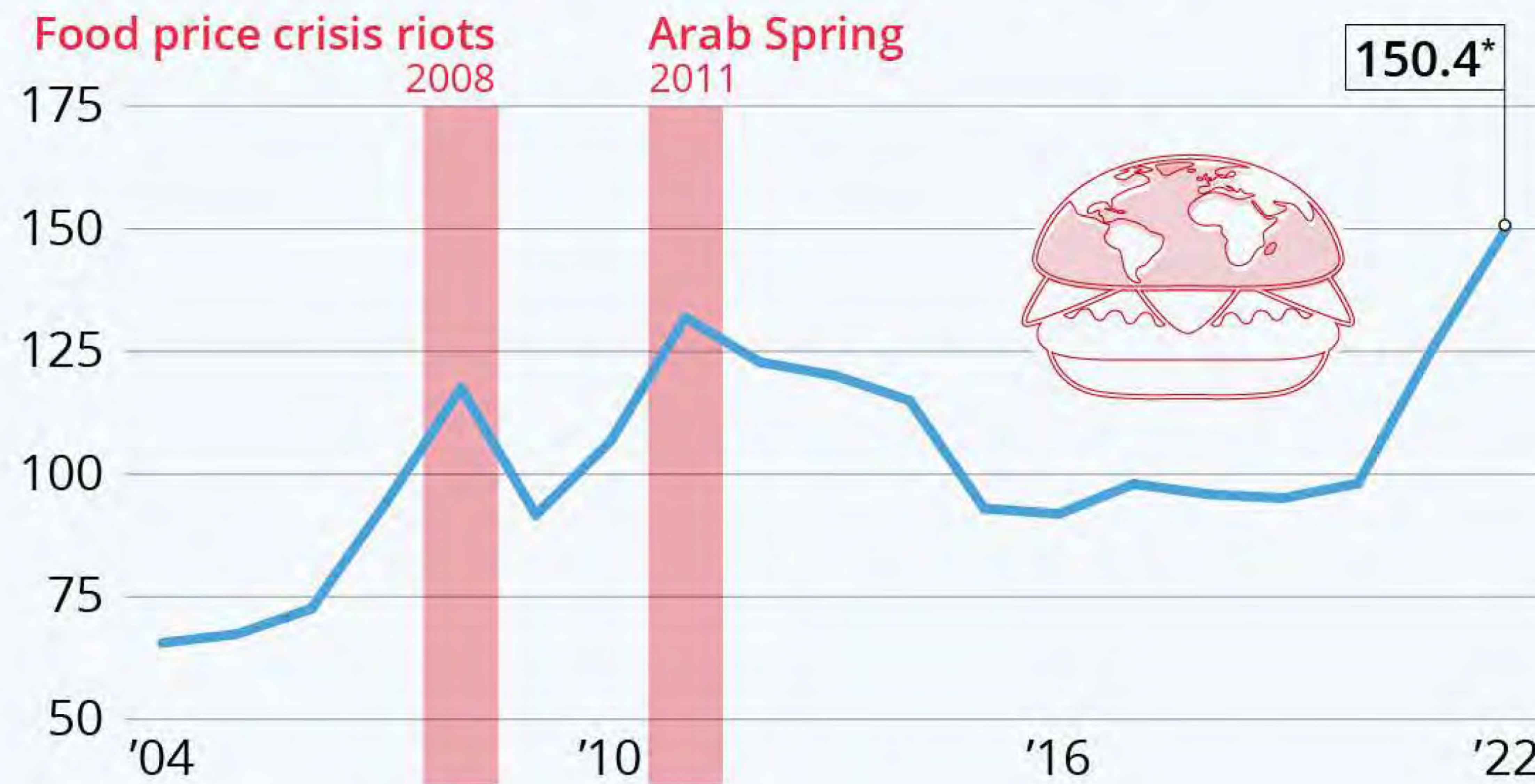






The Link Between Soaring Food Prices and Political Instability

Development of the FAO World Food Price Index and occurrence of widespread unrest since 2004



100 = average price 2014-2016

* Jan-May 2022

Source: FAO





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- Finding key Aromas / Odors
- GC-MS/O Determination

ARTICLE

Is deglobalisation a good or bad thing?

Professor Chris Elliott examines the ongoing deglobalisation of our food system and analyses its potential impact.





The COVID-19 pandemic, interruption in international supply chains, and the war in Ukraine have severely disrupted food, fuel, and fertilizer markets, which are interlinked. By June 2022 the number of acute food insecure people – whose access to food in the short term has been restricted to the point that their lives and livelihoods are at risk – increased to 345 million in 82 countries according to WFP. Making matters worse, around 25 countries have reacted to higher [↗](#) food prices by adopting export restrictions affecting over 8 percent of global food trade.[\[1\]](#) [↗](#) In addition, complicating the food supply response is the doubling of fertilizer prices over the last twelve months, [↗](#) reflecting record-high costs of inputs such as natural gas. Global stocks, which steadily increased over the last decade, need to be released to bring prices down. All this is happening at a time when fiscal space for government action is already severely constrained [↗](#) following the COVID-19 pandemic. Beyond the short term, climate change is structurally affecting agriculture productivity in many countries.



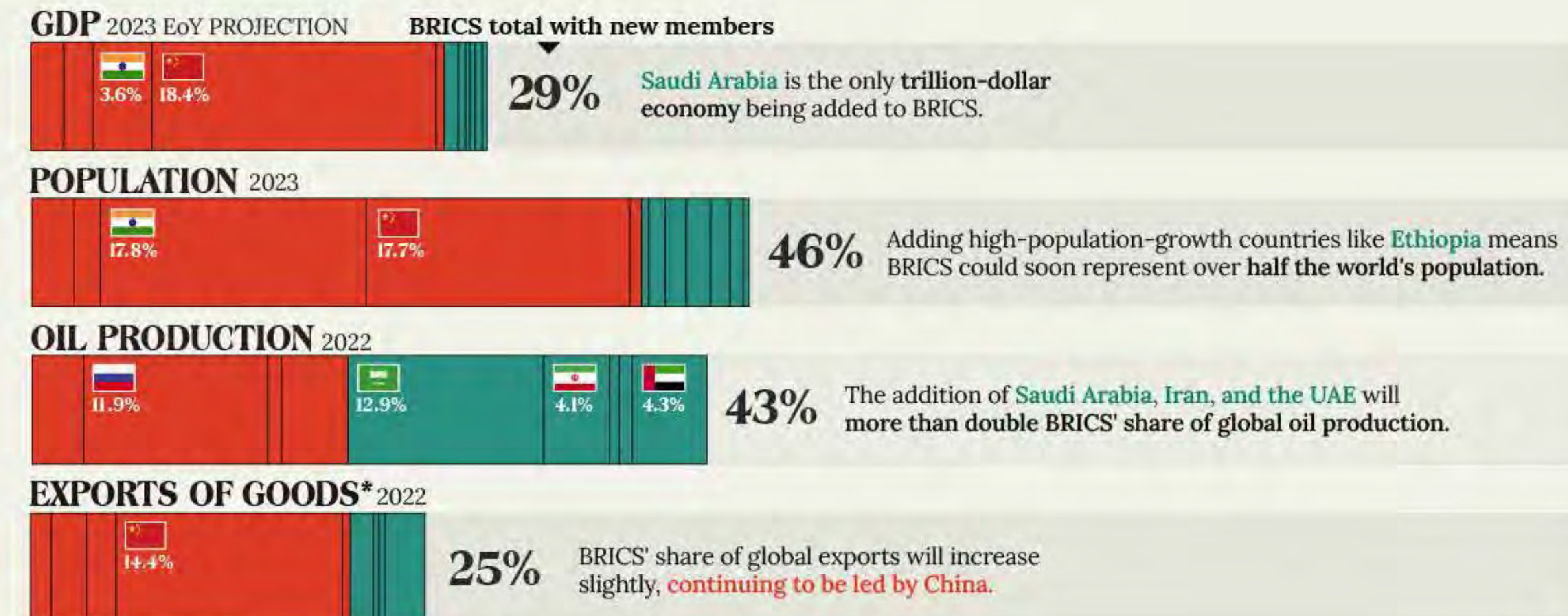
VISUALIZING THE 2023 BRICS EXPANSION

BRICS, a bloc of developing countries formed in 2010, is set to welcome six new members at the beginning of 2024.

▲ Members ▲ New Members ▲ Applied for membership



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*Merchandise trade only.

Sources: IMF, World Population Review, EI Statistical Review of World Energy, World Trade Organization

visualcapitalist.com

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A 'food power' is born

By OVIGWE EGUEGU | China Daily Global | Updated: 2023-09-11 08:10





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The growing evidence of our food systems fragility

Single Point Failures and Cascading Failures



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SHARE THIS ON TWITTER."**



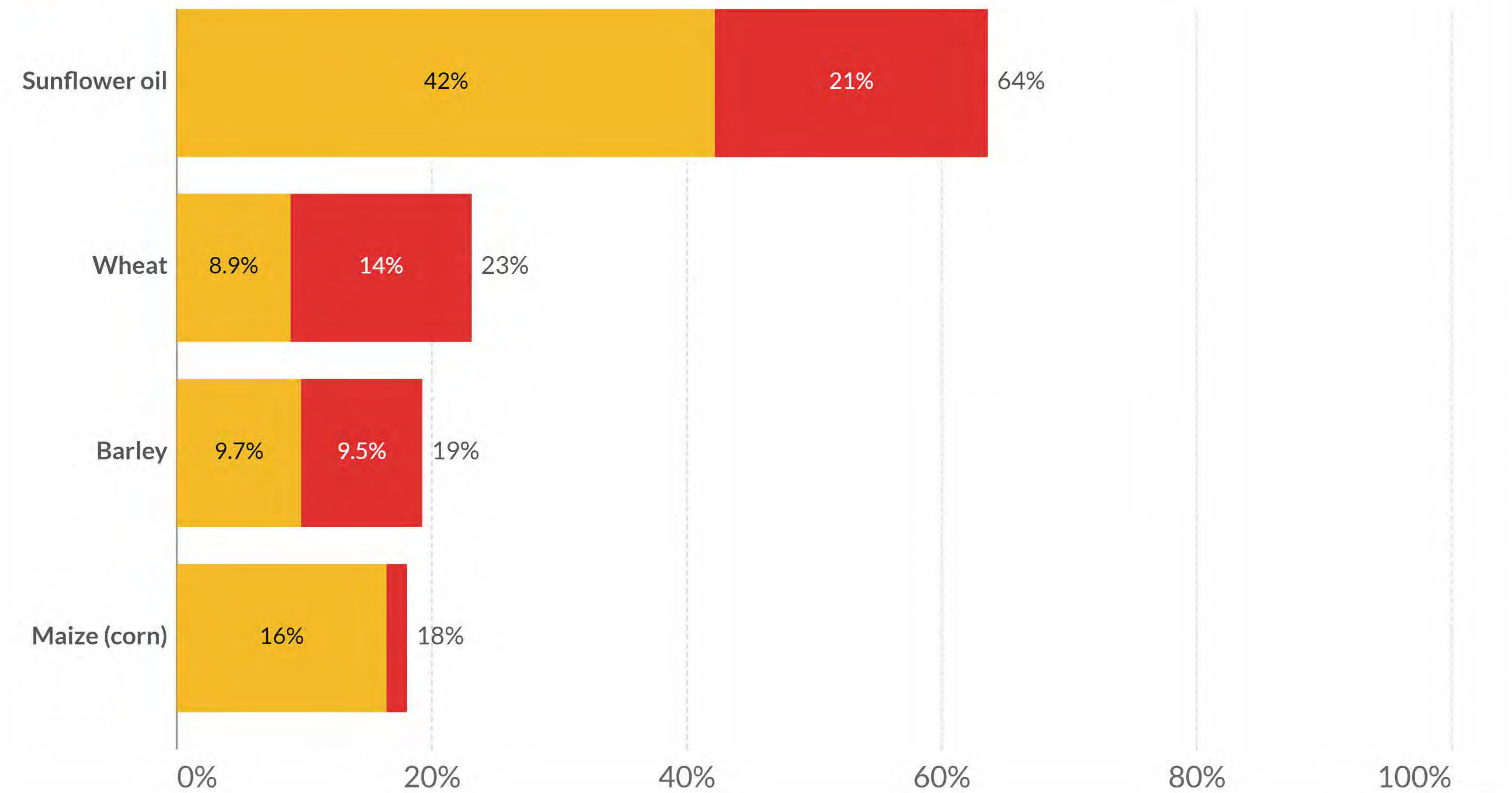
Well published food security issues due to Ukraine invasion

Global food exports: how much comes from Ukraine & Russia?, 2019

This is shown for the largest crops grown by Ukraine and Russia.



■ Ukraine ■ Russia





Examples of non- food commodities

Lifestyle > Food and Drink

CO2: will there be another carbon dioxide gas shortage in the UK - and how it could impact food supplies

CO2 is a gas used in the slaughter of animals, but the UK could see more shortages as a Government deal expires

By Alex Nelson

Monday, 31st January 2022, 9:22 am



Aluminum shortage impacting cat food, canned beer, and more

Experts predict issue may linger well into 2023



You are in : [All News](#) > Supply chain crisis hits vitamin E, knock-on effects across nutrition industry

Supply chain crisis hits vitamin E, knock-on effects across nutrition industry



24 Jan 2022 --- As the global economy continues to tackle challenges caused by supply chain constraints and inflation, the nutrition and food industries have also been hit by issues surrounding vitamin E.

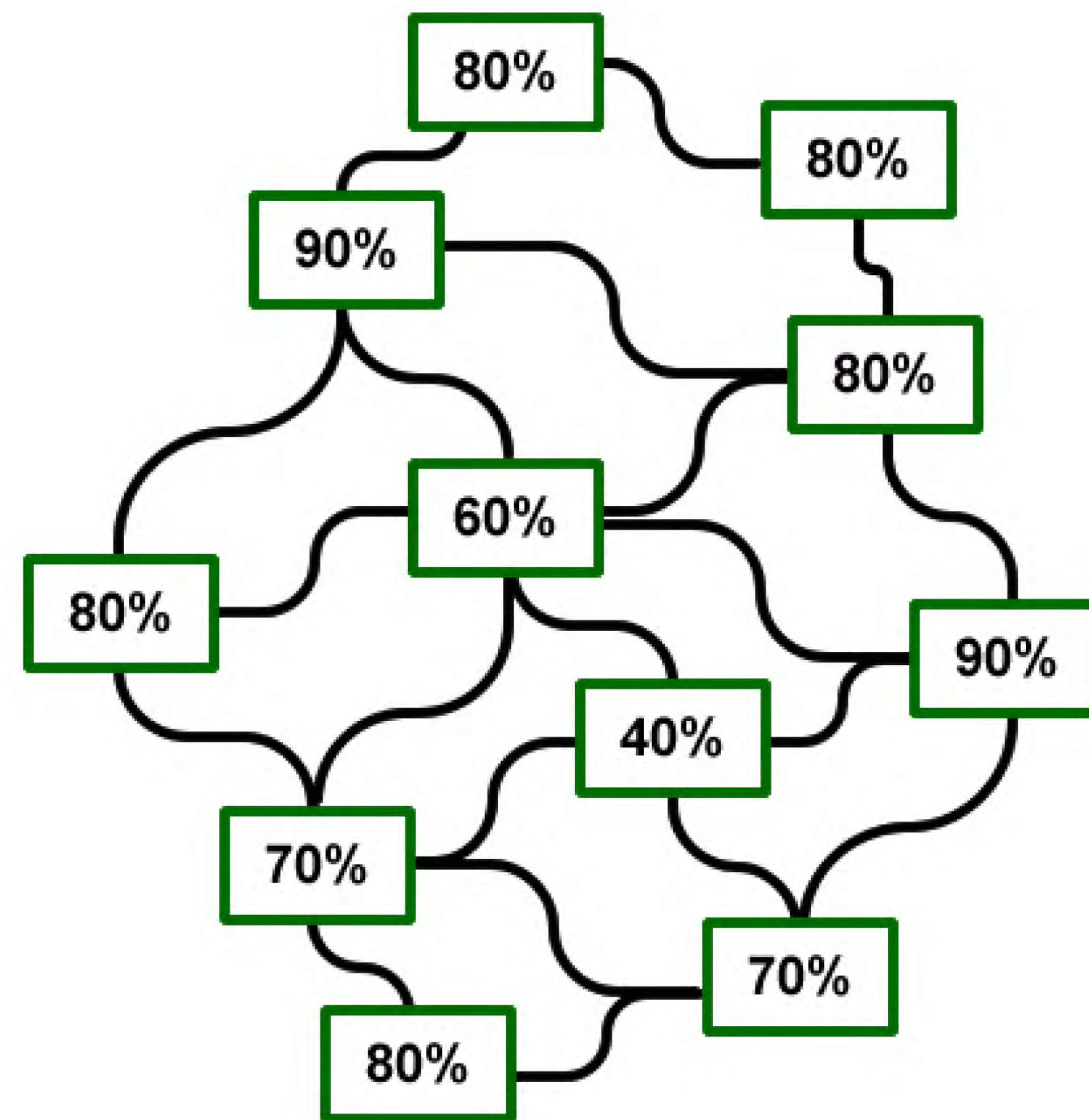
Now, industry is facing increasing costs, causing businesses to turn to alternatives wherever possible.

"The supply chain crisis has also affected vitamin E, like many of our other products," Peter de Meester, chief operating officer health nutrition and care at DSM, tells *NutritionInsight*





A **cascading failure** is a process in a system of interconnected parts in which the failure of one or few parts can trigger the failure of other parts



Network running normally



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Indonesia, the world's top cooking-oil exporter, says it's going to ban exports of the oil this week, and it's sent the global prices of edible oils soaring



Palm oil is used in the production of foods such as **cake, chocolate, biscuits**, It is also found in cosmetics, soap, shampoo, cleaning products.
Up to 50% of products in an average UK supermarket now contain palm oil



TIRUCHIRAPALLI

Food Safety officials crack the whip on adulteration of edible oil in Tiruchi



SPECIAL CORRESPONDENT

TIRUCHI MARCH 02, 2022 18:10 IST
UPDATED: MARCH 02, 2022 19:25 IST

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Combatting adulteration in edible oils

Today, adulteration in oils is a rising concern and poses a grave risk to human health. Edible oil fraud usually involves misleading the purchaser as to the true nature, substance or quality of the oil demanded.

TIRUCHIRAPALLI MARCH 02, 2022 18:10 IST

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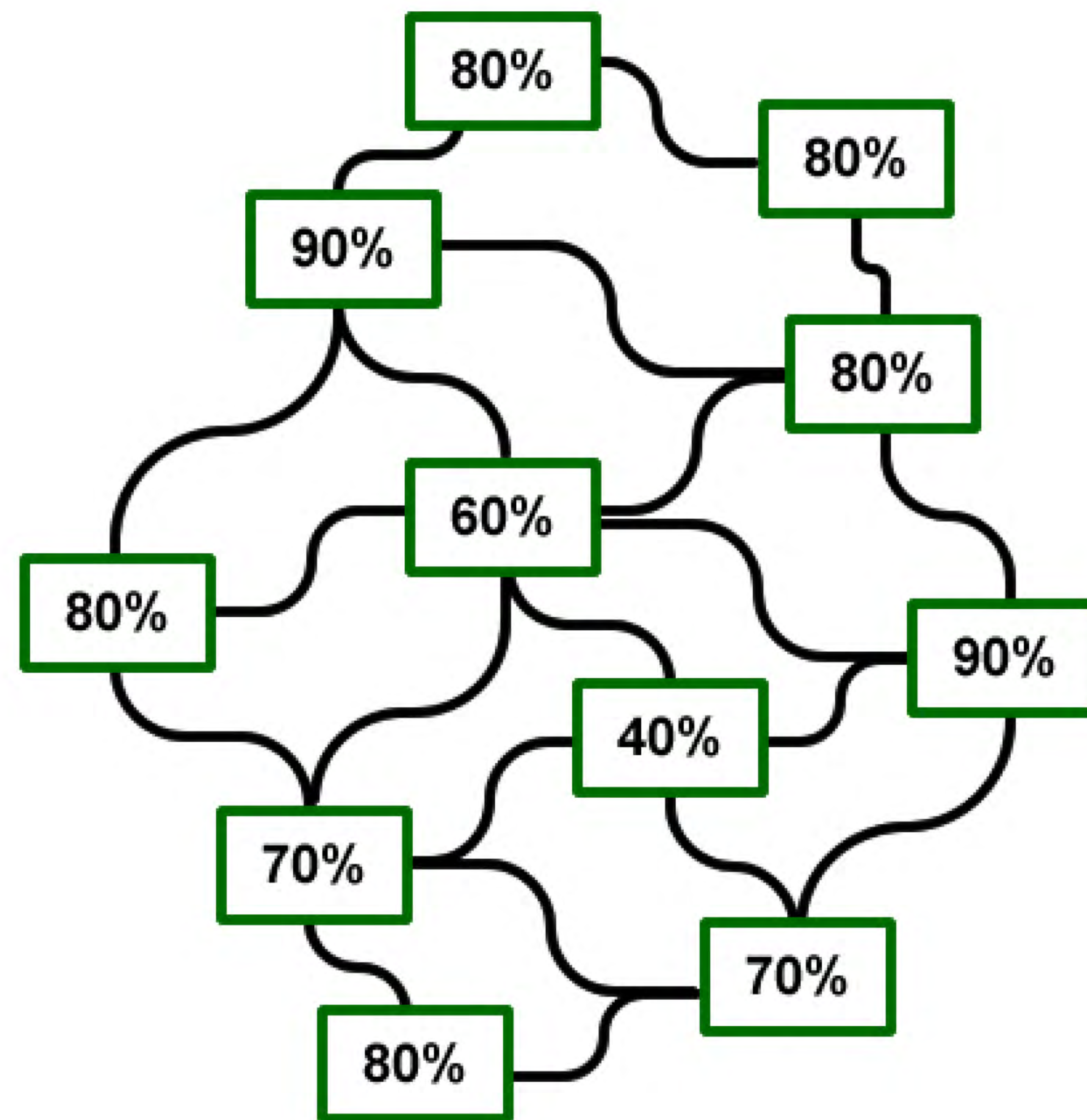
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Palm Oil Adulteration: FDA introduces traceability system to rid supply chain of culprits

5d ago | Source: CNR Citi Newsroom



The vegetable oil network failure



Network running normally



Food system resilience: Defining the concept

Capacity over time of a food system and its units at multiple levels, to provide sufficient, appropriate and accessible food to all, in the face of various and even unforeseen disturbances.

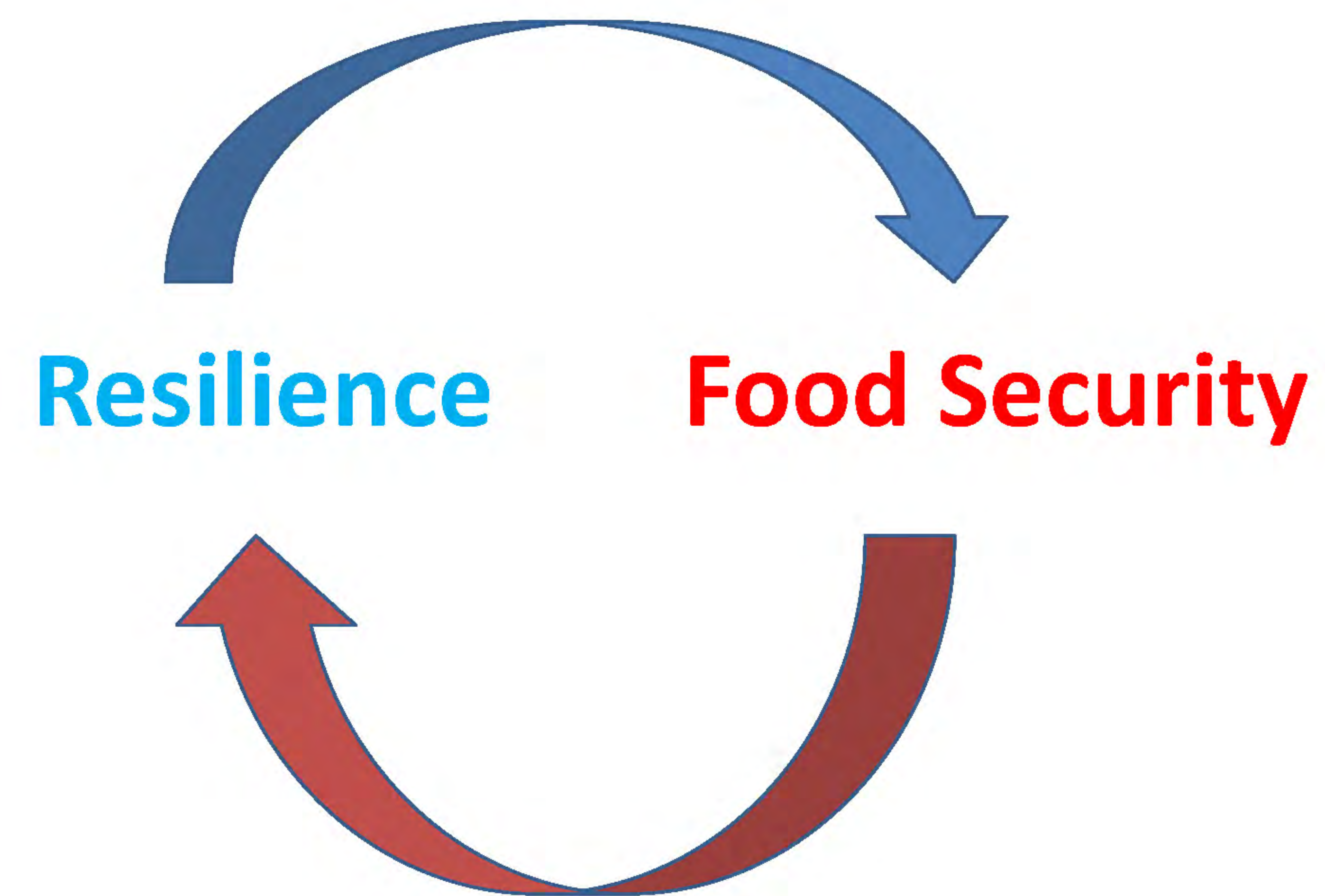


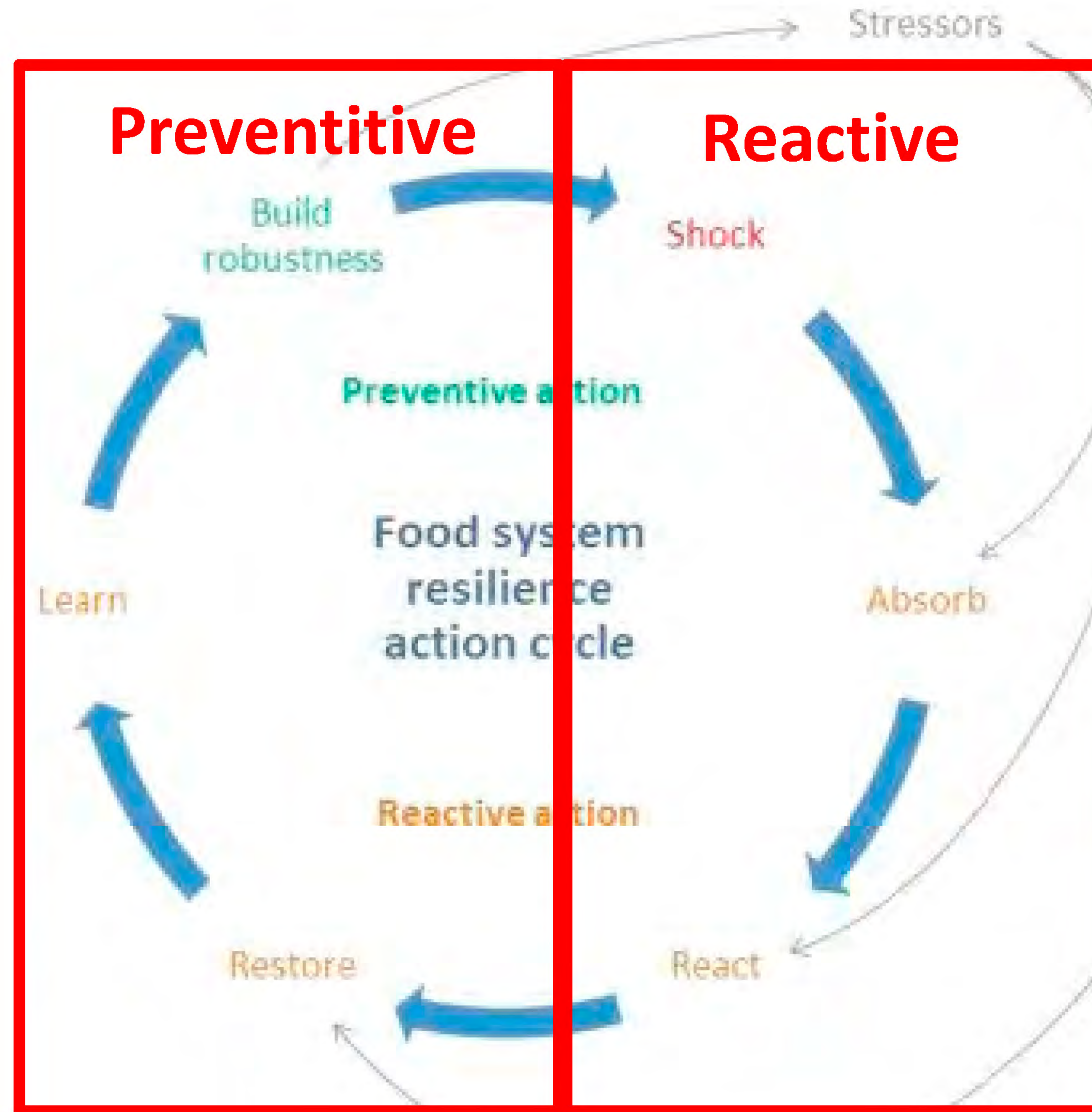
Tendall et al, Global Food Security, Volume 6, 2015, Pages 17-23



Food systems resilience

Building resilience in food systems helps to develop strengths against shocks such **climate change, urbanization, natural disasters, disease outbreaks, financial and political crises**







Four properties that define response capacity

Agency: the means and capacities of people to mitigate risks and to respond to shocks.

Buffering: resources to fall back on in the face of shocks and stressors.

Connectivity: the interconnection of and communication between actors and market segments.

Diversity: diversity at different scales and in different places, from production to consumption and from farm level to regional diversity.

The ABCD of food system resilience building



Agency



Buffering



Connectivity



Diversity



What can businesses do?

Get fully transparency of supply chains

Understand points of failure and built resilience plans

Develop diversification plans and understand impacts (fraud for example)

Analysis of more local supplies (investment in local businesses)





The key headline when talking about food security is self-sufficiency.

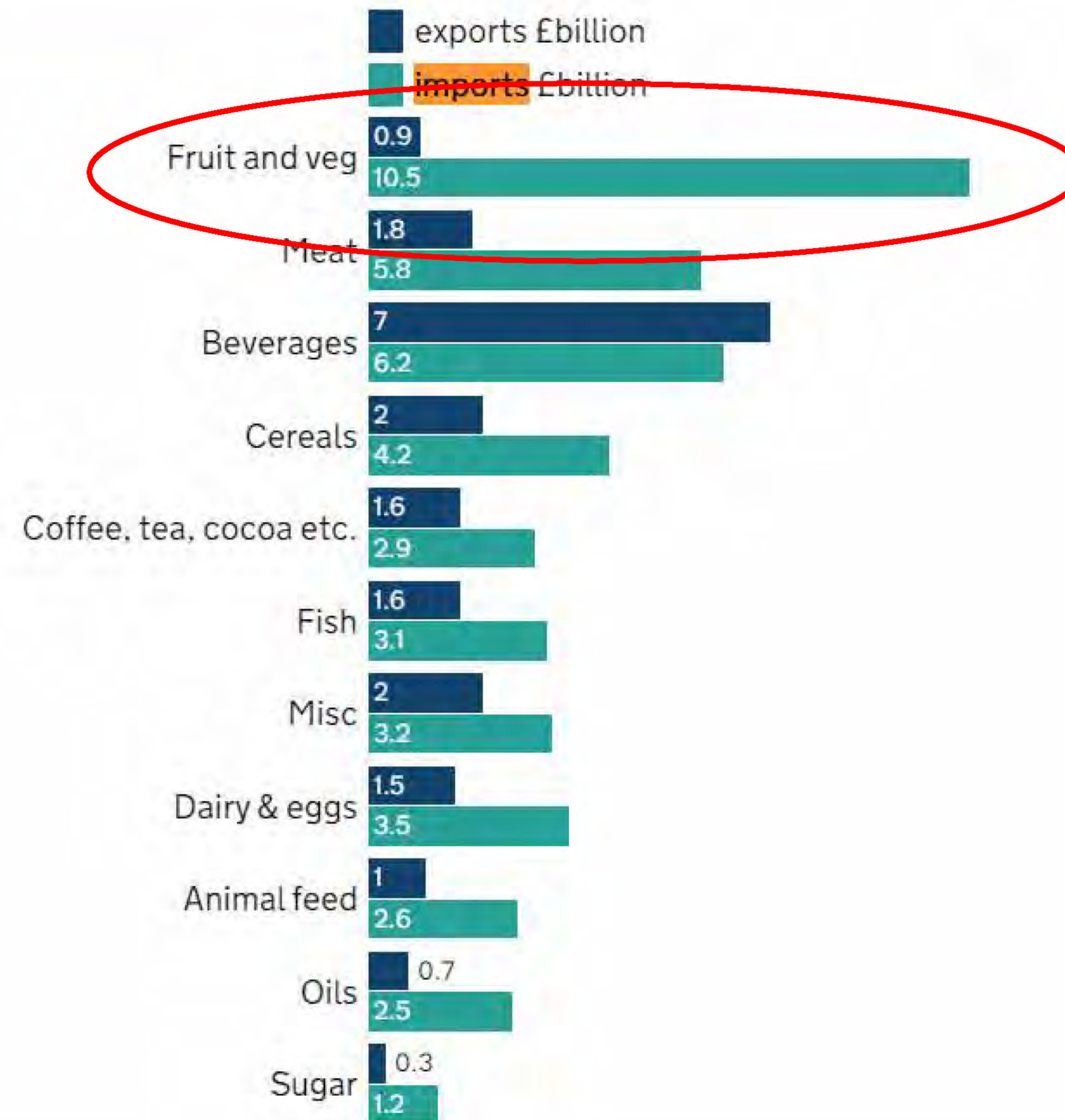
The UK is not self-sufficient in food production; it imports 48% of the total food consumed and the proportion is rising.

(Source **Global Food Security programme**)





3.4 UK trade in different food groups, 2021

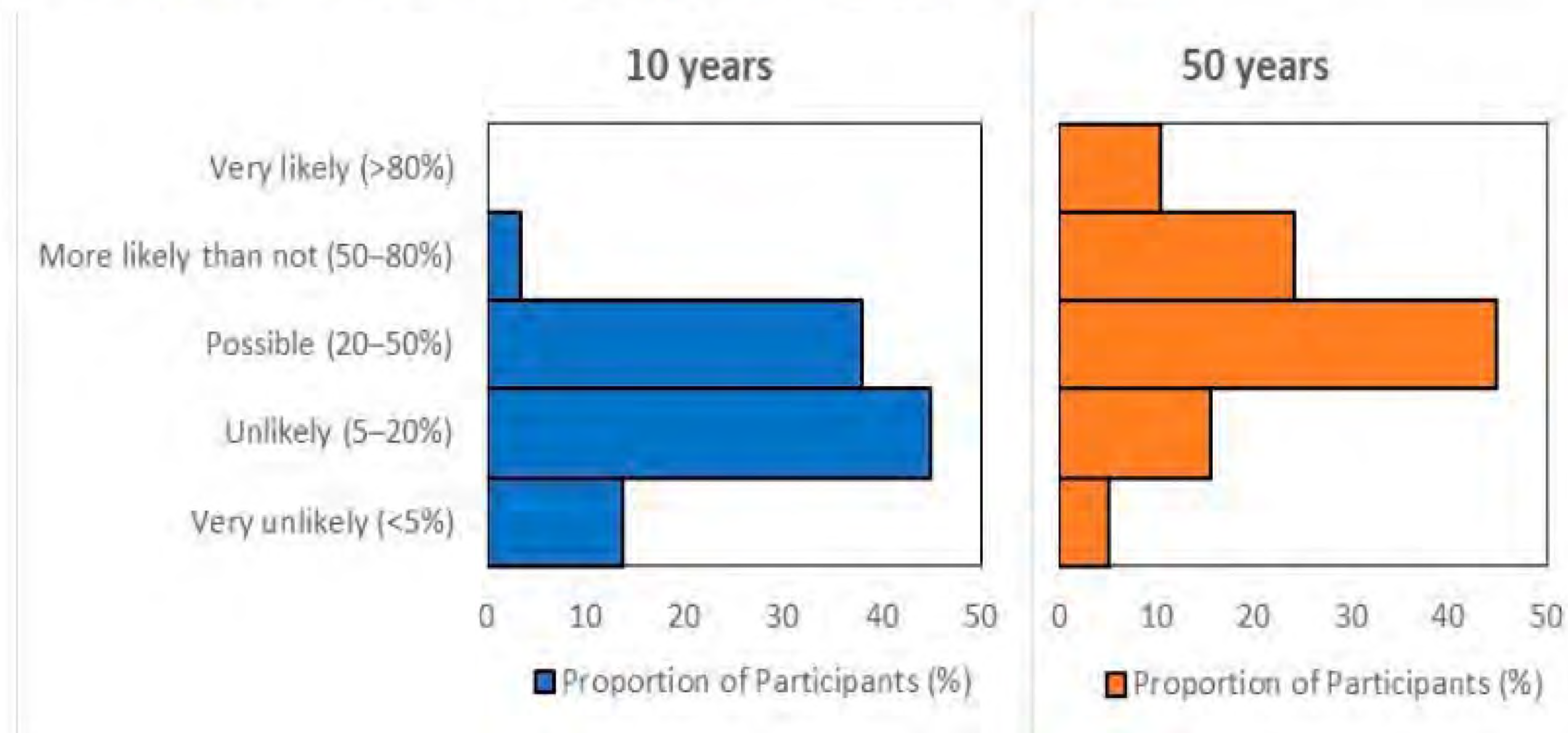




- **Soaring energy bills**
- **Lack of labour**
- **Brexit**
- **Climate change**
- **National Farmers Union warned the UK was "sleepwalking" into a food supply crisis.**



Scoping Potential Routes to UK Civil Unrest via the Food System: Results of a Structured Expert Elicitation



The food system will face significant challenges in the future and its design needs to be optimised for both resilience and efficiency. We argue that a systematic review of the resilience of the UK's food system to such multi-causal crises is urgently required. To prevent catastrophic impacts, the UK must be prepared to both respond to, and mitigate, likely causes.



Policy Framework and Strategies for Climate-resilient Food Systems

Strategy 6: Improving food system resilience through better governance

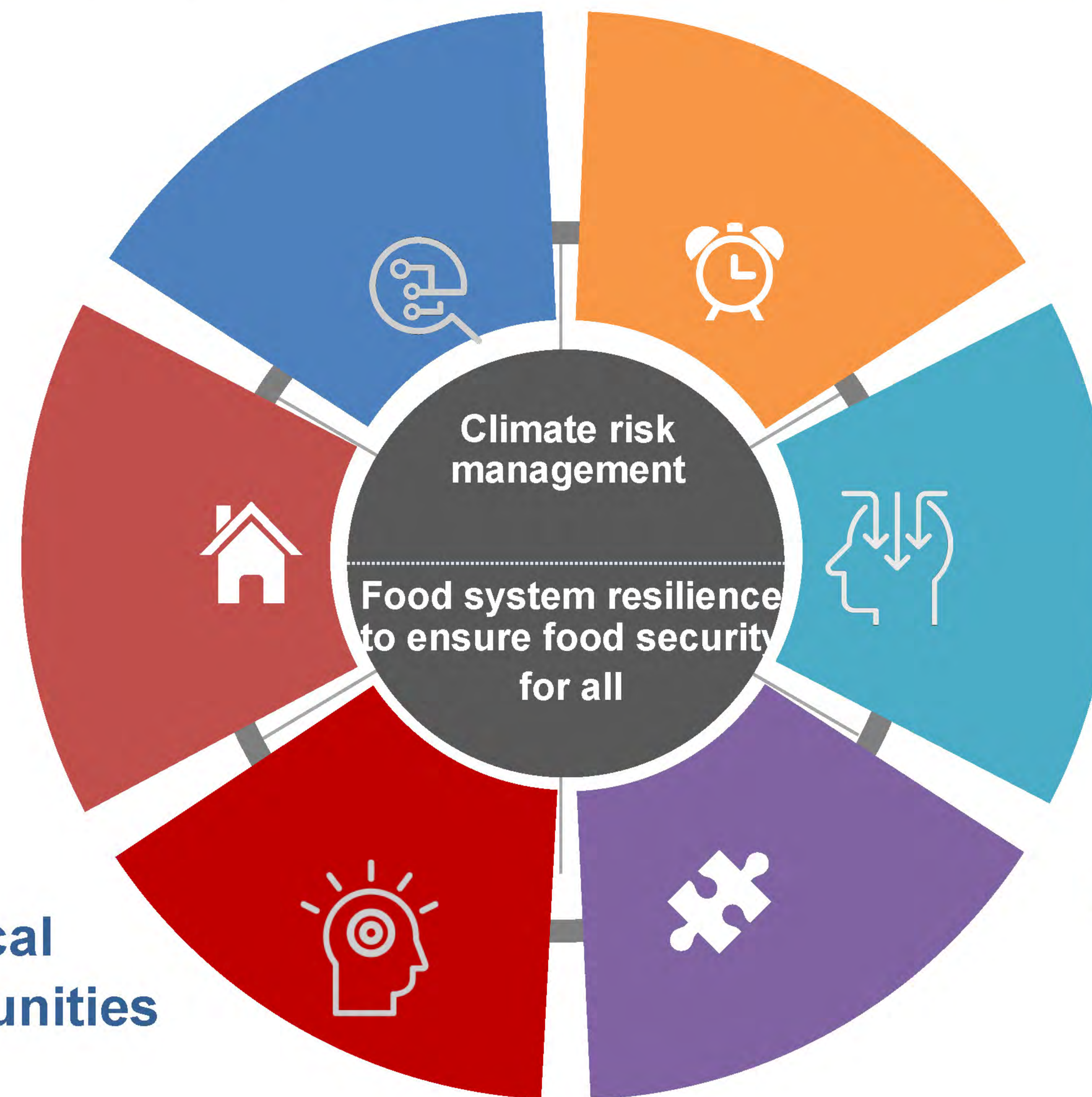
Strategy 1 Develop national and local contingency plans to ensure food supply and food security in times of crises

Strategy 5: Enhancing food security for local communities through local food chain

Strategy 2: Building capacity to deal with shocks and crises

Strategy 4 Raising awareness and communication among local actors, groups and communities on climate resilience

Strategy 3 Strengthen research and development, and scaling up technology adoption to better respond to climate change





Conclusions

- Our food system is becoming increasingly fragile
- Food resilience has become a hugely important part of food security
- We cannot have a resilient and secure food system without safe food

