



# Global Food Security

## Q2 2022

July, 2022

# Table of Contents

<b>Introduction</b>	3	<b>Food Security Index: World Map and Rankings</b>	33
<b>Global Food Security at a Glance</b>	4	<b>Regional Risk Profiles</b>	43
<b>Food Security Overview in 2022</b>	6	● Africa	45
Drivers of the Food Crisis	7	● Asia and the Pacific	47
Food Prices Inflation Overview	8	● Europe	49
Food Affordability and Effects of the War	9	● Latin America & the Caribbean	51
Fertilizers Prices Surge	10	● Middle East and North Africa	53
Behind Fertilizer Prices Growth	12	● North America	55
Food Export Restrictions	13	<b>National Food Strategies Overview</b>	57
Food Export and Import by Regions	14	● UAE: National Food Security Strategy 2051	58
Food Import Dependency Globally	15	● UK: Government Food Strategy	59
Household Food Expenditures Share in the World	16	● Taiwan: 'Agriculture 4.0' to Industrialize Food Production	60
The Most Food Dependent Countries by Income Category	18	● Moving towards Food Security with '30 by 30' in Singapore	61
Largest Exporters of Food Products	20	● Kazakhstan Food Security Plan 2022-2024	62
How Wheat Shortages Affect the World Food Crisis	21	● US Government Global Food Security Strategy 2022 – 2026	63
<b>Food Security Index</b>	22	● East Africa Regional Plan 2019-2024	64
Food Security Index: Data at a Glance	23	● EU Food Security Plan	65
Food Security Index: Objective and Methodology	24	<b>Food Security start-ups and Industry Innovations</b>	66
		<b>Trends and Obstacles</b>	75
		<b>About Deep Knowledge Analytics</b>	79
		<b>Disclaimer</b>	80

# Introduction

Developed by Deep Knowledge Analytics, the new '**Global Food Security Q2 2022**' report provides a comprehensive overview of the Food Security sector.

This is done by focusing on the key trends – root causes of food crises and overview of major aspects of food security such as food dependency, inflation, and policy developments. Further, the attention is drawn to the regional overview.

In the course of the study, the **Food Security Index** was constructed considering the issues of access to food, crisis risks, and the resilience of economy across 171 countries. The index is a dynamic quantitative and qualitative benchmarking model constructed from 40 unique factors that measure the drivers of food security across both developing and developed countries. Essentially, Food Security Index concept envisages three dimensions: **Access to Food, Crisis Level, and Food System and Economy Resilience**.

All these aspects are explored with reference to legislative acts, policy papers, and academic literature on the topic.

The final section explores latest innovations to advance the state of food security policy to help mitigate consequences of the crisis.



**868**  
million

people do not have sufficient food consumption



**30%**  
rise

of fertilizer prices since the beginning of 2022



**35**  
countries

implemented food-export restrictions



**88%** of  
population

in low income countries without access to healthy food



**25**  
countries

considered 'high risk' and deteriorating



**20%**  
rise\*

of food prices in 2022

# Global Food Insecurity at a Glance

All countries/territories with major food crises mainly driven by conflict were also affected by either weather extremes, economic shocks, including the COVID-19 pandemic, or both. These two drivers often fuel tensions and conflicts by increasing competition around limited natural resources and income opportunities.

In 2020

**768 Million**

Were chronically hungry (undernourished globally)



In 2021

**193 Million**

Experienced acute hunger across 53 countries

In 2022

As of June 2022,

**868 Million**

People do not have sufficient food consumption across 92 countries.

## Chronic hunger

Means that people are not able to meet food consumption requirements long-term (also referred to as undernourishment)

## Chronic hunger

Countries with the highest prevalence of undernourishment:

Somalia, Haiti, Yemen, Madagascar, Democratic People's Republic of Korea, Liberia, Democratic Republic of the Congo.

## Acute hunger

Means that people are not able to meet food consumption requirements in the short term, often due to different crises

## Acute hunger

Countries with the worst food crises in 2021  
Democratic Republic of The Congo, Nigeria, Sudan, Pakistan, Haiti, Yemen, Ethiopia, Syria, South Sudan, Afghanistan

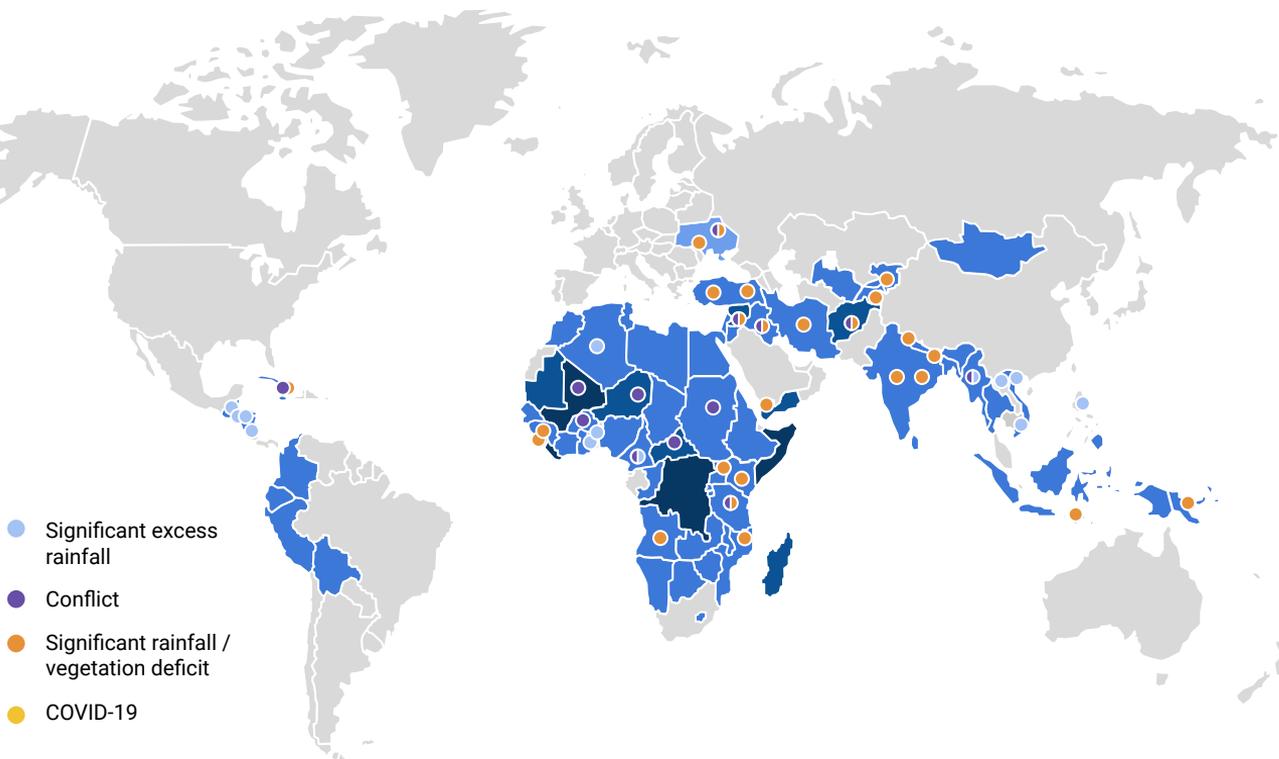
## Number of people in crisis by the primary driver, 2018-2021

	2018	2019	2020	2021
Conflict/insecurity	73.9M 21 countries	77.1M 22 countries	99.1M 23 countries	<b>139.1M</b> 24 countries
Weather extremes	28.8M 26 countries	33.8M 25 countries	15.7M 15 countries	<b>23.5M</b> 8 countries
Economic shocks	10.2M 6 countries	24.0M 8 countries	40.5M 17 countries	<b>30.2M</b> 21 countries

# Global Food Insecurity at a Glance

## Current food security outlook, 2 June 2022

There are 17 countries in the world considered as 'high risk' or 'moderate risk' and deteriorating



### Tier 1: High Risk and Deteriorating

Subnational regions with more than 40% prevalence for the average of the above two indicators and **significant** deterioration observed for the average of both indicators from March 2022.

### Tier 2: High Risk and Stable

Subnational regions with more than 40% prevalence for the average of the above two indicators and **no significant** deterioration observed for the average of both indicators from March 2022.

### Tier 3: Moderate Risk and Deteriorating

Subnational regions with less than 40% prevalence for the average of the above two indicators and **significant** deterioration observed for the average of both indicators from March 2022.

### Tier 4: Moderate Risk and Stable

Subnational regions with less than 40% prevalence for the average of the above two indicators and **no significant** deterioration observed for the average of both indicators from March 2022.

# Food Security Overview in 2022

Globally, hunger levels remain alarmingly high. In 2021, they surpassed all previous records as reported by the 'Global Report on Food Crises 2022', with close to 193 million people acutely food insecure – nearly 40 million more people than during the previous high reached in 2020.

## Domestic consumer food price inflation around the world, January 2022

Price Increase:

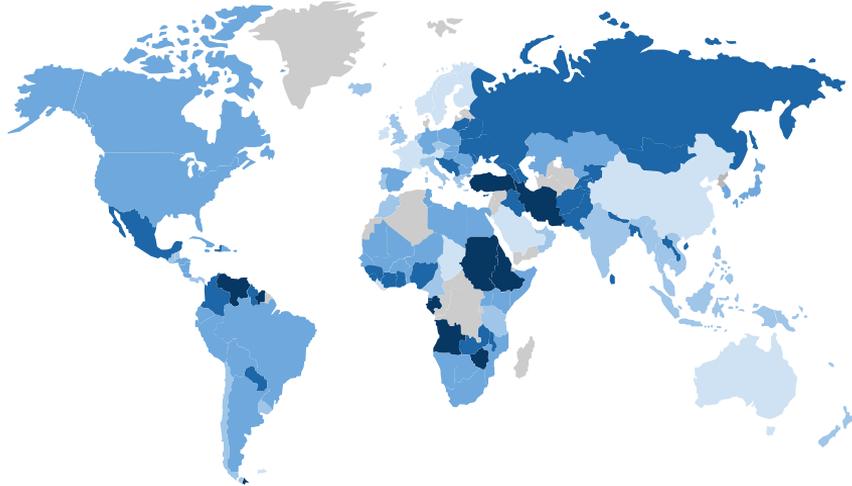
<2%

2%-5%

5%-10%

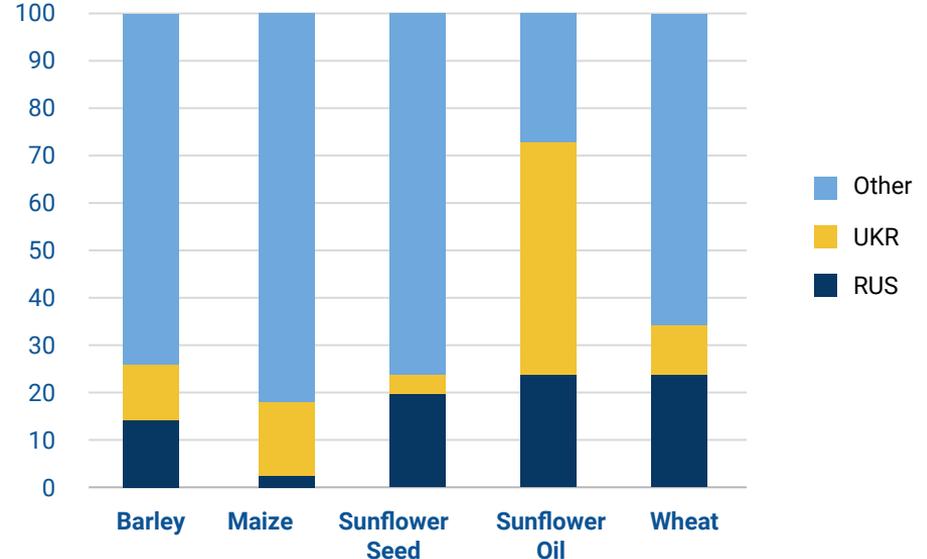
10%-30%

>30%



In the near term, food prices in world markets should be expected to rise further amidst all uncertainty, and this will add to global food insecurity.

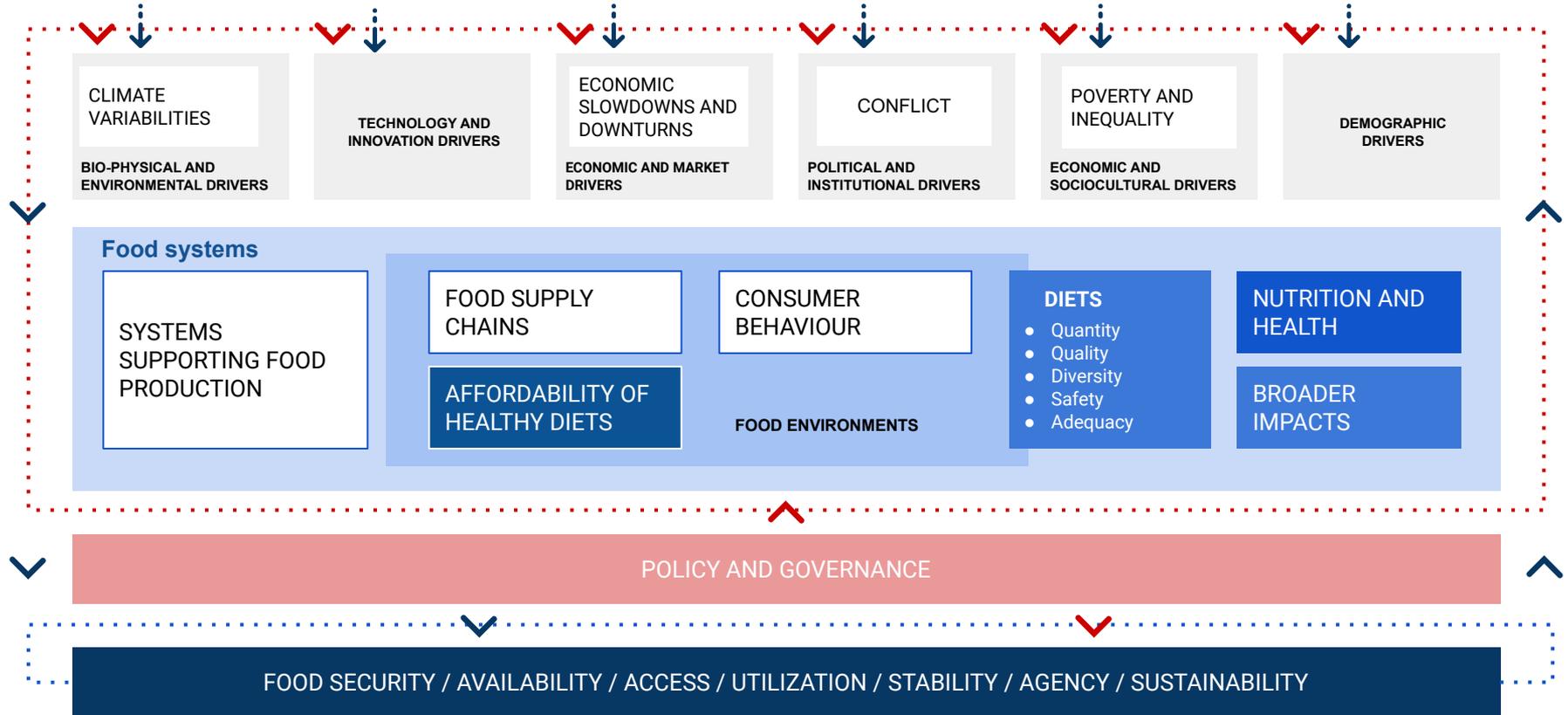
## Global market shares for key agricultural exports from Ukraine and Russian Federation (percent)



Ukraine and Russia each provide about 6% of the globally traded supply of food energy in kilocalories. Any serious disruption from these suppliers will drive food prices further up and erode food security for millions of people.

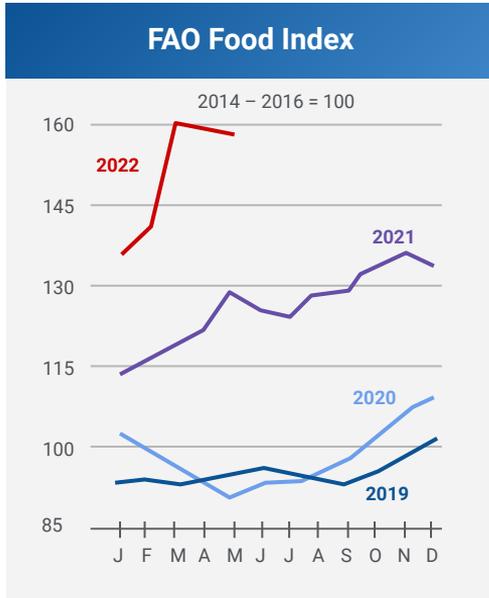
# Drivers of the Food Crisis

Impacts of various drivers are transmitted through food systems, undermining food security and nutrition.



# Food Prices Inflation Overview

Global food prices started to rise in mid-2020 when businesses shut down due to the COVID-19 pandemic, straining supply chains. Since then, there have been problems with key crops in many parts of the world. Russia's invasion of Ukraine in late February dramatically worsened the outlook for food prices.



99.1

In 2020

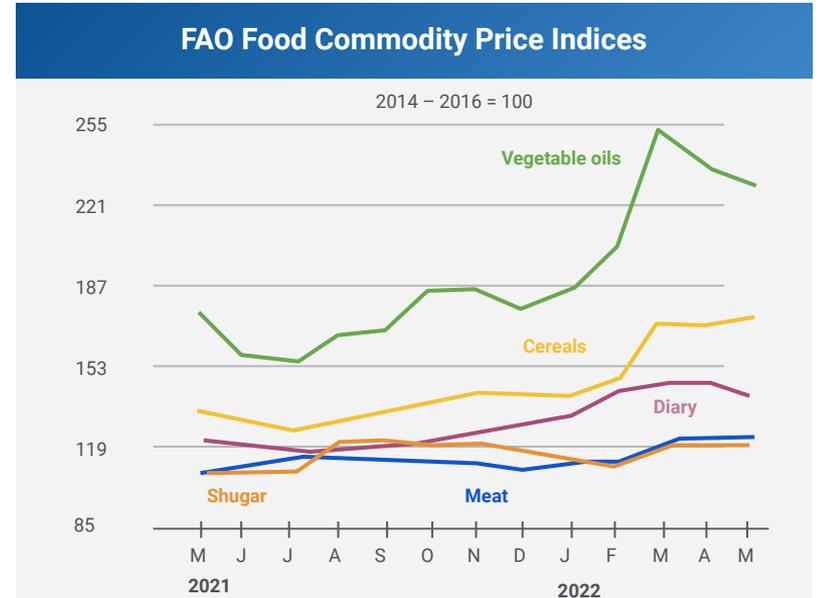
125.7

In 2021

158.46

In 2022

The **FAO\* Food Price Index** (FFPI) is a measure of the monthly change in international prices of a basket of food commodities. Due to steady upward trend of food commodity prices, FFPI averaged 158.5 points in 2022, up 36.4 points (30%) from 2021, and 65.2 points (70%) from its 2020 value.



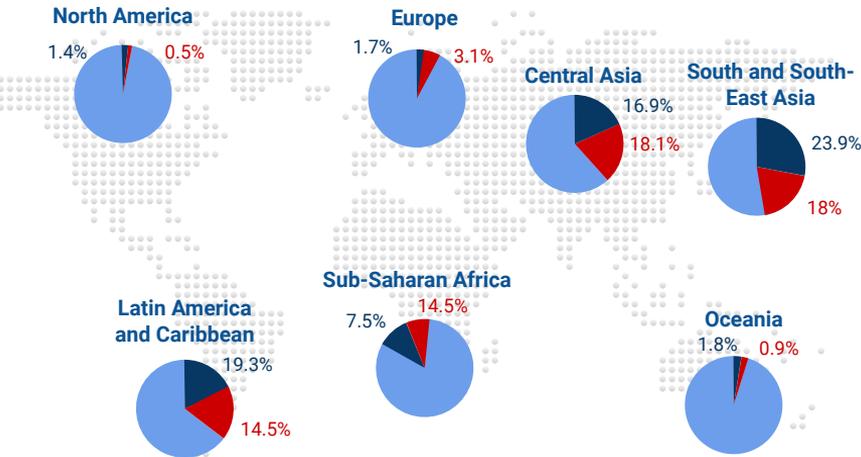
High vegetable oil prices have helped drive up broader food costs. Cereal prices also hit a record in March, a result of limited shipments of corn and wheat during the Russia-Ukraine war. Dairy and meat prices reached a record in April-May 2022.

# Food Affordability and Effects of the War

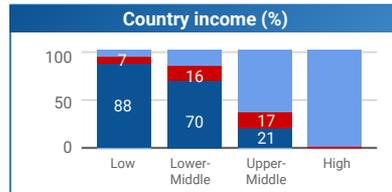
People most affected by the rise of food prices live in developing countries, where a larger share of income is spent on food. Conflict, the climate crisis, COVID-19, and surging food and fuel costs have created a perfect storm.

## Who cannot afford a healthy diet

Billions worldwide could not fully satisfy their nutritional needs in 2019



- Population without access to healthy food
- Population at risk of no longer having access to a healthy diet if their income falls by one third
- Rest of the population



## Global Effects of the War in Ukraine:

- Disruptions to global food and energy markets, which have further pushed up already elevated agricultural commodity and fuel prices.
- Shipments from Black Sea harbors of Ukraine and those of Russia have been reduced in volume, immediately affecting countries depended on food imports.

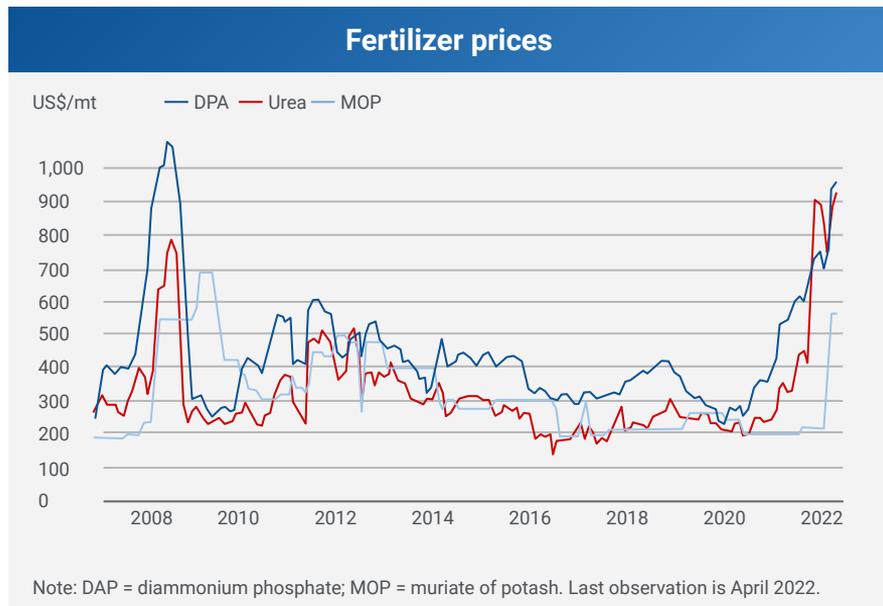
### High costs of fertilizers reached record levels:

**30%** rise since the start of 2022, following last year's 80% surge.

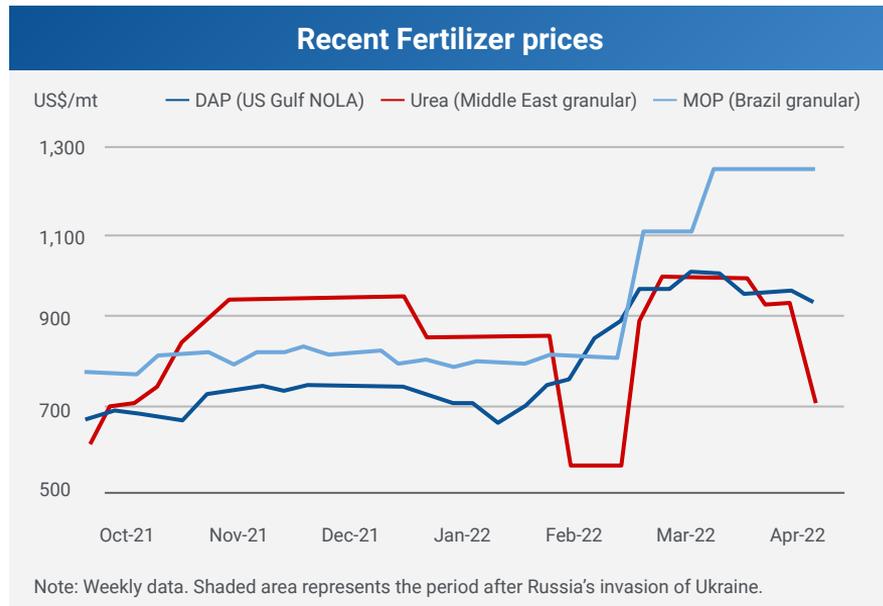
- High prices coupled with shortages due to disruptions of exports from the region are likely to reduce fertilizer usage in many countries, which will affect yields of coming harvests and future availability of agricultural commodities on international markets.

# Fertilizers Prices Surge

Fertilizers are crucial as they are added to crops to produce enough food for the population. Since the beginning of 2022, fertilizer prices surged. Supply shortages and uncertainty has increased following fresh sanctions on Russia and Belarus.



Urea (key N-fertilizer) prices tripled over the past year, raising from \$265/tonne in January 2021 to \$846/tonne in January 2022. The price for diammonium phosphate (DAP/key P-fertilizer) increased from \$421/tonne to \$699/tonne. Potash prices were 116% higher than a year ago.

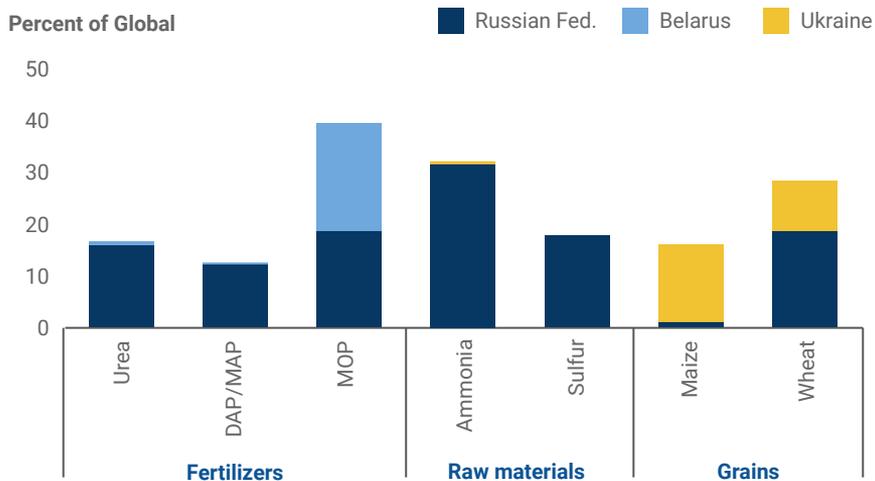


Although urea and DAP prices have retracted in May due to lower tender offers in India (buyers await clarity on Indian fertilizer subsidies), potash prices show no signs of easing.

# Fertilizers Exports

As can be observed, Russia is one of the largest fertilizer exporter in the world, which has decided to restrict export of fertilizers until 31 August 2022. Chinese decision to suspend exports of fertilizers until at least June 2022 only pushes the problem further.

## Exports of Russia, Belarus, and Ukraine



Note: Data for 2019, except grains (2020).

Russia accounts for about 16% of global urea exports and 12% of DAP and MAP exports. Russia and Belarus together make up two-fifths of global MOP exports. Adding to supply concerns, China has suspended exports of fertilizers to ensure its domestic availability.

## Fertilizer Exports by Country (\$B)

Country	\$B	Percent of Global
Russia	12.5	15.1%
China	10.9	13.3%
Canada	6.6	8%
Morocco	5.7	6.9%
USA	4.1	4.9%
Saudi Arabia	3.6	4.4%
Netherlands	2.9	3.5%
Belgium	2.6	3.2%

Collectively, these major suppliers of fertilizers accounted for roughly 60% of globally exported fertilizers. In the near term, the loss of Russian fertilizer will push fertilizer prices higher. However, other countries might be able to increase production and offset the loss of the Russian supply.

# Behind Fertilizer Prices Growth

Adding to supply concerns, China has suspended exports of fertilizers to ensure its domestic availability.

## World fertilizer prices have continued to skyrocket after China curbed exports

Fertilizer prices and exports January 2017-March 2022 (index: 2019 = 100)



**Note:** Export data are 12-month trailing sum.

## Factors behind recent rise of fertilizer prices:



### Trade Measures

The increasing demand for fertilizers globally and the rising price on the domestic market have forced key suppliers to impose export restrictions, placing an additional upward pressure on international fertilizer prices.



### High Transportation Costs

The COVID-19 pandemic has affected international supply chains, causing higher freight costs and longer transit times.

The war in Ukraine made the shipment from the Black Sea problematic because of the Russian blockade.



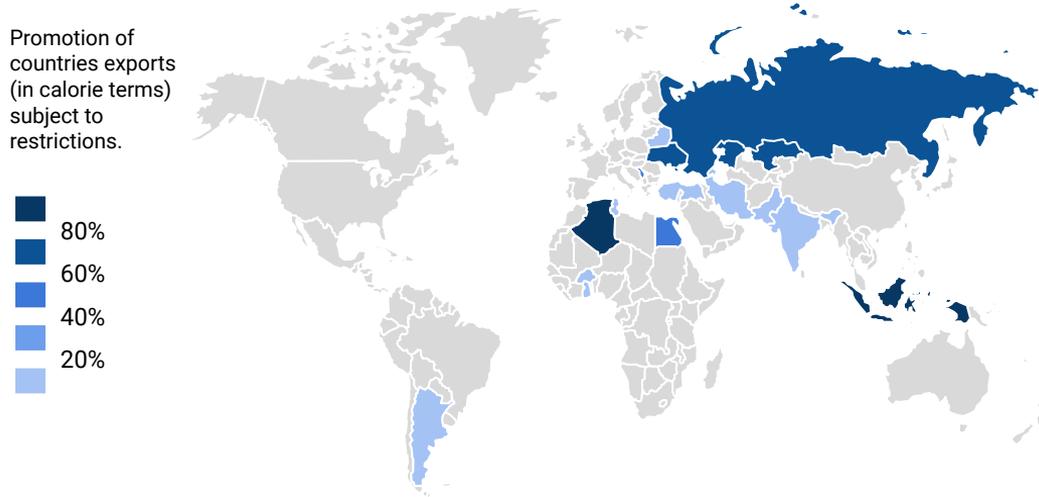
### High Natural Gas Prices

Production of fertilizers requires a lot of natural gas, which is unlikely to drop soon.

# Food Export Restrictions

The number of countries enacting food-export restrictions has risen by 25%, bringing the total to 35 within a few weeks in 2022. As of the end of March, 53 new policies affecting food trade had been adopted, 31 of which restricted exports and nine curbed wheat exports.

Major food exporters such as Argentina, India, Indonesia, Kazakhstan, and Russia, as well as smaller exporters such as Algeria, Turkey, and Serbia have introduced food export restrictions:

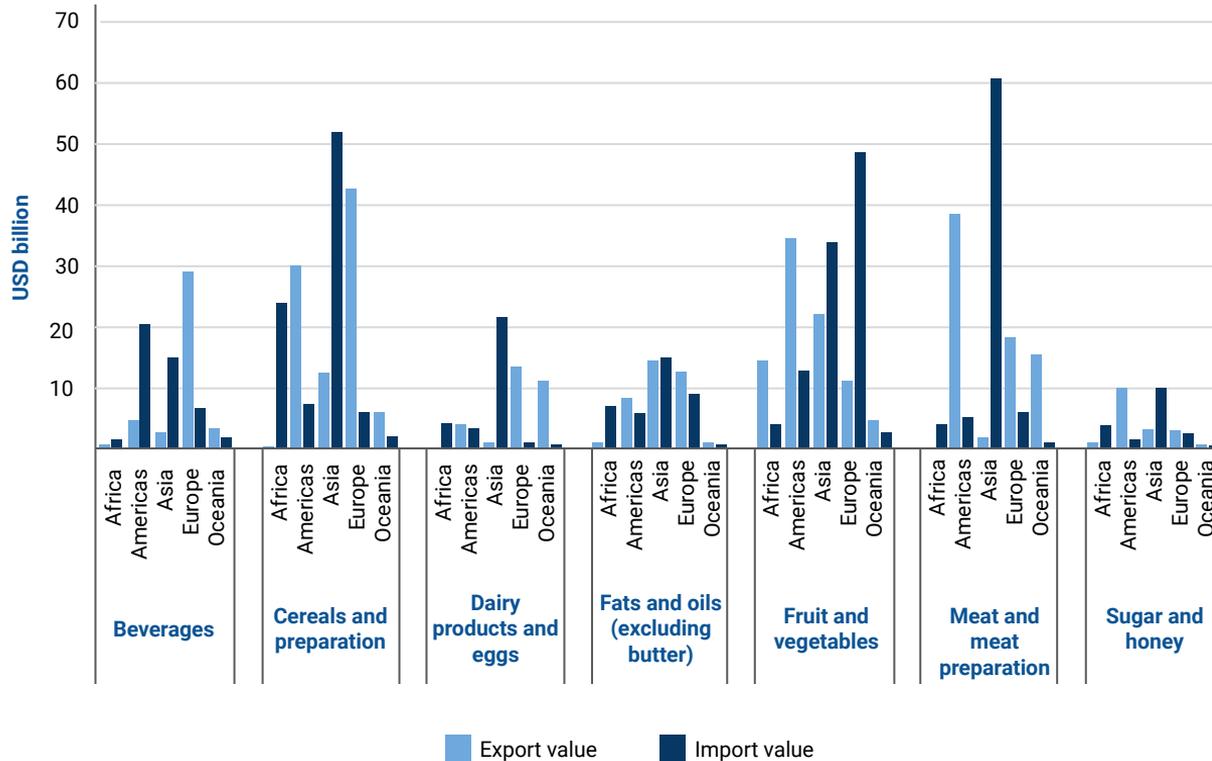


Country	Type of food product	Ban end day
Argentina	Soybean oil, soybean meal	31 Dec 2023
Algeria	Pasta, wheat derivatives, oil, sugar	31 Dec 2022
Egypt	Vegetable oils, maize	12 Jun 2022
	Wheat, flour, lentils, pasta, beans	10 Jun 2022
India	Wheat	31 Dec 2022
Indonesia	Palm oil, palm kernel oil	31 Dec 2022
Iran	Potatoes, eggplants, tomatoes, onion	31 Dec 2022
Kazakhstan	Wheat, wheat flour	15 Jun 2022
Kosovo	Wheat, corn, flour, vegetable oil, salt, sugar	31 Dec 2022
Turkey	Beef, goat meat, butter, cooking oils	31 Dec 2022
Ukraine	Wheat, oats, millet, sugar	31 Dec 2022
Russia	Sugar, sunflower seeds	31 Aug 2022

The impact of export restrictions alone can result in downward pressure on domestic prices under certain circumstances. However, with more countries imposing restrictions, there is a greater risk of price volatility, panic buying, shortages, and hoarding.

# Food Export and Import by Regions

Food (excluding fish) imports and exports by main categories and region, 2020



Asia is the largest importer of cereals, dairy products and eggs, meat, sugar, and honey.

For the Beverages category Americas region is a leading importer.

The largest importer of fruits and vegetables is Europe (about \$48 billion).

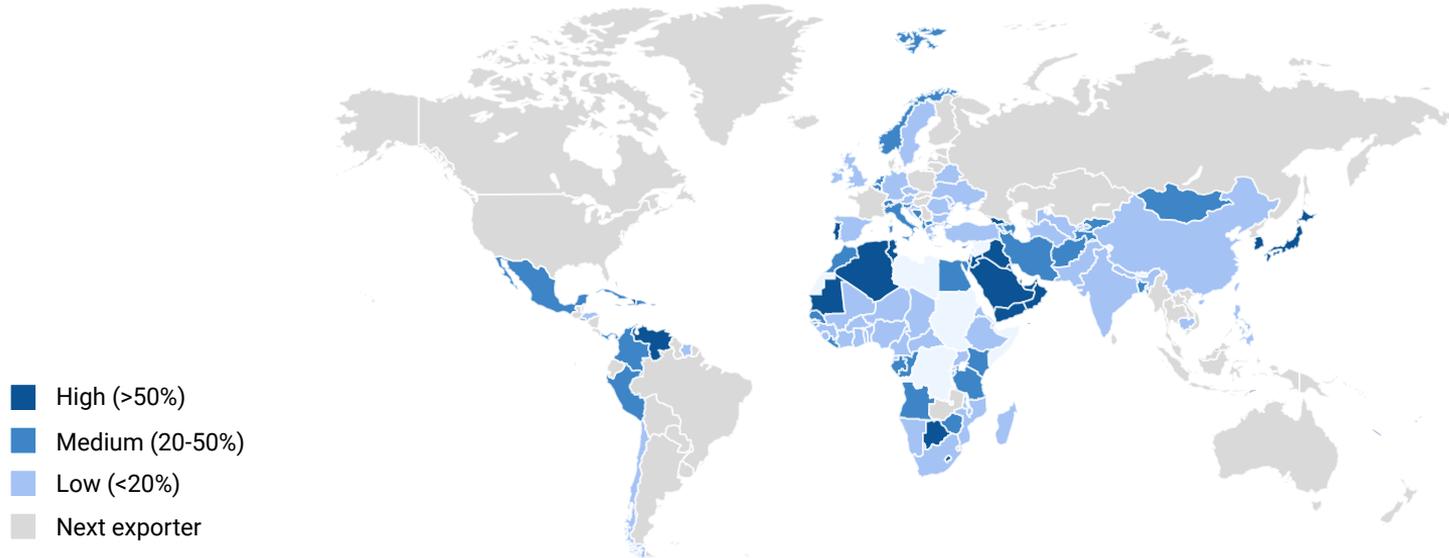
Americas leads the exports of fruits and vegetables, meat, sugar and honey while Asia is the largest exporter of fats and oils (excluding butter).

**Countries rely on each other in order to procure an adequate supply of food through imports and exports. As more countries have improved access to export markets, competition increases. This is a particular challenge for the developing countries where efforts must be directed towards strengthening their food control systems.**

# Food Import Dependency Globally

Food imported out of necessity leads to countries' dependence on external sources as a means of providing food for their populations. This is when food insecurity occurs. Currently, at least 34 countries in the world are unable to produce their own food because of water and land shortages. This represents a significant portion of the global population who are forced to rely on imported food to survive.

## Net Food Imports as a Percentage of Domestic Food Supply

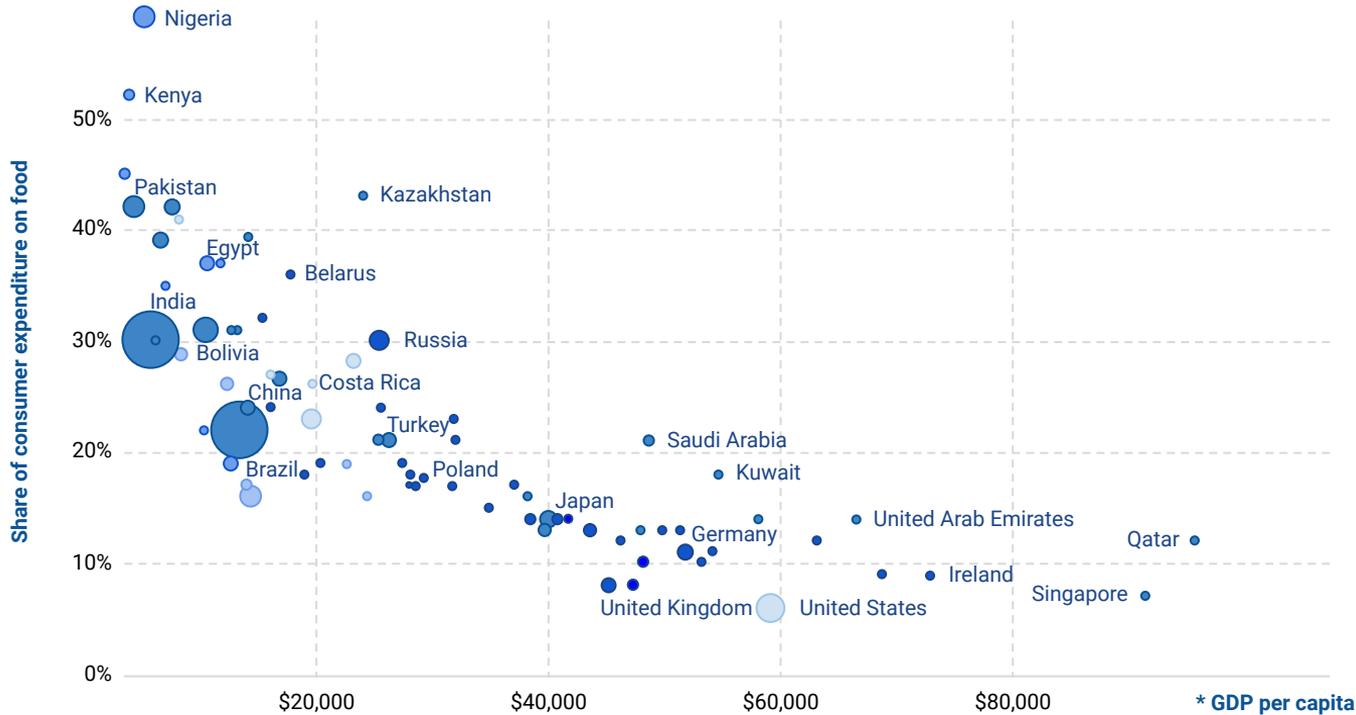


While food crises have a negative effect on everyone, they are devastating for the poorest and most vulnerable populations. The reasons for this are twofold. First, a common feature of the poorest countries is their reliance on food imports. Second, in low-income countries, food makes up at least half of household expenditures.

# Household Food Expenditures Share in the World

Food crises are detrimental for everyone, but they are devastating for the poorest and most vulnerable populations. As was stated previously, poorest countries rely heavily on food imports. Thereby, food in low - income countries makes up at least half of household expenditures.

## Share of consumer expenditure spent on food vs. GDP per capita, 2016

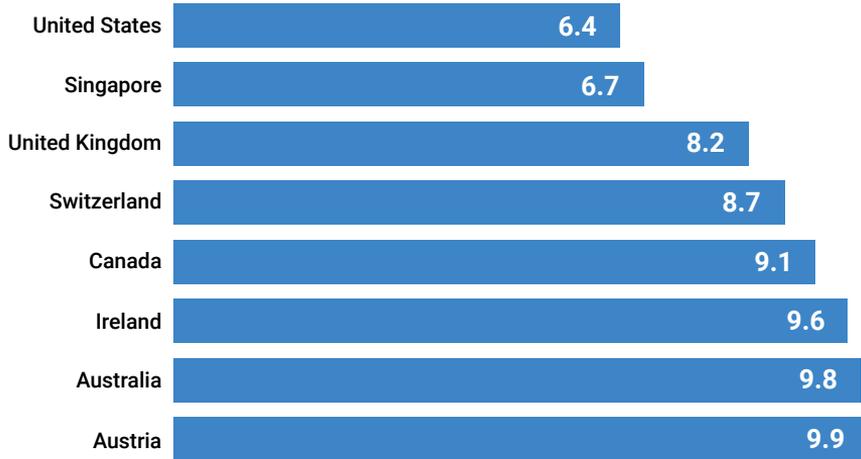


- Asia
- Russia
- Oceania
- Africa
- South America
- North America

# Countries that Spend the Least and the Most on Food

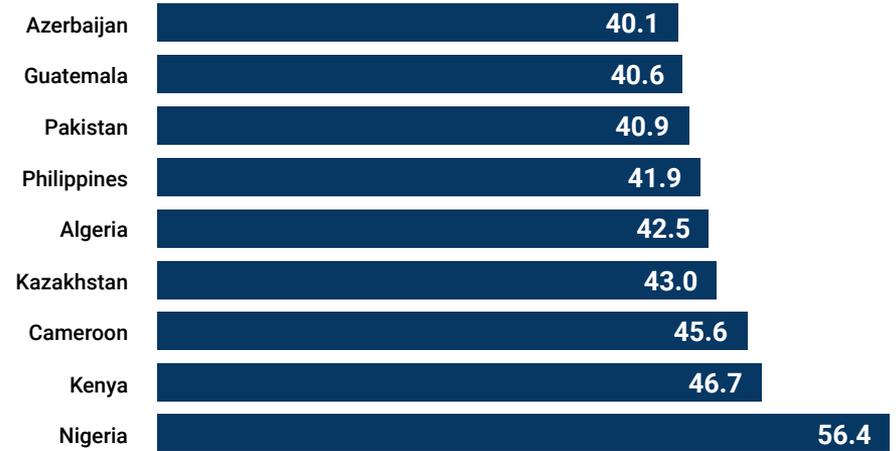
The more developed a country, the less income is spent by its citizens on food. Developing countries will have even greater food insecurity and hunger levels with most vulnerable paying more for less food.

## Countries that spend the least (% of household income)



There are only eight countries in the world that spend less than 10% of their household income on food. Four of these are in Europe: The UK is third at 8.2%, followed by Switzerland at 8.7%; Ireland spends 9.6%, and Austria – 9.9%. The remaining four countries are spread across the globe. The USA spends the least at 6.4%, and Singapore records the second lowest amount at 6.7%.

## Countries that spend the most (% of household income)

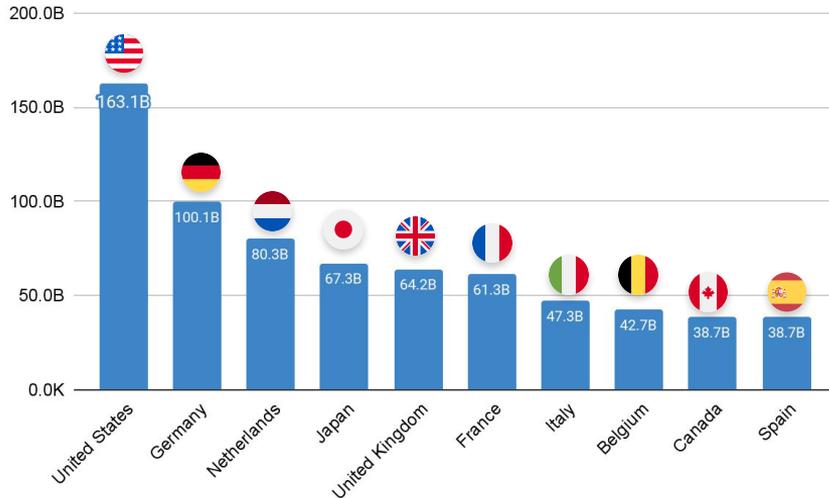


Nigeria spends over half of household income on food, and there are nine other countries that spend over 40% on food. Four of them are in Africa, and four are in Asia. Guatemala is the only South American country to appear in the list, spending 40.6% of its household income on food.

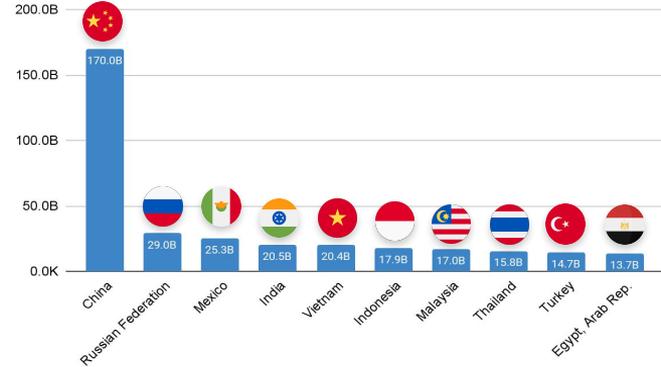
# The Most Food Dependent Countries by Income Category

The United States, being one of the world's largest economies, imports a total of \$163.1 billion worth of food, followed by Germany and the Netherlands. However, world's largest food importers also happen to be the world's wealthiest countries. It is crucial to note that in such cases, food is imported with the aim to create more variety for the consumer, unlike in developing world where it is done to prevent starvation and hunger (e.g. Yemen, Ethiopia, Niger, Congo). Developing countries is where the food insecurity actually occurs when countries rely and depend on outside sources to feed themselves. There are also countries that cannot produce their own food due to limitations shown on the next slide.

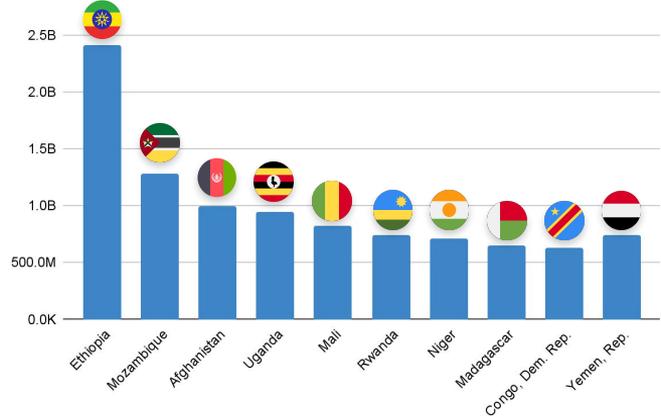
## High-income countries, \$B



## Middle-income countries, \$B



## Low-income countries, \$B



# Countries Unable to Produce Their Own Food

As was stated previously, food insecurity occurs in countries where food is imported out of necessity and due to limitations to produce their own food. The rank of top 15 countries unable to produce food due to certain limitations is stated below.

## Countries without sufficient food supply

### Rank Name of the country

1	Afghanistan
2	Burkina Faso
3	Burundi
4	Cameron
5	Central African Republic
6	Chad
7	Democratic Republic of the Congo
8	Djibouti
9	Eritrea
10	Ethiopia
11	Guinea
12	Iraq
13	Kenya
14	Lesotho
15	Liberia

## Challenges faced in these regions



Climate Change



Population Growth



Diet and Nutrition Habits

- High temperatures and extreme weather are affecting the local agriculture industry.
- Agricultural productivity is not keeping up with population growth.
- The MENA region, for instance, is extremely dependent on imports of food, especially wheat and other staple grains, so food is calorie-rich but nutritionally deficient. As a result, people suffer from the double burden of malnutrition: stunting and obesity.

**One way to combat insufficient food supply is for each country, rich or poor, to focus its resources on improving their agricultural productivity. Another possible solution is diet modifications geared towards the consumption of crops that are produced locally. Further studies will have to be conducted to determine the viability of this option.**

# Largest Exporters of Food Products

United States is the world's top food exporter due to its extensive agricultural infrastructure and high crop harvests. The most popular export products are wheat, sugar, beet, sugar cane, potatoes, and chicken.

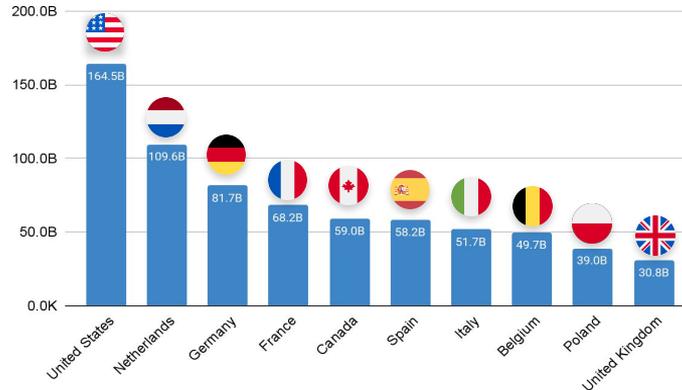
China is one of the largest agricultural producers, with rice being the top agricultural crop they produce. The reason why Chinese food exports are worth \$69.6 billion is because most of its produce is consumed locally.

Ethiopia's agricultural exports are largely unprocessed commodities, including coffee, oil seeds, pulses, live plants, and cut flowers. Conversely, agro-industries accounted for only 5% of Ethiopia's GDP, yet 50% of the total manufacturing production was in food and beverages.

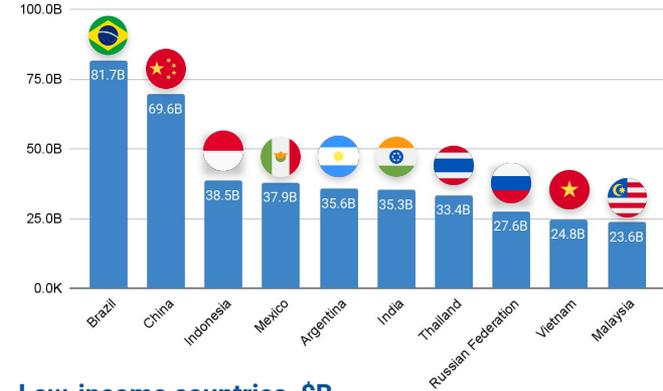
## Food waste.

Unfortunately,  $\frac{1}{3}$  of the food produced in the world is wasted or lost. Many countries contribute to the food waste problem. The USA discards food worth \$48B annually while China wastes 50 mln grains each year. The UK wastes more than 6M tons of food each year.

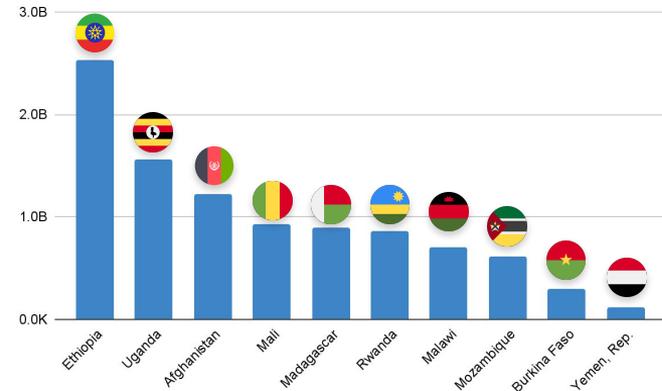
## High-income countries, \$B



## Middle-income countries, \$B



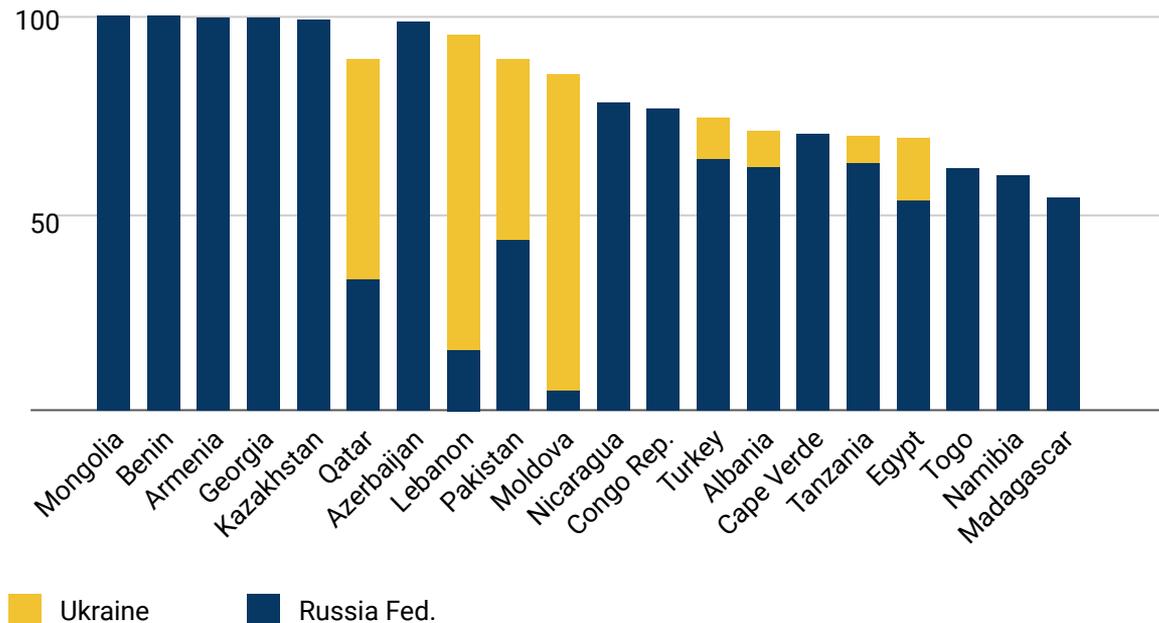
## Low-income countries, \$B



# How Wheat Shortages Affect the World Food Crisis

Disruptions to wheat exports from Ukraine have already affected several importing countries, especially in the Middle East and North Africa, including Egypt and Lebanon. As a result, several countries have introduced (or announced) trade policy measures that either reduce or ban wheat exports.

## Wheat imports from Russia and Ukraine



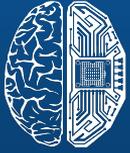
Note: Data is for 2020

Wheat exports from Ukraine have been stalled due to closures of all Ukrainian ports on the Black Sea, accounting for about 90% of Ukraine's wheat exports.

Limited quantities of wheat exports using rail and road corridors started taking place in early March 2022. But so far, Russian wheat exports have not been affected.

### Key takeaways

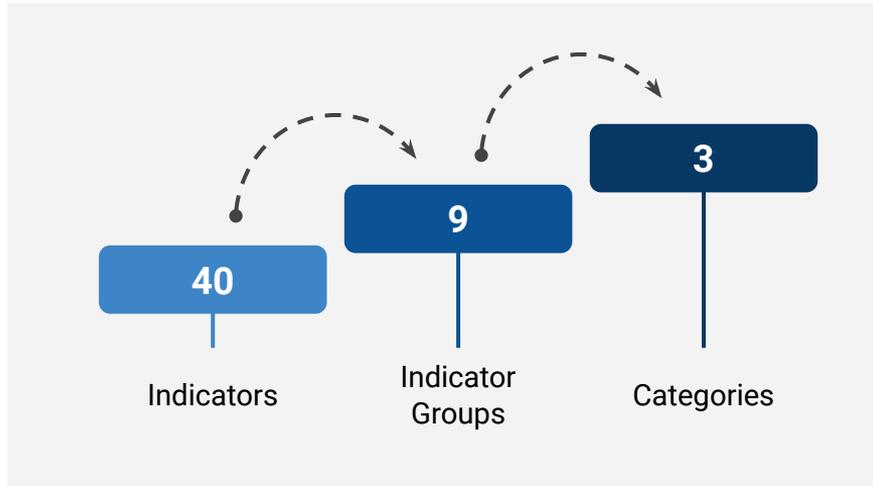
- Russia and Ukraine are crucial grain producers;
- Other countries will export more to compensate;
- Still, the poorest countries will suffer the most.



DEEP  
KNOWLEDGE  
ANALYTICS

# Food Security Index

# Food Security Index: Data at a Glance



**171**  
countries

Ranked in the research, according to the likelihood of food crisis in the near future



**6**  
regions

Have a risk profile that shows the level of the individual components of risk



**3**  
categories

Access to Food, Crisis Level, Food System and Economy Resilience



**40**  
unique factors

Grouped in nine subgroups that measure major drivers of food security



**22** countries

Considered 'high risk' and deteriorating



**7,000+**  
data points

Collected in total in order to conduct the research

# Food Security Index: Objective and Methodology

In the course of the study, the Food Security Index (FSI) was constructed, considering the issues of access to food, crisis risks, and the resilience of economy across 171 countries. The index is a dynamic quantitative and qualitative benchmarking model constructed from 40 unique factors that measure the drivers of food security across both developing and developed countries.

FSI is a composite indicator that identifies countries at risk from humanitarian emergencies and disasters that could overwhelm current national response capacity and therefore lead to a need for international assistance.

Essentially, Food Security Index concept envisages three dimensions:

- **Access to Food** – measures ease of access to sufficient and nutritious food that meets people’s dietary needs for a healthy and active life.
- **Crisis Level** – assesses a country’s exposure to the impacts of a changing climate, sociological or biological hazards.
- **Food System and Economy Resilience** – resources available that can alleviate the impact of global food crisis.

## Applied Research and Analytics Methods

Descriptive Analysis

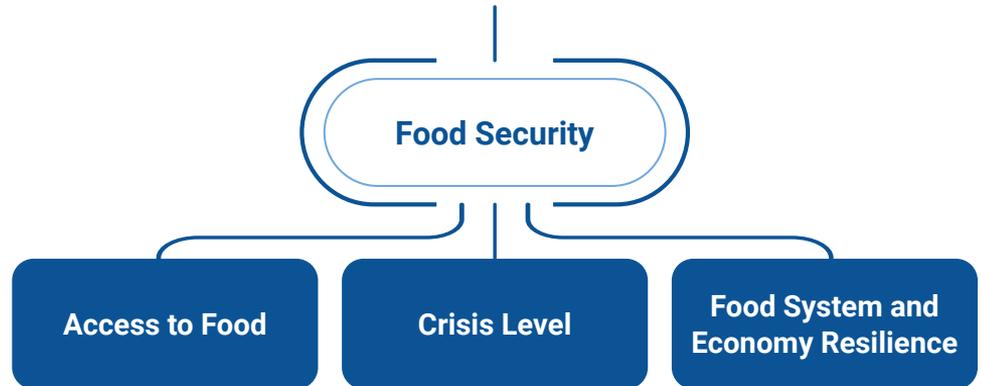
Mixed Data Research

SWOT Analysis

Comparative Analysis

Qualitative Data Collection

Data Filtering



# Food Security Index: Objectives and Methodology

1 The dataset of features for more than 269 countries was collected from publicly available databases. Then, countries with missing data for more than half of the dataset was removed, summarising the final list of 171 countries.

2 Missing values were imputed using kNN ('k-nearest neighbors') method. The idea behind this method is to identify 'k' samples in the dataset that are similar or close in the space. Then these 'k' samples are used to estimate the value of the missing data points. Each sample's missing values are imputed using the mean value of the 'k'-neighbors found in the dataset.



3 Features are normalised then. The minimum value of that feature gets transformed into a 0, the maximum value gets transformed into a 1, and every other value gets transformed into a decimal between 0 and 1:

$$x = (x - \text{Min}(x)) / (\text{Max}(x) - \text{Min}(x))$$

4 After features are assorted into the groups for one of three dimensions (categories), the score of these dimensions are calculated by, first, summing up the weighted values of the features in the groups and, second, summing up the groups' values in the framework of each dimension. This score are multiplied by 10, so the maximum value is 10.

$$\text{Indicator group} = \sum \text{weighted individual feature}$$

$$\text{Dimension} = (\sum \text{weighted indicator subgroups}) \times 10$$

5 The Food Security Index score is calculated with a multiplicative equation where each of the dimensions (category) is treated equally:

$$\text{Food Security Index} = (\text{Access to Food})^{1/3} + (10 - \text{Crisis Level})^{1/3} + (\text{Food System and Economy Resilience})^{1/3}$$

# Food Security Index: Objective and Methodology

Food Security Index								
Access to Food			Crisis Level			Food System and Economy Resilience		
Food expenditure & consumption	Undernourishment levels	Quality of Diet & Well being	Natural Hazards	Conflict Intensity	Exposure to Epidemics	Economic Development	Food system economy	Wealth & equality
Share of consumer expenditure on food	Prevalence of insufficient food consumption	The nutritional quality of diets, the safety of food	Exposure to the impacts of climate change	Current National Power Conflict Intensity	Physical exposure to epidemics	Country class by income group	Food dependency ratio	Human Development Index (HDI)
Food supply (kcal per capita per day)	The sufficiency of the national food supply	Prevalence of severe food insecurity in the population	Relative exposure to natural disasters	Current Subnational Conflict Intensity	COVID Related Cases per 100,000	GDP (current US\$)	Food exports (% of merchandise exports)	Gini Index
Healthy diet cost (% cannot afford)	Prevalence of undernourishment (% of population)	Mortality rate, infant (per 1,000 live births)	Droughts probability and historical impact	Current Highly Violent Conflict Intensity Score	COVID Related Fatalities per 100,000	GDP per capita, PPP (current international \$)	Food exports in USD	Poverty headcount ratio at national poverty lines
Consumers vulnerability to price shocks								
People with insufficient food consumption				Conflict Related Fatalities per 100,000		Unemployment, total (% of total labor force)	Food imports (% of merchandise imports)	Poverty Rate
Obesity Rate							Food imports in USD	Population living in slums (% of urban population)

# Food Security Index Framework (1/3)

## Access to Food

<i>Indicator groups</i>	<i>Features</i>	<i>Description</i>
Food Expenditure & Consumption	Share of consumer expenditure on food	The share of consumer expenditure spent on food products, measured as the percentage of total consumer expenditure per person. This share includes only food consumed at home and does not include expenditure on alcoholic beverages or tobacco.
	Food supply (kcal per capita per day)	Daily per-capita caloric supply is measured in kilocalories per person per day. This indicates the caloric availability delivered to households but does not necessarily indicate the number of calories actually consumed.
	Healthy diet cost (% cannot afford)	The cost of an energy-sufficient diet is defined as the minimum cost to meet energy requirements using the least-cost available starchy staple food in each country.
	Consumers vulnerability to price shocks	Measures the ability of consumers to purchase food, their vulnerability to price shocks, and the presence of programmes and policies to support customers when shocks occur.
	Obesity Rate	The percentage of a country's population considered to be obese.
Undernourishment Levels	People with insufficient food consumption	Population in millions whose habitual food consumption is insufficient to provide the nutrients that are required to maintain a normal healthy life.
	The sufficiency of the national food supply	Measures the sufficiency of the national food supply, the risk of supply disruption, national capacity to disseminate food, and research efforts to expand agricultural output.
	Prevalence of undernourishment (% of population)	Prevalence of undernourishment is the percentage of the population whose habitual food consumption is insufficient to provide the dietary energy levels that are required to maintain a normal active and healthy life.
Quality of Diet & Well-being	The nutritional quality of diets, the safety of food	Measures the variety and nutritional quality of average diets, as well as the safety of food.
	Prevalence of severe food insecurity in the population	The percentage of people in the population who live in households classified as severely food insecure.
	Mortality rate, infant (per 1,000 live births)	Infant mortality rate is the number of infants dying before reaching one year of age per 1,000 live births in a given year.

# Food Security Index Framework (2/3)

Crisis Level		
<i>Indicator groups</i>	<i>Features</i>	<i>Description</i>
Natural Hazards	Exposure to the impacts of climate change	Assesses a country's exposure to the impacts of climate change, its susceptibility to natural resource risks, and how the country is adapting to these risks.
	Relative exposure to natural disasters	Disasters comprise all geophysical, meteorological, and climate events, including earthquakes, volcanic activity, landslides, tropical cyclones, wildfires, storms, and flooding.
	Droughts probability and historical impact	Assessing the probability of drought severity based on historical data.
Conflict Intensity	Current National Power Conflict Intensity	Current conflicts over national power in a country.
	Current Subnational Conflict Intensity	Subnational conflicts are mostly restricted to certain regions of a country and only affect regional production and security.
	Current Highly Violent Conflict Intensity Score	Assesses risk of violent conflict in the next 1-4 years for each country in the world.
	Conflict Related Fatalities per 100,000	This indicator only includes deaths as a result of hostile action and does not include indirect deaths.
Exposure to Epidemics	Physical exposure to epidemics	Infectious disease outbreaks that have a large impact not only on mortality and morbidity but also on travel and trade, as well as socioeconomic effects.
	COVID-Related Cases per 100,000	The cumulative number of confirmed cases since the beginning of the COVID-19 pandemic divided per population of the country.
	COVID-Related Fatalities per 100,000	The cumulative number of confirmed deaths related to COVID-19 since the beginning of the COVID-19 pandemic divided per population of the country.

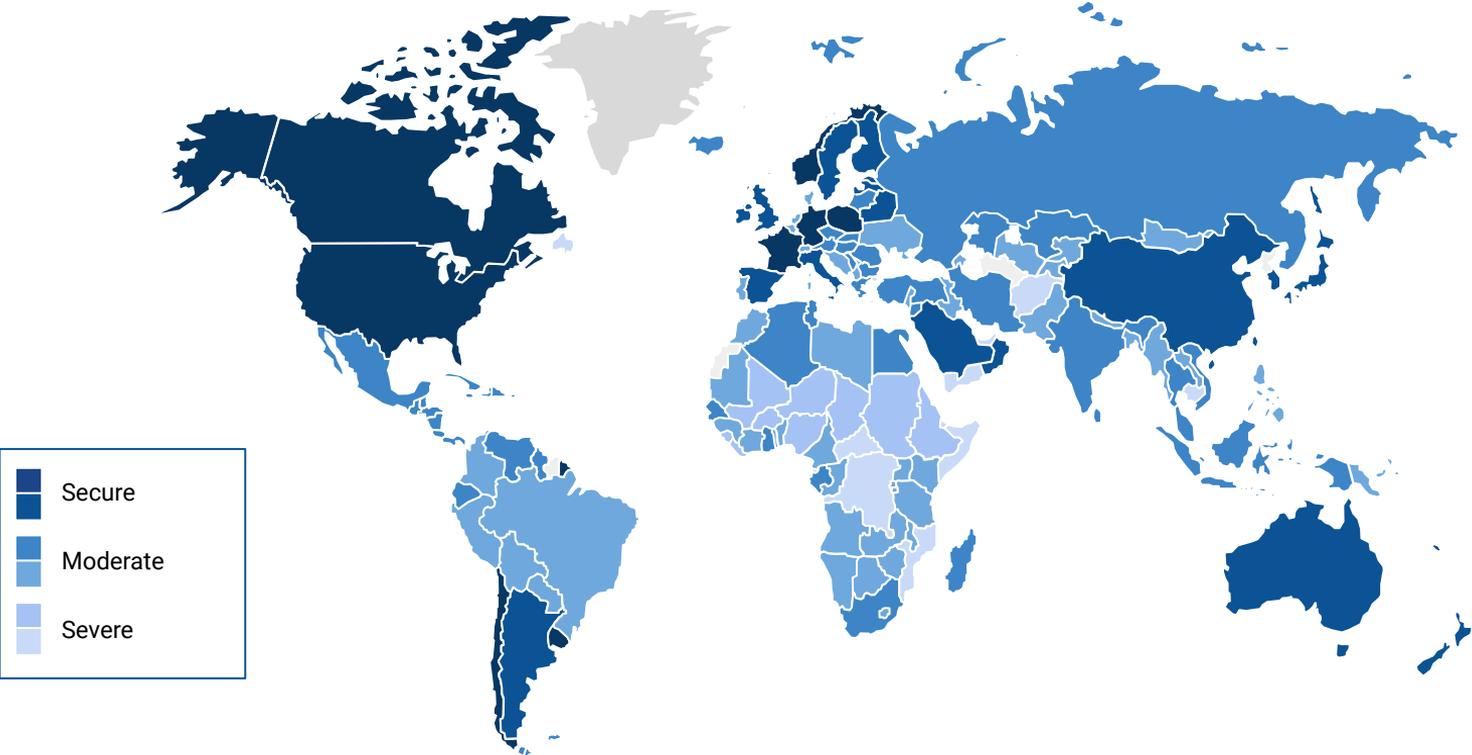
# Food Security Index Framework (3/3)

## Food System and Economy Resilience

<i>Indicator groups</i>	<i>Features</i>	<i>Description</i>
Economic Development	Country class by income group	Assigns the world's economies to four income groups – low-, lower-middle-, upper-middle-, and high-income countries.
	GDP (current US\$)	GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.
	GDP per capita, PPP (current international \$)	GDP per capita based on purchasing power parity (PPP) is gross domestic product converted to international dollars using purchasing power parity rates.
	Unemployment, total (% of total labor force)	Unemployment refers to the share of the labour force that is without work but available for and seeking employment.
Food System Economy	Food dependency ratio	Measures the ratio between a country's export prices and its import prices.
	Food exports (% of merchandise exports)	Share of food products in total merchandise exports.
	Food exports in US\$	Food products in exports, in millions US\$.
	Food imports (% of merchandise imports)	Share of food products in total merchandise imports.
	Food imports in US\$	Food products in imports, in millions US\$.
Wealth & Equality	Human Development Index (HDI)	Provides a single index measure to capture three key dimensions of human development: a long and healthy life, access to knowledge, and a decent standard of living.
	Gini Index	Measure of statistical dispersion intended to represent the income inequality or the wealth inequality within a nation or a social group.
	Poverty headcount ratio at national poverty lines	National poverty headcount ratio is the percentage of the population living below the national poverty line(s).
	Poverty Rate	The number of people (usually expressed as a percentage) in a given demographic group whose income falls below the global poverty line.
	Population living in slums (% of urban population)	The proportion of the urban population living in slum households.

# Food Security Index by Overall Score

The Food Security Index was constructed considering the issues of access to food, crisis risks, and the resilience of the economy across 171 countries. The Index ranges from 0 to 10 where the value closer to 0 shows a more insecure state of the certain country and the value closer to 10 shows a more secure and stable state.

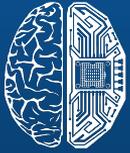


# Food Security Index: Overall Ranking (1/2)

United States	7.90	Qatar	6.99	Thailand	6.51
Norway	7.89	Bahrain	6.99	Paraguay	6.48
Ireland	7.82	Russian Federation	6.93	Panama	6.47
Netherlands	7.79	Hungary	6.93	Venezuela	6.47
Canada	7.79	Kazakhstan	6.87	Croatia	6.42
Germany	7.75	Luxembourg	6.86	Samoa	6.40
France	7.54	Greece	6.86	Morocco	6.40
New Zealand	7.52	Malaysia	6.86	Tunisia	6.39
Poland	7.50	South Korea	6.85	Turkey	6.36
Finland	7.49	Costa Rica	6.84	Dominican Republic	6.30
Denmark	7.48	Portugal	6.83	Ecuador	6.25
Belgium	7.43	Estonia	6.78	Nicaragua	6.25
Sweden	7.41	Oman	6.77	Mauritius	6.24
United Kingdom	7.39	Lithuania	6.76	Fiji	6.24
Belarus	7.35	Algeria	6.76	Moldova	6.16
Austria	7.31	Saudi Arabia	6.75	Cuba	6.16
Switzerland	7.29	Malta	6.74	Vietnam	6.13
Czech Republic	7.28	Slovak Republic	6.72	Belize	6.12
Italy	7.26	Kuwait	6.69	Indonesia	6.10
Spain	7.25	Slovenia	6.69	Jordan	6.10
Australia	7.23	Romania	6.67	Sri Lanka	6.10
Uruguay	7.20	Bulgaria	6.60	Grenada	6.08
Chile	7.18	Latvia	6.59	Mexico	6.08
Japan	7.16	Cyprus	6.57	Barbados	6.05
Singapore	7.09	Seychelles	6.56	Ukraine	6.03
United Arab Emirates	7.07	Argentina	6.56	Iran	6.02
China	7.02	Israel	6.55	Bhutan	5.99
Iceland	6.99	Serbia	6.51	India	5.99

# Food Security Index: Overall Ranking (2/2)

Jamaica	5.98	Mongolia	5.56	Togo	5.09
Vanuatu	5.97	Bangladesh	5.54	Zimbabwe	5.08
Uzbekistan	5.96	Georgia	5.53	Malawi	5.06
Guyana	5.95	Cabo Verde	5.52	Philippines	5.05
Brunei Darussalam	5.95	Honduras	5.51	Kenya	5.05
Brazil	5.94	Tajikistan	5.49	Syria	5.01
Lebanon	5.94	Pakistan	5.45	Madagascar	5.00
Bolivia	5.93	Cote d'Ivoire	5.44	Mauritania	4.98
Peru	5.92	Rwanda	5.41	Cameroon	4.97
North Macedonia	5.92	Azerbaijan	5.41	Guinea	4.78
Bosnia and Herzegovina	5.91	Tanzania	5.36	Congo, Rep.	4.70
Guatemala	5.90	Iraq	5.35	Liberia	4.61
Lao PDR	5.86	Senegal	5.35	Haiti	4.61
Albania	5.86	Namibia	5.34	Lesotho	4.54
Gabon	5.85	Cambodia	5.34	Ethiopia	4.48
Colombia	5.84	Timor-Leste	5.33	Sierra Leone	4.47
Solomon Islands	5.83	Uganda	5.33	Mali	4.46
South Africa	5.81	Myanmar	5.32	Yemen	4.41
Montenegro	5.79	Armenia	5.31	Sudan	4.38
El Salvador	5.78	Benin	5.30	Chad	4.28
Kyrgyz Republic	5.78	Guinea-Bissau	5.26	Niger	4.24
Kiribati	5.78	Botswana	5.26	South Sudan	4.15
Ghana	5.77	Eswatini	5.22	Nigeria	4.11
West Bank and Gaza	5.76	Libya	5.18	Burkina Faso	4.05
Papua New Guinea	5.76	Zambia	5.14	Afghanistan	3.79
Egypt	5.76	Burundi	5.12	Central African Republic	3.79
Sao Tome and Principe	5.74	Gambia, The	5.11	Mozambique	3.76
Nepal	5.74	Angola	5.10	Congo, Dem. Rep.	3.75
Comoros	5.60	Djibouti	5.09	Somalia	2.97

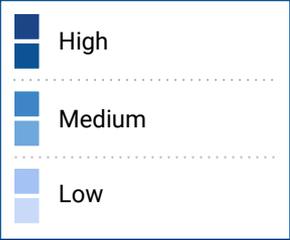
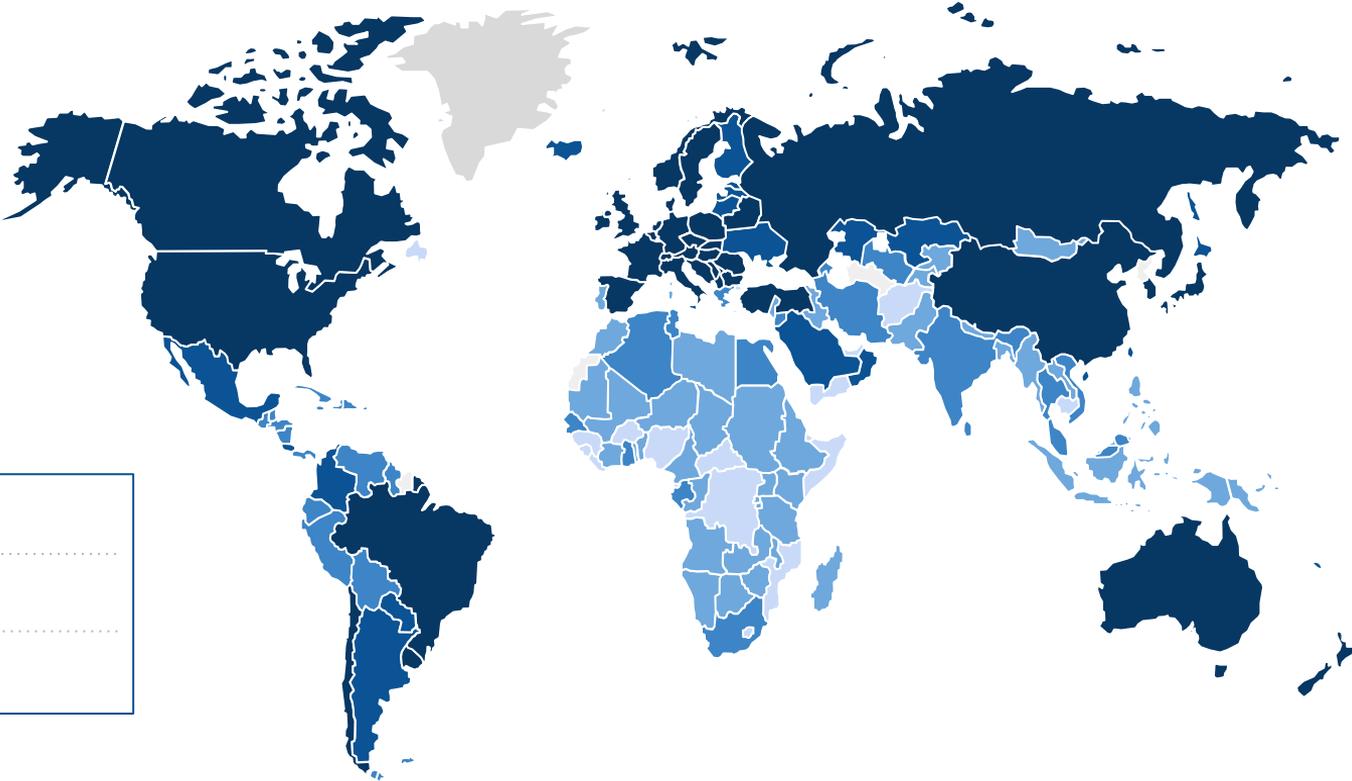


DEEP  
KNOWLEDGE  
ANALYTICS

# Food Security Index: World Map and Rankings

# Food Security Index by Access to Food

The 'Access to Food' dimension measures ease of access to sufficient and nutritious food that meets people's dietary needs for a healthy and active life.



# Food Security Index: Access to Food Ranking (1/2)

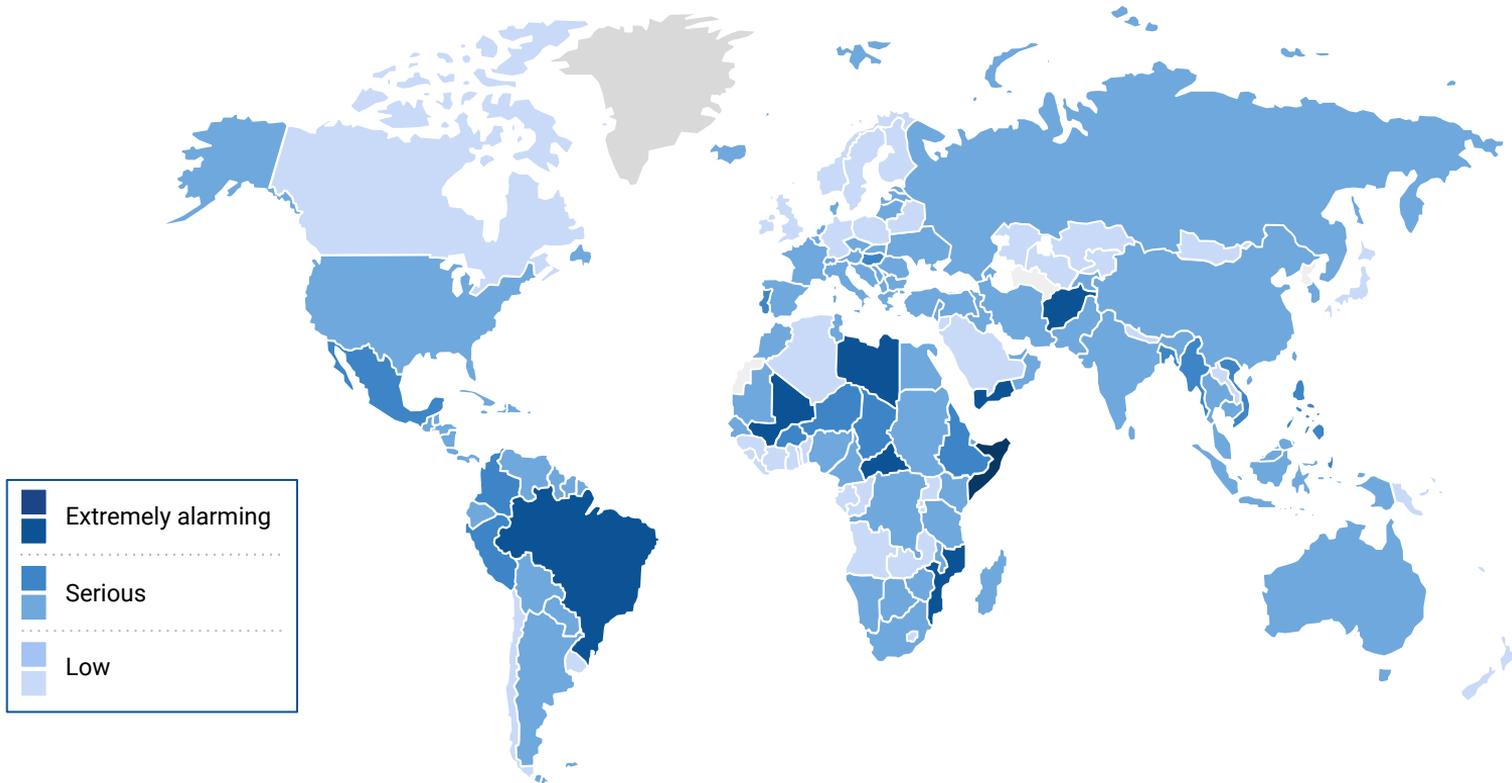
United States	8.76	New Zealand	7.91	Latvia	7.07
Canada	8.63	Turkey	7.88	Lithuania	7.04
United Kingdom	8.53	Belarus	7.84	Tunisia	7.04
Ireland	8.49	Kuwait	7.82	Ukraine	7.03
France	8.47	Hungary	7.81	Malta	7.01
Germany	8.46	Chile	7.73	Cyprus	6.99
Austria	8.36	Romania	7.70	Azerbaijan	6.93
Italy	8.31	Bahrain	7.63	Jordan	6.89
Denmark	8.27	Uruguay	7.62	Croatia	6.89
Belgium	8.25	Bulgaria	7.60	Morocco	6.80
Netherlands	8.24	Slovak Republic	7.58	Montenegro	6.75
Finland	8.24	Brazil	7.57	Bosnia and Herzegovina	6.71
Sweden	8.21	China	7.56	Cuba	6.68
Switzerland	8.20	Costa Rica	7.55	Dominican Republic	6.68
Norway	8.19	Oman	7.55	Algeria	6.66
Australia	8.18	Singapore	7.50	Lebanon	6.59
Israel	8.18	Kazakhstan	7.48	Thailand	6.57
Greece	8.08	Serbia	7.44	Uzbekistan	6.57
Spain	8.07	Argentina	7.37	Ecuador	6.45
Portugal	8.02	Panama	7.35	Nicaragua	6.42
Poland	8.02	Malaysia	7.34	Iran	6.39
Czech Republic	8.00	Slovenia	7.30	Peru	6.35
Qatar	8.00	Mexico	7.29	Barbados	6.35
Saudi Arabia	7.96	Luxembourg	7.22	Belize	6.34
South Korea	7.92	Paraguay	7.15	North Macedonia	6.31
Russian Federation	7.92	Colombia	7.11	Bolivia	6.30
United Arab Emirates	7.92	Estonia	7.09	South Africa	6.29
Japan	7.92	Iceland	7.07	Jamaica	6.29

# Food Security Index: Access to Food Ranking (2/2)

Vietnam	6.29	Papua New Guinea	5.61	Togo	4.45
Syria	6.26	Myanmar	5.51	South Sudan	4.41
Samoa	6.26	Sao Tome and Principe	5.51	Zambia	4.39
Venezuela	6.25	Bhutan	5.47	Yemen, Rep.	4.38
Albania	6.22	Comoros	5.47	Eswatini	4.34
Seychelles	6.22	Guatemala	5.45	Cameroon	4.34
Sri Lanka	6.18	Philippines	5.43	Tanzania	4.33
Egypt	6.18	Cambodia	5.35	Mauritania	4.30
Grenada	6.16	Vanuatu	5.35	Zimbabwe	4.29
Guyana	6.14	Ghana	5.31	Uganda	4.23
Brunei Darussalam	6.13	Nepal	5.26	Chad	4.20
El Salvador	6.12	Pakistan	5.26	Kenya	4.02
Mauritius	6.08	Cabo Verde	5.24	Ethiopia	4.00
India	6.04	Bangladesh	5.19	Madagascar	4.00
Armenia	6.00	Lao PDR	5.11	Haiti	3.96
Libya	5.99	Senegal	5.09	Angola	3.90
Moldova	5.96	Djibouti	5.04	Burkina Faso	3.83
Indonesia	5.94	Botswana	4.92	Malawi	3.69
Gabon	5.93	Cote d'Ivoire	4.89	Guinea	3.63
Honduras	5.87	Guinea-Bissau	4.76	Congo, Rep.	3.53
Iraq	5.85	Burundi	4.74	Lesotho	3.50
Tajikistan	5.83	Benin	4.72	Nigeria	3.50
Fiji	5.82	Namibia	4.68	Afghanistan	3.23
West Bank and Gaza	5.75	Mali	4.67	Mozambique	3.16
Mongolia	5.71	Niger	4.58	Liberia	2.86
Georgia	5.71	Rwanda	4.55	Congo, Dem. Rep.	2.80
Kiribati	5.70	Timor-Leste	4.51	Sierra Leone	2.61
Kyrgyz Republic	5.68	Gambia, The	4.48	Central African Republic	2.41
Solomon Islands	5.62	Sudan	4.46	Somalia	2.04

# Food Security Index by Crisis Level

Crisis Level evaluates a country's exposure to the impacts of a changing climate, sociological or biological hazards. The maximum value of 6 in our ranking represents an extremely alarming situation in the countries.



# Food Security Index: Crisis Level Ranking (1/2)

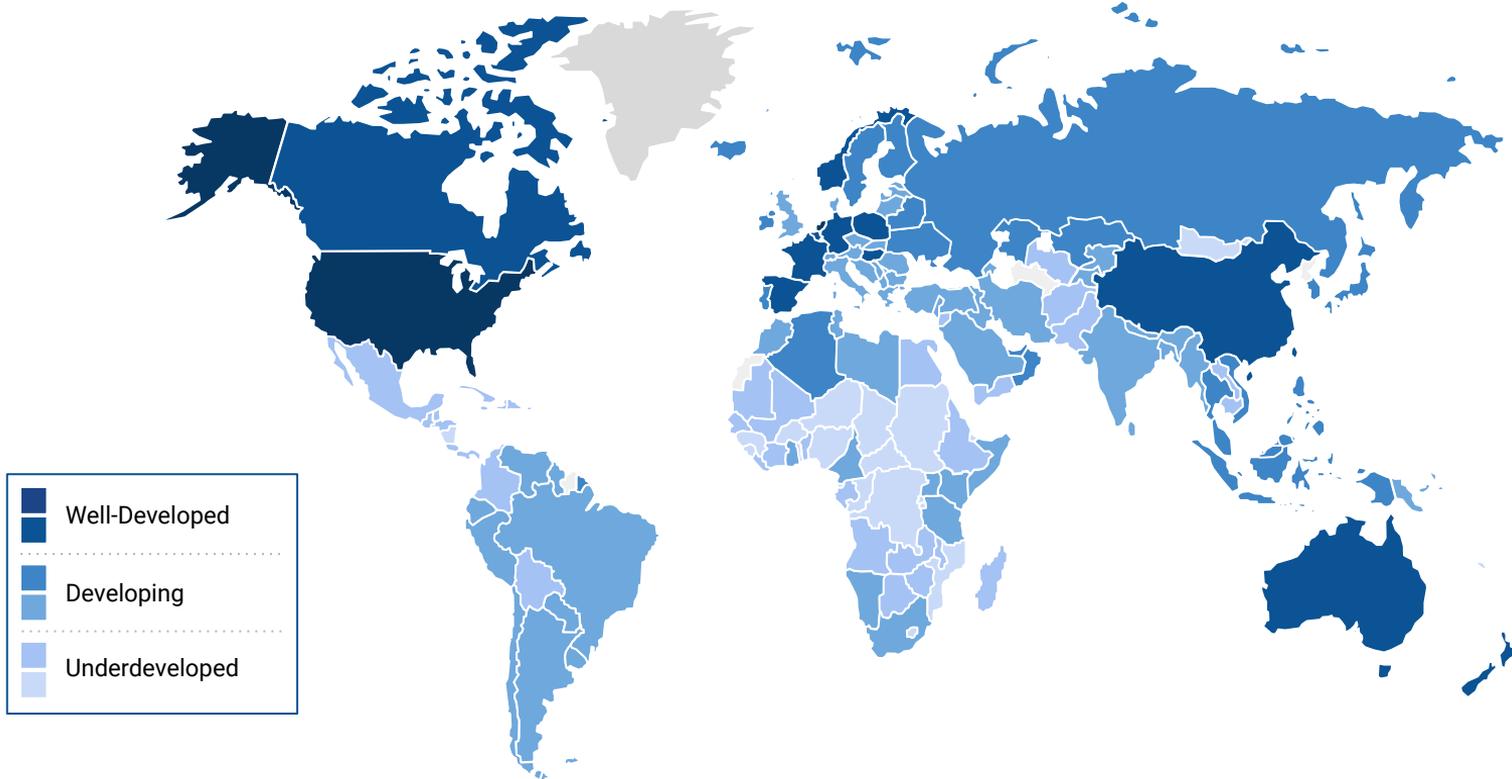
Syria	5.66	Central African Republic	3.52	Cyprus	2.81
Somalia	5.27	Israel	3.30	Bolivia	2.79
Azerbaijan	5.18	Namibia	3.22	Moldova	2.78
Yemen	5.11	South Africa	3.08	Madagascar	2.78
Afghanistan	4.90	Kenya	3.06	Ecuador	2.76
Brazil	4.75	Mauritania	3.06	United States	2.76
Mozambique	4.72	Vietnam	3.04	Slovenia	2.75
Iraq	4.71	Hungary	3.03	Tajikistan	2.75
Mali	4.59	Albania	3.03	Latvia	2.75
South Sudan	4.57	Bangladesh	3.03	Thailand	2.74
Libya	4.53	Montenegro	3.02	Paraguay	2.73
Armenia	4.49	India	2.99	Bosnia and Herzegovina	2.73
Ukraine	4.48	Iran	2.94	Cuba	2.72
Ethiopia	4.45	Indonesia	2.94	Belize	2.71
Niger	4.38	Zimbabwe	2.93	Guyana	2.71
Chad	4.34	North Macedonia	2.91	Senegal	2.71
Burkina Faso	4.24	Serbia	2.91	Botswana	2.70
Philippines	4.14	Cambodia	2.90	Malaysia	2.68
Turkey	4.01	Pakistan	2.89	Tanzania	2.67
Myanmar	3.99	Egypt	2.89	United Arab Emirates	2.65
Sudan	3.93	Croatia	2.88	Lithuania	2.63
Nigeria	3.91	Greece	2.87	Romania	2.62
Congo, Dem. Rep.	3.88	Haiti	2.85	Brunei Darussalam	2.61
Mexico	3.87	Bulgaria	2.85	Sri Lanka	2.60
Colombia	3.77	Australia	2.83	Oman	2.57
Cameroon	3.70	Djibouti	2.83	El Salvador	2.57
Georgia	3.68	Argentina	2.82	Slovak Republic	2.55
Peru	3.67	Portugal	2.82	Panama	2.54

# Food Security Index: Crisis Level Ranking (2/2)

Uganda	2.53	Angola	2.33	Liberia	2.07
China	2.53	Saudi Arabia	2.32	Czech Republic	2.05
Russian Federation	2.52	Lebanon	2.28	Gabon	2.03
Guatemala	2.52	Jamaica	2.28	Malta	2.01
Honduras	2.50	Uzbekistan	2.28	Guinea-Bissau	2.01
Lao PDR	2.49	Kazakhstan	2.28	Singapore	1.98
Jordan	2.49	Venezuela	2.27	Netherlands	1.98
Bahrain	2.49	Solomon Islands	2.27	Sierra Leone	1.97
Malawi	2.49	Guinea	2.22	Switzerland	1.97
Zambia	2.46	Luxembourg	2.22	Costa Rica	1.96
Cote d'Ivoire	2.46	Mauritius	2.20	Grenada	1.93
Eswatini	2.44	Morocco	2.20	Poland	1.91
Barbados	2.44	Vanuatu	2.20	Uruguay	1.90
Seychelles	2.44	Cabo Verde	2.20	United Kingdom	1.81
Mongolia	2.43	Lesotho	2.19	Comoros	1.71
Italy	2.42	Gambia, The	2.18	West Bank and Gaza	1.70
Ghana	2.42	Kiribati	2.18	Algeria	1.69
Spain	2.41	Kuwait	2.18	Germany	1.68
Nepal	2.41	Chile	2.17	Bhutan	1.68
Kyrgyz Republic	2.39	Estonia	2.16	Samoa	1.67
Papua New Guinea	2.39	South Korea	2.14	Sao Tome and Principe	1.62
Benin	2.39	Fiji	2.13	Japan	1.60
Tunisia	2.38	Dominican Republic	2.13	Canada	1.60
Nicaragua	2.37	Iceland	2.13	Belarus	1.56
Austria	2.34	Congo, Rep.	2.10	New Zealand	1.56
Belgium	2.34	Qatar	2.09	Sweden	1.47
Burundi	2.34	Timor-Leste	2.09	Ireland	1.46
Rwanda	2.34	France	2.09	Finland	1.03
Denmark	2.34	Togo	2.07	Norway	1.02

# Food Security Index by Food System and Economy Resilience

Food System and Economy Resilience assesses resources available that can alleviate the impact of the global food crisis. Food imported out of necessity leads to countries' dependence on external sources as a means of providing food for their populations. This is when food insecurity occurs. The maximum value of 7.7 in our ranking represents a well-developed situation in terms of food system and economy resilience.



# Food Security Index: Food System and Economy Resilience Ranking (1/2)

United States	7.70	Thailand	5.70	Qatar	5.07
Netherlands	7.11	Switzerland	5.64	Ecuador	5.07
Denmark	6.51	Luxembourg	5.59	Bulgaria	5.06
Norway	6.50	Ukraine	5.54	Fiji	5.03
Germany	6.46	Cyprus	5.54	Paraguay	5.02
Ireland	6.41	Slovenia	5.53	Brazil	5.00
Poland	6.38	Sweden	5.48	Serbia	4.99
Belgium	6.37	United Kingdom	5.46	Lao PDR	4.96
Canada	6.34	Latvia	5.44	Romania	4.93
Australia	6.33	Venezuela	5.42	Costa Rica	4.92
France	6.25	Estonia	5.42	Iraq	4.92
New Zealand	6.22	Kazakhstan	5.41	India	4.91
Spain	6.08	Russian Federation	5.40	Mauritius	4.85
Iceland	6.04	Greece	5.37	Mexico	4.82
China	6.03	Oman	5.33	South Korea	4.77
Hungary	6.02	Moldova	5.32	Guatemala	4.77
Chile	5.98	Indonesia	5.30	Vanuatu	4.76
United Arab Emirates	5.94	Algeria	5.29	Israel	4.75
Austria	5.91	Portugal	5.29	Belize	4.74
Italy	5.90	Finland	5.26	Sri Lanka	4.71
Malaysia	5.90	Croatia	5.26	Nicaragua	4.70
Seychelles	5.90	Malta	5.23	Panama	4.61
Czech Republic	5.88	Turkey	5.21	Iran	4.61
Lithuania	5.87	Japan	5.16	Samoa	4.61
Uruguay	5.87	Argentina	5.14	Saudi Arabia	4.61
Bahrain	5.83	Vietnam	5.14	Morocco	4.59
Belarus	5.78	Slovak Republic	5.13	Namibia	4.57
Singapore	5.76	Peru	5.09	Georgia	4.57

# Food Security Index: Food System and Economy Resilience Ranking (2/2)

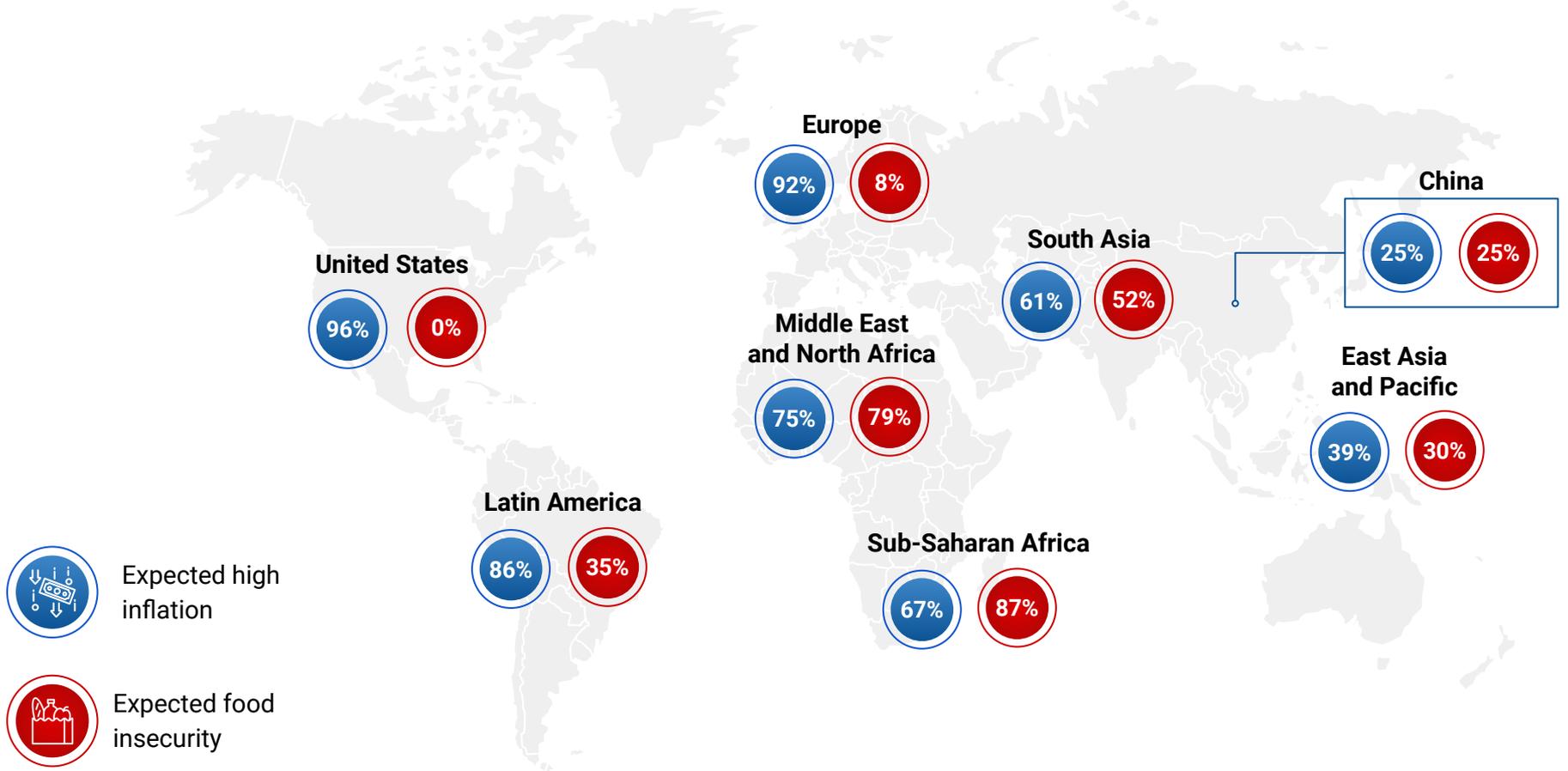
Cuba	4.51	Grenada	4.02	Mongolia	3.41
Tunisia	4.51	Egypt	3.99	Tajikistan	3.39
Azerbaijan	4.47	Pakistan	3.98	Sao Tome and Principe	3.34
Bangladesh	4.45	Malawi	3.97	Mali	3.30
Kuwait	4.44	Yemen	3.96	West Bank and Gaza	3.24
Ghana	4.43	Jamaica	3.92	Honduras	3.14
Myanmar	4.43	Ethiopia	3.90	Djibouti	3.07
Guyana	4.43	Jordan	3.90	Comoros	3.06
Syria	4.43	Cote d'Ivoire	3.88	Gambia, The	3.04
Tanzania	4.42	Zimbabwe	3.87	Liberia	3.04
Armenia	4.42	Philippines	3.85	Guinea-Bissau	3.03
Albania	4.38	Kiribati	3.81	Afghanistan	3.03
Dominican Republic	4.37	El Salvador	3.80	Chad	2.98
Nepal	4.36	Madagascar	3.78	Burundi	2.97
North Macedonia	4.36	Eswatini	3.77	Guinea	2.94
Brunei Darussalam	4.31	Bosnia and Herzegovina	3.75	Togo	2.90
Bolivia	4.28	Angola	3.72	Mozambique	2.85
Cameroon	4.28	Mauritania	3.71	Sierra Leone	2.77
Uganda	4.28	Senegal	3.67	Nigeria	2.76
Barbados	4.23	Gabon	3.64	Haiti	2.71
South Africa	4.21	Montenegro	3.64	Congo, Rep.	2.68
Bhutan	4.19	Uzbekistan	3.60	South Sudan	2.62
Kenya	4.18	Cambodia	3.57	Sudan	2.61
Colombia	4.17	Timor-Leste	3.56	Burkina Faso	2.57
Solomon Islands	4.13	Benin	3.56	Niger	2.52
Libya	4.09	Botswana	3.55	Central African Republic	2.47
Papua New Guinea	4.06	Lebanon	3.51	Congo, Dem. Rep.	2.35
Kyrgyz Republic	4.05	Zambia	3.51	Lesotho	2.31
Rwanda	4.04	Cabo Verde	3.50	Somalia	2.16



DEEP  
KNOWLEDGE  
ANALYTICS

# Regional Risk Profiles

# Projected Regional Rates of Inflation and Food Insecurity

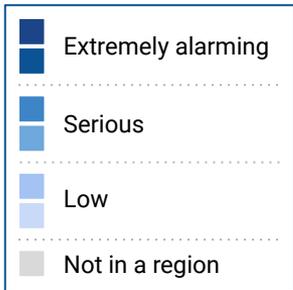
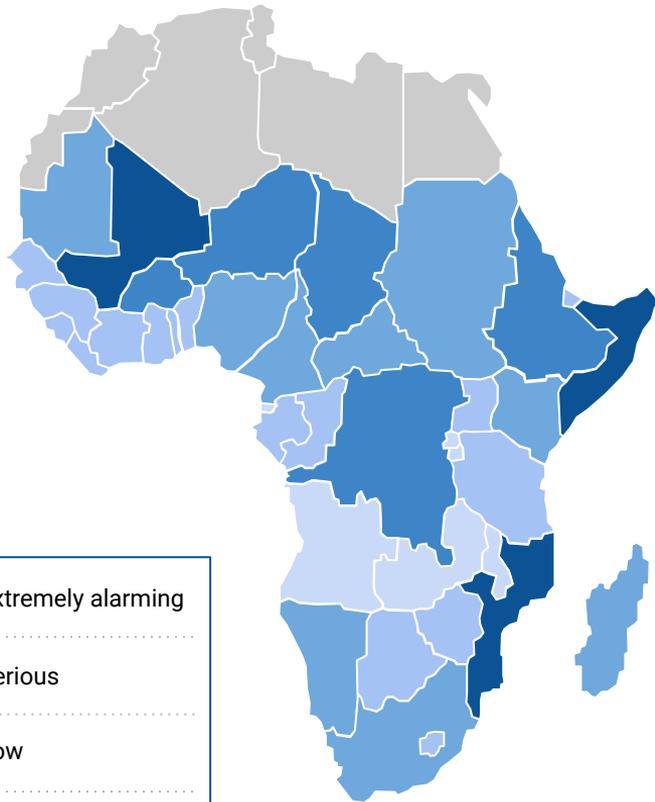


Expected high inflation



Expected food insecurity

# Regional Overview: Africa (except northern part)



Food security in African region is off track. In 2021, more than one in five people in Africa experienced hunger, which is more than double the proportion of hungry people in any other region. With the largest untapped potential of arable land, the region remains a net food importer, spending about \$43 billion on food imports annually. The risk of the food crisis degrading further, triggering massive population displacements, is high.

2021		2022
142.1M were chronically hungry	117.8M experienced acute hunger	305 M do not have sufficient food consumption
<b>Social Vulnerability</b>		
432.5M people beyond the poverty line	1-35% unemployment rate	16-60% food expenditure as % of income
<b>Agricultural Potential</b>		
10.1M sq km agricultural land	1.3% cropland area	17.2% agriculture as a % of GDP

# Key Drivers: Africa

## Relationship between hunger and the key drivers

### Epidemics

#### Countries with the highest outbreaks of COVID-19

	Physical exposure to epidemics	Total Number of Cases	Confirmed Cases per 100K	Number of Fatalities per 100K
<b>Seychelles</b>	2.6		44.7K	1688.4
<b>Mauritius</b>	3.7		231.0K	786.9
<b>Botswana</b>	4.1		322.8K	1142.6
<b>Cabo Verde</b>	4.9		60.5K	717.2
<b>South Africa</b>	4.5		4.0M	1694.6
<b>Namibia</b>	4.7		169.2K	1569.6
<b>Eswatini</b>	3.8		73.1K	1207.8
<b>Sao Tome and Principe</b>	5.9		6.0K	326.8
<b>Gabon</b>	6.7		47.9K	133.8
<b>Zambia</b>	6.4		325.9K	211.6

### Conflict

#### Countries with the greatest incidence of conflict-related fatalities and their current situation of food security

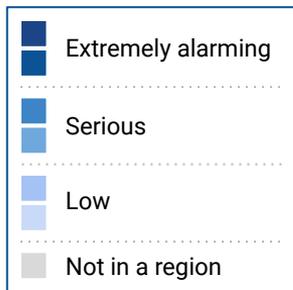
	No. of conflict-related fatalities per 100k	Prevalence of Insufficient food consumption	No. of people with insufficient food consumption
<b>Burkina Faso</b>	2.36		11.2M
<b>Somalia</b>	1.96		11.3M
<b>Mali</b>	1.92		12.1M
<b>Central African Republic</b>	0.86		1.4M
<b>South Sudan</b>	0.72		6.5M
<b>Niger</b>	0.46		16.7M
<b>Ethiopia</b>	0.44		21.9M
<b>Cameroon</b>	0.39		8.6M
<b>Nigeria</b>	0.31		53.5M
<b>Congo, Dem. Rep.</b>	0.3		49M
<b>Mozambique</b>	0.16		8.4M

### Climate

#### Countries facing most ecological threats

	Physical exposure to natural disasters	Natural resources and resilience	Droughts probability and historical impact
<b>Niger</b>	13.98		6.4
<b>Madagascar</b>	13.78		4.7
<b>Malawi</b>	13.72		5.9
<b>Sierra Leone</b>	13.4		1
<b>Mali</b>	12.32		7.3
<b>South Africa</b>	12.14		9.4
<b>Togo</b>	11.54		3
<b>Kenya</b>	11.44		6.9
<b>Uganda</b>	11.26		6.1
<b>Cote d'Ivoire</b>	11.08		3.5

# Regional Overview: Asia and the Pacific



The overall food security situation is a major concern to the Asia and the Pacific region, home to 60% of the world's population. More than half of the world's hungry also live in Asia and the Pacific. The share of food expenditure in GDP varies greatly across countries as it is related to the degree of national economic development. In addition, there has been a significant inflation in food prices, especially in Central Asian region, a result of currency depreciation pressures and increase in commodity prices.

2021		2022
<b>301M</b> were chronically hungry	<b>30.5M</b> experienced acute hunger	<b>436M</b> do not have sufficient food consumption
<b>Social Vulnerability</b>		
<b>700M</b> people beyond the poverty line	<b>1-14%</b> unemployment rate	<b>7-43%</b> food expenditure as % of income
<b>Agricultural Potential</b>		
<b>11.6M sq km</b> agricultural land	<b>3.4%</b> cropland area	<b>5.8%</b> agriculture as a % of GDP

# Key Drivers: Asia and the Pacific

## Relationship between hunger and the key drivers

### Epidemics

#### Countries with the highest outbreaks of COVID-19

	Physical exposure to epidemics	Total Number of Cases	Confirmed Cases per 100K	Number of Fatalities per 100K
India	7.5		31.2K	376.8
South Korea	2.2		357.7K	478.3
Vietnam	6.8		109.5K	438.9
Japan	3.4		73.5K	247.9
Australia	2.1		313.4K	380.5
Indonesia	7.2		22.0K	567.1
Malaysia	5.6		139.1K	1,091.0
Thailand	5.3		64.6K	437.7
Philippines	6.5		33.3K	545.1
Bangladesh	7.6		11.8K	175.3

### Conflict

#### Countries with the greatest incidence of conflict-related fatalities and their current situation of food security

	No. of conflict-related fatalities per 100k	Prevalence of Insufficient food consumption	No. of people with insufficient food consumption
Myanmar	3.69		14.4
Afghanistan	0.81		37.2
Papua New Guinea	0.11		1.1
Philippines	0.05		15.8
Bangladesh	0.01		22.2
Tajikistan	0.01		2.8

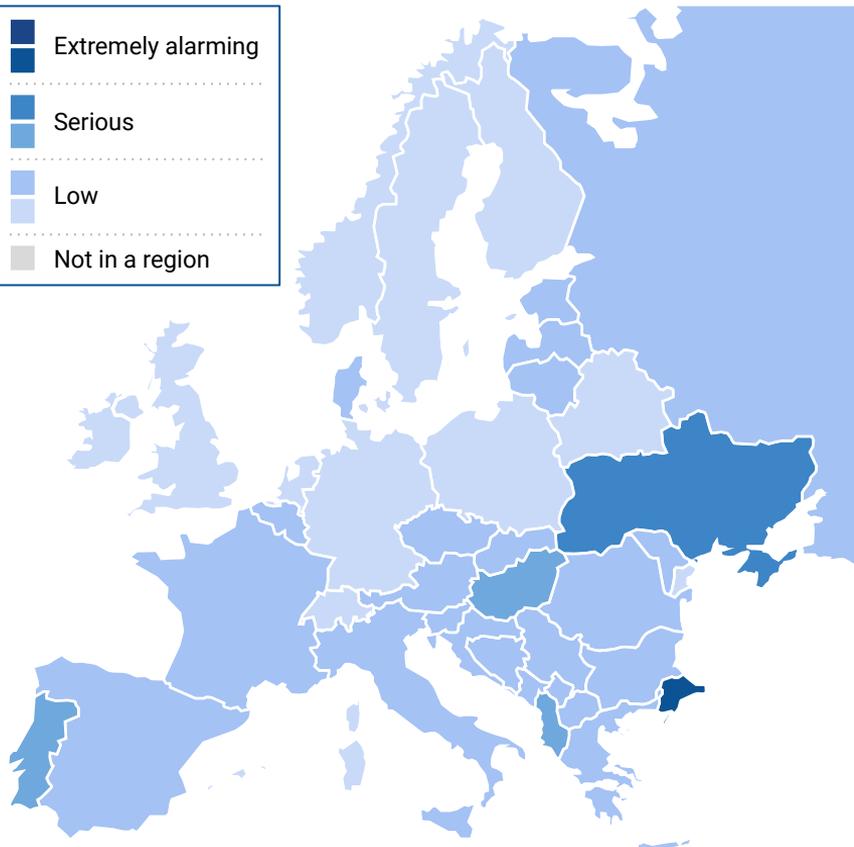
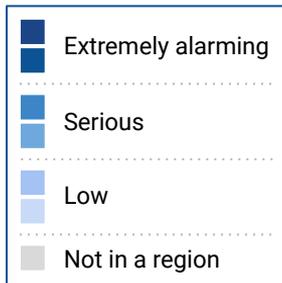
### Climate

#### Countries facing most ecological threats

	Physical exposure to natural disasters	Natural resources and resilience	Droughts probability and historical impact
Japan	16.42		0.5
New Zealand	16.32		2
Myanmar	15.02		1
Thailand	14.32		5.7
India	14.28		6.6
South Korea	13.68		0.3
Vietnam	13.4		4.1
China	13.22		4.6
Philippines	13.08		4.1
Sri Lanka	12.78		3.8

# Regional Overview: Europe

Food availability and hunger is currently not at stake as the EU region is self-sufficient for much of its agricultural produce. However, the agricultural sector in EU is a net importer of particular products, such as feed protein. This, paired together with the high costs on fertilizers and fossil energy, creates challenges related to production for farmers and increase in food prices.



2021		2022	
<b>N/A</b> were chronically hungry	<b>N/A</b> experienced acute hunger	<b>14M</b> do not have sufficient food consumption	
<b>Social Vulnerability</b>			
<b>6.4M</b> people beyond the poverty line	<b>8-38%</b> unemployment rate	<b>3-19%</b> food expenditure as % of income	
<b>Agricultural Potential</b>			
<b>8.0M sq km</b> agricultural land	<b>4.0%</b> cropland area	<b>2.0%</b> Agriculture as a % of GDP	

**N/A** were chronically hungry

**N/A** experienced acute hunger

**14M** do not have sufficient food consumption

## Social Vulnerability

**6.4M** people beyond the poverty line

**8-38%** unemployment rate

**3-19%** food expenditure as % of income

## Agricultural Potential

**8.0M sq km** agricultural land

**4.0%** cropland area

**2.0%** Agriculture as a % of GDP

# Key Drivers: Europe

## Relationship between hunger and the key drivers

### Epidemics

#### Countries with the highest outbreaks of COVID-19

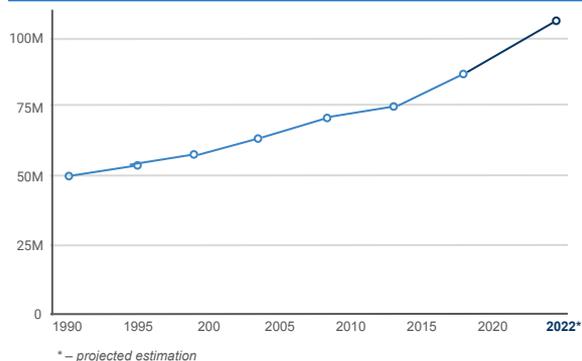
	Physical exposure to epidemics	Total Number of Cases	Confirmed Cases per 100K	Number of Fatalities per 100K
France	1.3		458.1K	2,217.6
Germany	1.4		334.3K	1,680.8
United Kingdom	1.5		333.4K	2,643.5
Italy	2		303.9K	2,786.8
Russian Federation	3.3		124.4K	2,558.4
Spain	2.2		272.4K	2,308.4
Netherlands	1.7		476.4K	1,307.2
Poland	2.4		159.1K	3,080.1
Portugal	1.9		506.9K	2,368.4
Ukraine	4.2		116.0K	2,587.2

### Conflict

#### Countries with the greatest incidence of conflict-related fatalities and their current situation of food security

	No. of conflict-related fatalities per 100k	Prevalence of Insufficient food consumption	No. of people with insufficient food consumption
Ukraine	5.92		7.9M
Moldova	-		0.3M

### Migration Flow by Year



### Climate

#### Countries facing most ecological threats

	Physical exposure to natural disasters	Natural resources and resilience	Droughts probability and historical impact
Ireland	16.5		0.5
Norway	15.24		1.5
France	15.08		1.3
Finland	15.04		1.5
Czech Republic	14.86		1.5
United Kingdom	14.82		1
Austria	13.92		3.1
Russian Federation	13.88		6.1
Slovak Republic	13.84		1.5
Sweden	13.62		1

# Regional Overview: Latin America and the Caribbean



The region has experienced increase in numbers of severely food insecure people by over half a million between December 2021 and March 2022. With many countries in Latin America and the Caribbean dependent on cereal imports, current food inflation creates even more hunger. Dramatic decline in people's daily lives has forced them to leave their communities and head north in search of work, food security, and shelter in Chile and Brazil. Migrants from Haiti are of particular concern.

2021		2022
<b>20M</b> were chronically hungry	<b>12.8M</b> experienced acute hunger	<b>24M</b> do not have sufficient food consumption
<b>Social Vulnerability</b>		
<b>23.7M</b> people beyond the poverty line	<b>3-18%</b> unemployment rate	<b>16-41%</b> food expenditure as % of income
<b>Agricultural Potential</b>		
<b>7.1M sq km</b> agricultural land	<b>1.2%</b> cropland area	<b>6.9%</b> agriculture as a % of GDP

# Key Drivers: Latin America and the Caribbean

## Relationship between hunger and the key drivers

### Epidemics

#### Countries with the highest outbreaks of COVID-19

Country	Physical exposure to epidemics	Total Number of Cases	Confirmed Cases per 100K	Number of Fatalities per 100K
Brazil	5.8		150.5K	3,134.9
Argentina	3.8		205.4K	2,830.1
Colombia	5.5		120.0K	2,730.3
Mexico	5.2		46.0K	2,499.9
Chile	2.7		206.8K	3,042.8
Peru	5.4		108.5K	6,399.5
Cuba	5.5		97.7K	753.6
Uruguay	3.1		274.8K	2,103.5
Bolivia	5		77.9K	1,855.2
Panama	5.5		209.5K	1,906.2

### Conflict

#### Countries with the greatest incidence of conflict-related fatalities and their current situation of food security

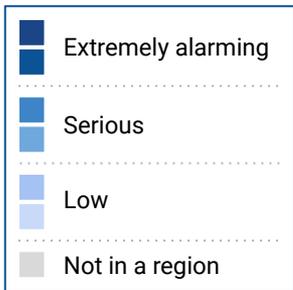
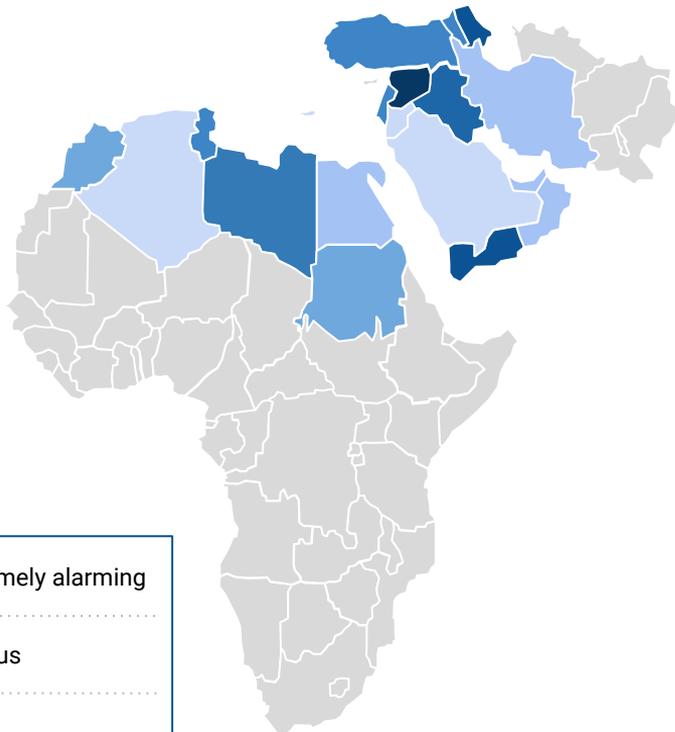
Country	No. of conflict-related fatalities per 100k	Prevalence of Insufficient food consumption	No. of people with insufficient food consumption
Haiti	0.47		4.8M
Honduras	0.41		0.2M
El Salvador	0.34		0.4M
Colombia	0.26		5.8M
Guatemala	0.17		1.3M
Nicaragua	0.07		0.2M
Peru	0.04		4.1M

### Climate

#### Countries facing most ecological threats

Country	Physical exposure to natural disasters	Natural resources and resilience	Droughts probability and historical impact
Costa Rica	15.6		1
Honduras	14.38		4.6
Uruguay	14.18		2
Colombia	14.08		1.9
Chile	13.96		0.3
Dominican Republic	13.42		0.5
Panama	13.32		1.3
Guatemala	13.24		3.8
Mexico	13.04		3.3
Nicaragua	13.04		4.1

# Regional Overview: Middle East and Northern Africa



The MENA region will remain as one of the most import-dependent regions in the world. About 50% of the region's food is imported, and some progress in the field of agri-food technology is being made in a number of countries such as Israel and UAE. Yemen and Syria, states that are devastated by war, have the highest levels of food insecurity. On top of the conflict, climate change and water shortages are affecting Algeria, Iraq, and Yemen, limiting the availability of resources needed for food production and development of agriculture.

## 2021 2022

**21.8M** were chronically hungry

**29.2M** experienced acute hunger

**86M** do not have sufficient food consumption

### Social Vulnerability

**38.2M** people beyond the poverty line

**0-29%** unemployment rate

**12-39%** food expenditure as % of income

### Agricultural Potential

**3.7M sq km** agricultural land

**0.9%** cropland area

**5.4%** agriculture as a % of GDP

# Key Drivers: Middle East and Northern Africa

## Relationship between hunger and the key drivers

### Epidemics

#### Countries with the highest outbreaks of COVID-19

	Physical exposure to epidemics	Total Number of Cases	Confirmed Cases per 100K	Number of Fatalities per 100K
Turkey	6.1		177.5K	1,164.3
Iran	6.5		85.1K	1,662.8
Israel	4.7		465.9K	1,178.1
Iraq	6.9		56.9K	612.9
Jordan	3.9		165.5K	1,369.9
Georgia	4.7		417.0K	4,231.2
Morocco	3.5		32.4K	431.2
Lebanon	3.7		163.9K	1,545.7
Tunisia	2.7		87.7K	2,402.0
United Arab Emirates	5.5		94.3K	231.5

### Conflict

#### Countries with the greatest incidence of conflict-related fatalities and their current situation of food security

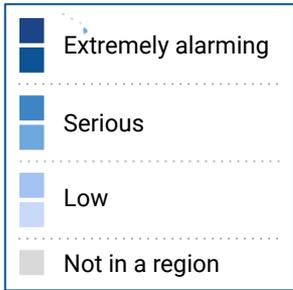
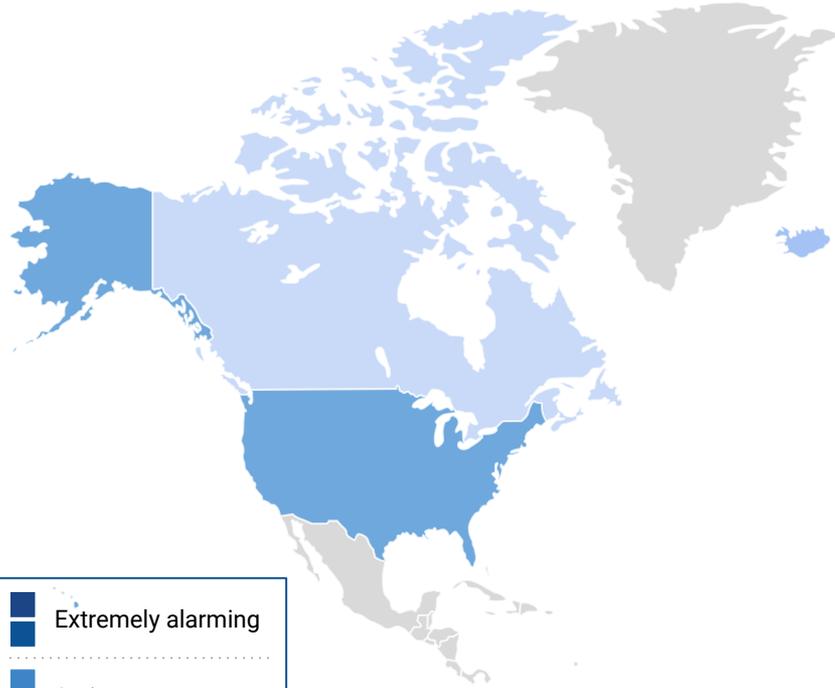
	No. of conflict-related fatalities per 100k	Prevalence of Insufficient food consumption	No. of people with insufficient food consumption
Libya	4.73		1.2M
Syria	2.06		9.2M
Iraq	1.55		2.8M
Yemen	0.65		15.8M
Sudan	0.26		11M
Lebanon	0.1		1.3M
Armenia	0.07		0.5M
Iran	0.02		8.5M

### Climate

#### Countries facing most ecological threats

	Physical exposure to natural disasters	Natural resources and resilience	Droughts probability and historical impact
Turkey	12.9		2.4
Egypt	12.8		1.9
Oman	11.7		3.4
Morocco	11.68		5.7
Tunisia	11.34		4.1
Algeria	11.3		2.4
Jordan	11.02		6.7
Syria	11.02		7.8
Israel	10.92		5.3
United Arab Emirates	10.52		5.3

# Regional Overview: North America



North America is a food secure region, with about 90% of households having access to enough food for an active and healthy life. Average food expenditure as a percentage of income tends to be the lowest among all regions reviewed. However, internal challenges in the region are also present. For instance, 30-40% of income on food is spent by Americans from lower income households. Struggling families are supported by the federal assistance programs.

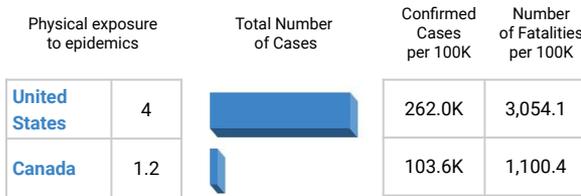
2021		2022
N/A	were chronically hungry	N/A
N/A	experienced acute hunger	N/A
<h3>Social Vulnerability</h3>		
37.3M	people beyond the poverty line	6-9%
5-7%	unemployment rate	food expenditure as % of income
<h3>Agricultural Potential</h3>		
4.6M	agricultural land	1.1%
0.2%	cropland area	agriculture as a % of GDP

# Key Drivers: North America

## Relationship between hunger and the key drivers

### Epidemics

#### Countries with the highest outbreaks of COVID-19



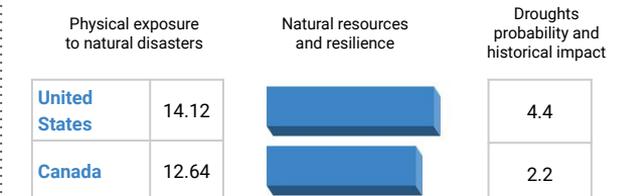
### Conflict

#### Countries with the greatest incidence of conflict-related fatalities and their current situation of food security

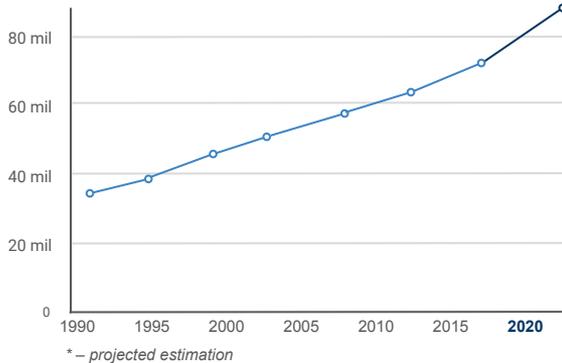


### Climate

#### Countries facing most ecological threats

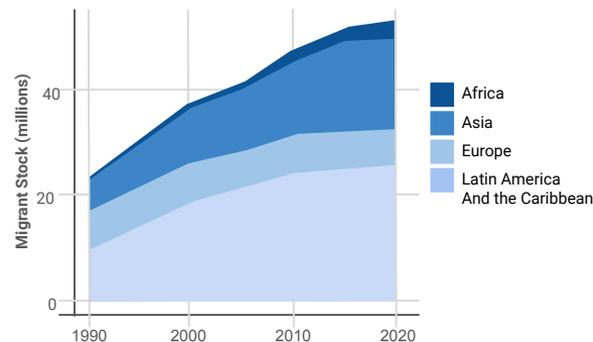


### Migration to North America trend

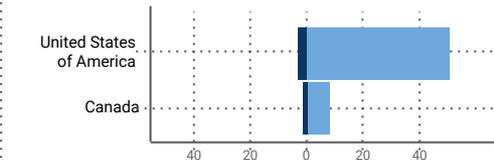


### Migration flows by years

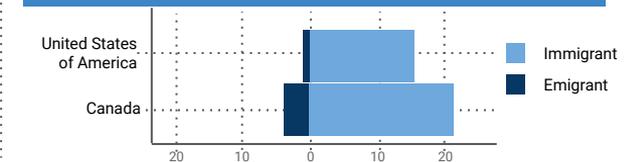
#### Migration to North America by region



### Migrants (millions)



### Percentage of population





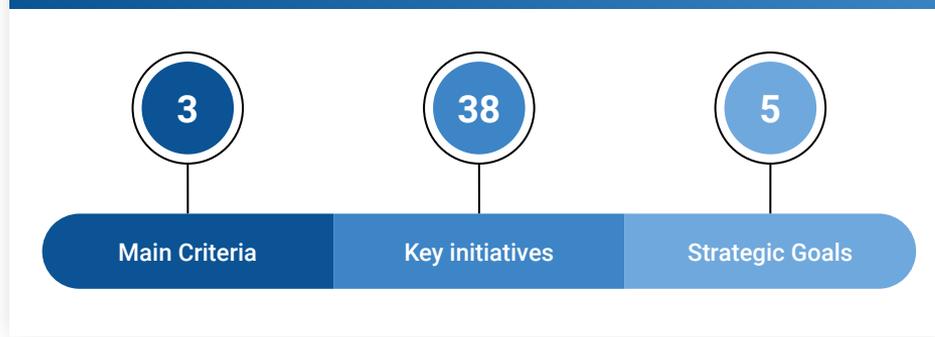
DEEP  
KNOWLEDGE  
ANALYTICS

# National Food Security Strategies

# UAE: National Food Security Strategy 2051

The National Strategy for Food Security in the UAE was presented by the Minister of Climate Change and Environment in November 2018.

## Agenda at a Glance



## The main focus is on:

- facilitating the global food trade;
- diversifying food import sources;
- identifying alternative supply schemes, covering three to five sources for each major food category.

## Main Aims of the Strategy

Make the UAE the world's best in the [Global Food Security Index](#) by 2051

Enable sustainable food production through the use of modern technologies

Enhance local production

Develop international partnerships to diversify food sources

Activate legislation and policies that contribute to nutrition

Activate legislation and policies to reduce waste

By launching the National Food Security Strategy 2051, the country aims to achieve zero hunger by ensuring access to safe, nutritious and sufficient food all year round throughout the world. The strategy specifically aims to implement resilient agricultural practices that increase productivity and production which help maintain ecosystems.

# UK: Government Food Strategy

Published 13 June 2022, and presented to Parliament by the Secretary of State for Environment, Food and Rural Affairs by Command of Her Majesty.

## Main objectives

Prosperous agrifood and seafood sector

Affordable food system

Sustainable trade

## The broader affordability of and access to food

a key element of the government's approach to tackling poverty

**£15 billion**

Cost of living support package, announced on 26 May 2022, including:

**£400 off**

household energy bills

**£650 off**

living payment to the most vulnerable households

## The government seeks to:



### Improve Food production

Broadly maintain the current level of food produced domestically

### Year of 2030

- employment and productivity, as well as completion of high-quality skills training will have risen in the agri-food industry
- halve childhood obesity by 2030



### UK Export Strategy

Reach £1 trillion of exports annually by 2030

# Taiwan: 'Agriculture 4.0' to Industrialise Food Production

To strengthen its food security, the Taiwan government has developed "Agriculture 4.0" to industrialise agriculture and increase food production, given its limited resources.



## Main aims of the program:

Make intelligent agriculture and digitalise agrarian production through Big Data analysis, intelligent machine technology, and agricultural integration intelligence sensors.

Emphasize the application of e-commerce and digital management to achieve the goal of reducing production wastes.

## Food tech developments:

Taiwanese communications company U-Sync provides low-cost the Internet of Things (IoT) sensors with a built-in SIM card and solar power supply features at a reasonable monthly fee. Farmers can easily adjust the location of the sensors based on the needs of their farms. This allows farmers to monitor the environmental information of the farms in real time.

AI controls the light and gives instructions of the retention or removal of flower buds and fruit grading. To ensure the harvest of dragon fruits, a LoRa network sensor and base station are installed in the farms to collect farm data on a daily basis, such as air, the soil temperature and humidity, electrical conductivity, and illuminance.

# Moving Towards Food Security with '30 by 30' in Singapore

The country has been planning for long-term food security through the strategy of 'three food baskets' – diversifying food sources, growing locally, and growing overseas.

## '30 by 30' goal



The government announced its '30 by 30' goal to increase local production to meet 30% of Singapore's nutritional needs with <1% of its land area by 2030. The government implemented a host of regulatory and financial measures. First, **the Singapore Food Agency (SFA)**, a new agency that would focus solely on 'ensuring and securing supply of safe food', was established to develop and award agricultural land to companies, including large arable plots in the more rural area of Singapore known as Lim Chu Kang and small unorthodox urban spaces like car park rooftops.

## Investments in local funds

### Agri-food innovation park

Extensive research and development investment in agriculture such as in vertical farming and identification of alternative protein sources.

### Urban farming

The government has invested heavily in local farms to build capacity and innovate through funding schemes such as the SG\$63 million Agriculture Productivity Fund and the Start-up SG Equity Scheme for agritechology.

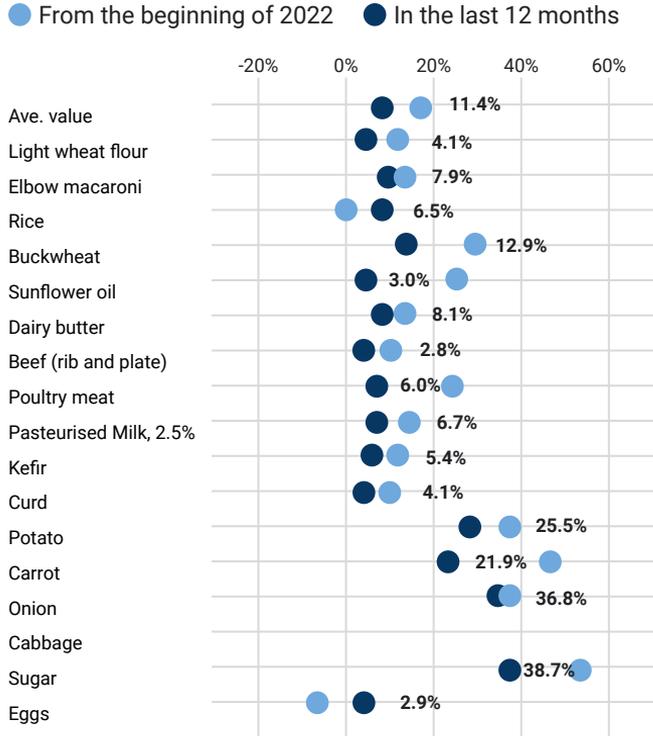
### Implementing community gardens

Small-scale initiatives by the government have involved expanding community gardens and implementing schemes to empower individuals to grow their own food.

# Kazakhstan Food Security Plan 2022-2024

Following the inflation on food prices in March 2022, the Ministry of Agriculture developed the Food Security Plan for 2022-2024.

## Rate of food price rises in Kazakhstan (as percentage)



The plan consists of three main sections and envisages **implementation of 31 measures**, including 18 measures to ensure physical accessibility, six measures to ensure economic security, and seven to ensure the safety and quality of products.

**Subsidies for agricultural producers** will be increased to KZT 139 billion, which will include also subsidies for social bread and eggs. **Diversification in crop production** will be carried out by increasing the area of oilseeds from 3 million to 3.5 million hectares, potatoes from 200,000 to 215,000 hectares, fodder from 3.6 million up to 4.2 million hectares.

The implementation of investment projects for the storage of potatoes, vegetables, and fruits will increase storage capacity in 2022 by 98,300 tons, in 2023 – 104,500 tons, in 2024 – 19,600 tons.

**31** Events related to Food Security

Diversification of crop production

Increased storage

# US Government Global Food Security Strategy 2022-2026

The US Government's Global Food Security Strategy is an integrated whole-of-government approach that aims to end global hunger, poverty, and malnutrition through the **Feed the Future initiative**.

The US government aims to contribute toward a 20% reduction in poverty and stunting in the areas where it works between 2022-2026 by partnering with foreign governments, the private sector, civil society, implementers, and the research community.



## Feed the Future Target Countries:

Bangladesh	Guatemala	Mali	Nigeria
Ethiopia	Honduras	Nepal	Senegal
Ghana	Kenya	Niger	Uganda

## Goal: Sustainably reduce global poverty, hunger, and malnutrition

### Objective 1

Inclusive and sustainable agriculture-led economic growth

### Objective 2

Strengthened resilience among people and systems

### Objective 3

A well-nourished population, especially among women and children

## New priority areas

Equity and inclusion

Countering COVID-19 long-term effects

Climate change

Working across the entire food system

Integration of conflict mitigation, peacebuilding, and social cohesion

# East Africa Regional Plan 2019-2024

The Global Food Security Strategy (GFSS) Country Plan for East Africa Regional was co-written by the United States Government (USG) interagency involved in food security and nutrition work through Feed the Future.

**Target Geography:** focus countries, Kenya, Uganda, Ethiopia, Tanzania Rwanda, Burundi, Democratic Republic of the Congo, South Sudan, Somalia, and Zambia.

**Based on lessons learned, Feed the Future EA has developed following components to be implemented:**



GFSS  
D01

Inclusive and Sustainable Agricultural-led Economic Growth:

- Support private-sector investment and trade in agriculture;
- Scale-up access to agricultural technology;
- Ensure compliance of regionally-harmonised policies based on science and international standards.

GFSS  
D02

Strengthened Resilience among People and Systems:

- Strengthen regional-resilience risk management systems;
- Support adaptation of existing regional-resilience frameworks.

GFSS  
D03

A Well-Nourished Population, Especially Women and Children:

- Regional technology scale-up;
- Regional trade and affordability of nutritious and nutrient-dense foods.

# EU Food Security Plan

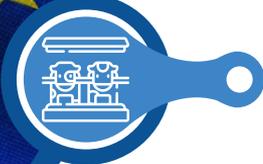
On 23 March, The European Commission introduced a plan to ensure food security against the impact of the war in Ukraine.



Up to €1.5 billion in aid will be received by EU farmers through a crisis reserve so that they can produce food on land set aside for biodiversity.



The EU's state aid rules will be relaxed for the agriculture and fertilizer sectors to allow up to €5,000 in aid to be distributed to individual farmers.



Flexibilities will also be introduced to existing import requirements for animal feed to alleviate the pressure on livestock producers.



Some of the CAP's environmental rules for 2022 will be paused to boost the EU's food production. Specifically, crop production will be allowed on fallow land as part of crop diversification requirements or Ecological Focus Areas.



DEEP  
KNOWLEDGE  
ANALYTICS

# Food Security Start-ups and Industry Innovations

# Leading Paradigms in Food Industry

## Five Groups of Trends are Expected to Move the Food Industry for Next Decade

### Population Changes

Population changes include ageing and an increase in life expectancy, a decrease in the birth rate and migratory flows. These trends have remarkable impacts on countries' economic and social structures. Specifically, the rebalancing of society and population will significantly affect the way people nourish themselves.

### New Geopolitical Balances

The most recent geopolitical changes and the emergence of megacities indirectly impact dietary trends and new distribution ways. It is predicted that in 2050, the world's population will reach 9 billion people (+32.4% since 2010), and 70% of the world's population will live in cities.

### Technological Innovations

New technologies, digitalisation, and automation – especially in energy, information, and sustainability – will play a fundamental role in evolving socio-economic changes, including the future dietary scenario.

### Focus on Environmental Aspects

F&B industry will be highly driven on increasing responsibility for the protection of the environment. The severe water stress, electricity production that depends too much on fossil fuels, and the severe risk of biodiversity loss are factors raising the growing alarm regarding environmental sustainability.

### Connectivity and Information

The enormous availability of data and information that can be found today, more freely, in real time, and with new methods, is a positive result of the significant changes underway. This will affect many potential developments in the food industry, supply chain management, and safety control.

# Latest Innovations in Food Security

The challenge of sustainably feeding a world of 10 billion people is going to require a lot of solutions. Entrepreneurs and innovators all over the globe are working hard to come up with answers. For this purpose, innovators of AgTech & New Food develop services and technologies with a focus on improving agricultural efficiency and sustainability, innovating food processing, and improve food ingredients, and create next-generation food.

## Improving agricultural efficiency and sustainability



- Field sensors
- Drones
- Farm-management software
- Robotics
- Vertical farming

U-Sync, Taiwanese company, provides low-cost IoT sensors with a built-in SIM card and solar power supply features at a reasonable monthly fee. Farmers can easily adjust the location of the sensors based on the needs of their farms. This allows farmers to monitor the environmental information of the farms in real time.

## Food supply chain optimisation



- Apps and services that provide access to food;
- Direct-to-consumer food delivery platforms;
- Meal kit and grocery delivery services;
- Products and services that innovate food processing and ingredients.

Unilever uses digital twins [of their factories](#). Factory equipment and machines are connected with IoT sensors and intelligent edge services in the Azure IoT platform. They send data on everything, from temperature to production cycle times to its digital twin software.

## 'New food' innovations as next-generation food and drinks



- Cultivated meat
- Plant-based meat and milk
- Insect-based products
- Fermented foods

The US company Eat Just makes its lab-grown chicken products in Singapore, which operates as its headquarters. Other homegrown start-ups such as Umami Meats and Shiok Meats are producing cell-cultured fish and offering cultivated red meat and seafood.

# Future Technologies in Food Industry



## Technologies that improve productivity of agricultural systems

- Automation of processes using innovations of engineering and information technology;
- Digital management and implementation of AI and Big Data analytics;
- Molecular markers in plant breeding. Genomics in the cultivation of needed traits in livestock.



## Technologies and practices that improve the sustainable use of inputs

- Technologies with fewer greenhouse gasses emission;
- Innovative approaches for increasing land surface performance;
- Increasing water use efficiency of crops and novel methods of water purification.



## Technologies that improve the health and wellness qualities of food

- Food as a vehicle for drug or biological delivery systems;
- Customised biological tests, data collection, and analysis for developing personalised diets;
- Nutrigenomics for diet customisation and preventing diet-related diseases.



## Food processing technologies

- Modifying packaging materials on a molecular scale;
- Novel and advanced biotechnological tools for cultured meat production;
- Microbial transformation for further usage in fermentation processes.



## Food safety and supply chain management technologies

- Blockchain and real-time food monitoring using the IoT devices;
- Real-time sensing of pathogens and biosensors for rapid detection of viruses;
- Implementation of technologies for reducing the number of artificial constituents in food.

# Upcoming Events 2022-2023



## Time to Act Together: Coordinating Policy Responses to the Global Food Crisis

18 July 2022  
Virtual event



## Africa Food Safety & Quality Summit

20 -22 July 2022  
Hybrid event  
Nairobi, Kenya



## International Conference on Food Resources and Security

11-12 Aug 2022  
Offline event  
Colombo, Sri Lanka



## Food Safety Forum

31 Aug 2022  
Virtual Event



## Euro-Global Conference on Food Science and Technology

12 -13 Sep 2022  
Offline Event  
Paris, France



## Global Food Security Food Safety and Sustainability

September 16-17, 2022  
Vancouver, Canada



## International Conference on Ecological Agriculture, Biodiversity, Food Security & Waste Management

20 -22 Sep 2022  
Offline event  
Barcelona, Spain



## International Food Safety Congress

03 -04 Nov 2022  
Offline event  
Istanbul, Turkey



## World Congress on Food Science and Technology

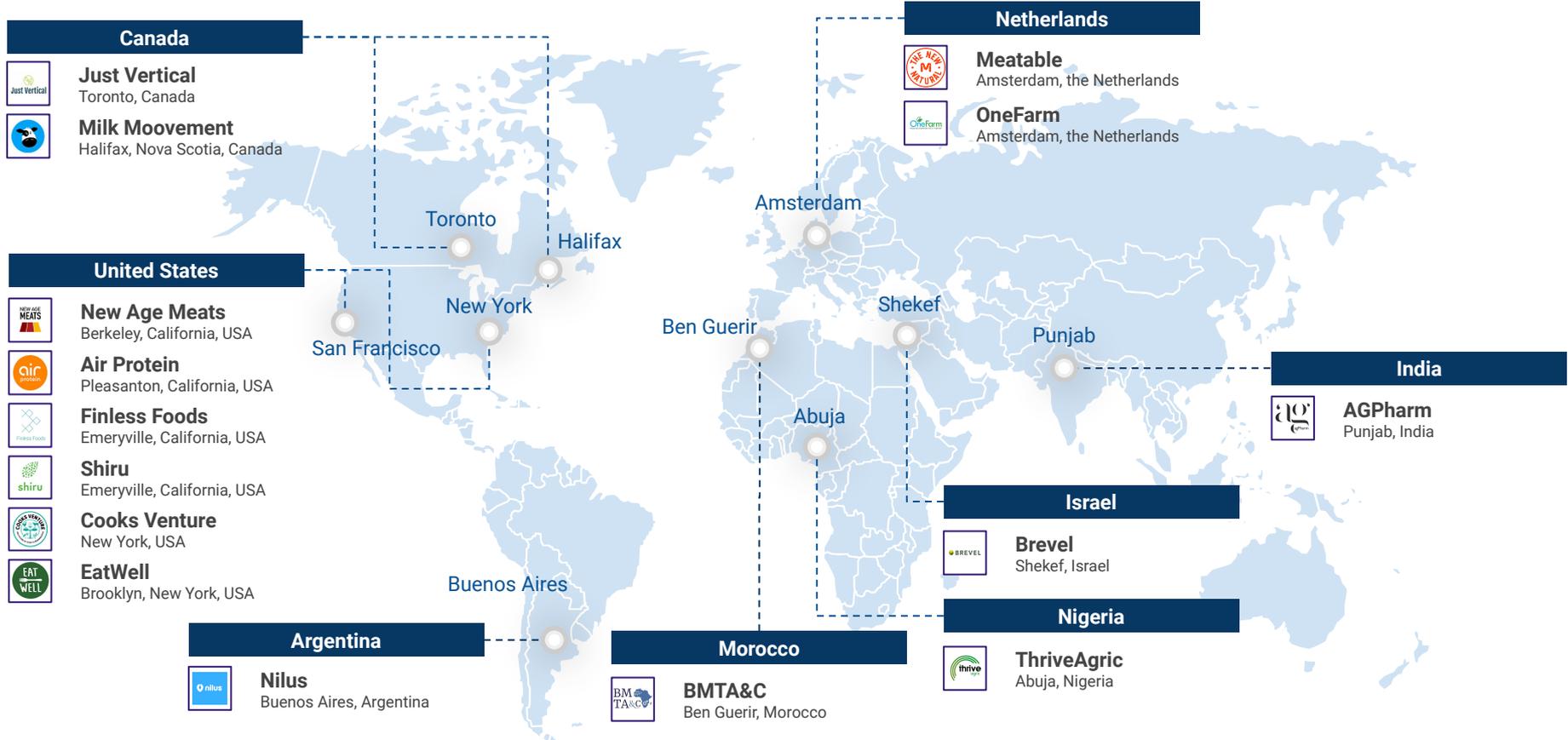
11-2 Nov 2022  
Offline event  
Rome, Italy



## Food Regulatory and Quality Assurance Summit

Fall 2023  
Online event

# Top Start-ups in Food Security Worldwide



# Top Start-ups in Food Security (1/3)

Name	Category	Location	Description
 New Age Meats	Biotechnology	 United States	New Age Meats is a biotechnology company that develops healthy cultivated meat grown from animal cells instead of animal slaughter.
 Thrive Agric	AgTech	 Nigeria	Thrive Agric is an agricultural technology providing access to finance, premium markets, and data driven advisory for small-holder farmers.
 Air Protein	Biotechnology	 United States	Air Protein is a start-up that develops protein-enriched food made from CO2.
 Just Vertical	AgTech	 Canada	Just Vertical offers a hydroponic system that allows anyone to easily grow herbs and produce right from home.
 Finless Foods	AgTech	 United States	Finless Foods provides cellular-agriculture technologies to create accessible plant-based and cell-cultured seafood alternatives.

# Top Start-ups in Food Security (2/3)

Name	Category	Location	Description
 Shiru	Biotechnology	 United States	Shiru leverages computational design to create enhanced proteins that feed the world sustainably.
 Cooks Venture	AgTech	 United States	Cooks Venture is a vertically integrated agricultural company to operate solely on regenerative agriculture.
 Meatable	Biotechnology	 Netherlands	Meatable is a food production company that produces real and guilt-free meat. With one cell, they are revolutionising the meat industry's impact on climate change and animal welfare and increasing food security at the same time.
 Milk Moovement	Supply Chain Management	 Canada	Milk Moovement creates a dairy supply chain management platform that connects all dairy supply chain players.
 EatWell	Food Affordability	 United States	EatWell delivers wholesome meal kits and engaging culinary education for patients struggling with food insecurity and chronic disease to alleviate barriers posed by social determinants and improve health outcomes.

# Top Start-ups in Food Security (3/3)

Name	Category	Location	Description
 Nilus	Food Affordability	 Argentina	Nilus is a social enterprise that applies crowdsourcing technology and AI to create healthy food markets for low-income populations.
 Brevel	Biotechnology	 Israel	Brevel is an Israeli start-up that produces microalgae solutions to address the rising global food demand by advancing its cultivation.
 OneFarm	AgTech	 The Netherlands	OneFarm develops vertical farming technologies and solutions. It builds large-scale vertical farms and combines this infrastructure with data on crops, pharmaceutical, and medicinal plants to increase the efficiency of planting patterns.
 AGPharm	Biotechnology	 India	AGPharm Bioinnovations is an Indian start-up that delivers crop disease prevention solutions.
 BMTA&C	Food Affordability	 Morocco	BMTA&C is a tech start-up from Morocco bringing solar-powered cold storage to the African continent.

# Trends for Food Security



## Digital Food Management

Big Data analytics, AI, and real-time monitoring enable companies to develop food management solutions to optimise manufacturing processes and supply chain operations. Customer and market intelligence allows brands to optimise their marketing strategies and effectively reach the relevant audience, boosting sales.

## Personalised Nutrition

Consumers desire to understand how dietary habits affect it. 3D printing and the adoption of robotics in food assembly lines allow food companies to provide nutrition personalisation at scale. In addition, various tracking devices allow users to track their diet and health conditions to streamline them.

## Productivity Growth

For the last few decades, agriculture has been focused entirely on increasing yields to meet the global goal of zero hunger. The progress achieved was significant. The market demand pushed farms to professionalise, become more prominent, and focus on producing highly productive crops in their area.

## L.A.T.T.E Consumer Trends

Consumers have the highest power in the value chain. Their preferences are switching to healthy food, and they prefer L.A.T.T.E (local, authentic, transparent, traceable, ethical) grown food. Farmers must prove that the food they produce is fully grown in line with sustainable agricultural practices.

## Traceability and Transparency

Consumers' desire for transparency in the food chain is at the heart of the growing demand for natural, traceable ingredients products. Blockchain and real-time food monitoring using IoT devices enable us to offer both traceability and transparency to customers.

## Low-Carbon Technologies

Producers are focusing on technologies with fewer greenhouse gasses emissions. The continued release of greenhouse gases can cause further warming and long-lasting changes in the climate system. The food system accounts for approximately 26% (13.6 B tons) of global greenhouse gas emissions.

## Nutraceuticals

Consumers are focusing more on eating healthy, making nutraceuticals a top emerging trend in the food industry. These include nutritional supplements, functional foods, medicinal food, and gut microbiomes enhancement foods such as prebiotics, probiotics, and postbiotics.

## Land Surface Efficiency

Additional novel solutions must be sought in new concepts of food production like vertical indoor farms that produce much more output per surface, lab-grown meat that is grown in an entirely ethical, transparent, and traceable way, insects as a significant source of protein, etc.

# Obstacles for Food Security



## Obstacles

### Health Consciousness

The increasing incidences of food-related disorders have prompted consumers to bring about vital changes in their diet and lifestyle, making them more health-conscious than ever. The need to eliminate artificial constituents from products is one of the major challenges faced by food and beverage managers.

### Traceability

Traceability is one of the top challenges in the F&B industry. Consumers have been taking increasing interest in formulations of food, which has led 'ingredient labelling' forming a major part of the packaging process. Furthermore, deploying advanced technology such as IoT, AI, and the blockchain is complex and costly task.

### Sustainability

An eco-friendly product has more of a consumer connection and is likely to make lucrative sales than a product that harms the environment. FoodTech companies are now competing to make the food manufacturing process highly environment-friendly through the adoption of numerous recycling practices.

### Regulatory Landscape

While most companies are known to perfunctorily adhere to the norms, the periodic changes subject to waste disposal, food quality, raw material, surplus production, documentation, etc. have cropped up to be one of the crucial challenges faced by FoodTech companies.

### Low-Carbon AgriTech

There is a need for the implementation of low-carbon technologies in agriculture and food industries due to climate change. The most significant barrier is a lack of technologies or side effects such as animals gaining weight after usage of methane-inhibiting additives.

### Safety Standards

Ensuring that safety standards are upheld in the industry is crucial to maintaining the high level of trust that consumers have in food manufacturers presently. This includes making sure that both the food is safe and that the people are looked after too. Food producers need to control safety according to new regulations.

### Veganism

With the increasing number of vegans, the demand for meat has witnessed a decline. FoodTech companies need to maintain their reputation with regards to ethical treatment of animal concern. As a result, companies have come up with meat-free alternatives to keep the retail and supply chains running.

### Online Visibility

Unlike e-commerce companies, food and beverage companies are still lagging when it comes to analysing their online presence. With the emergence of the newer market, changing nature of consumer spending, and advancing technology, it is high time for companies to focus on marketing products online.

# Key Takeaways



The global food system in 2022 has been destabilised by the recent Russian invasion of Ukraine. Levels of hunger and existing acute food insecurity in Sub-Saharan Africa and MENA region, along with higher food insecurity in Latin American and South Asia, are expected to increase even further by the end of this year.



High-income countries of North America and the EU lead the Food Security Index as the most food secure countries in the world. United States tops the ranking with 7.90 points out of 10. Thus, developed food secure countries will not face hunger but rather will experience the deficit of certain food products and high inflation.



Similarly, Sub-Saharan Africa and MENA region dominate the bottom of the Food Security Index, with Somalia scoring the lowest 2.97 points out of 10. The bottom top countries have not demonstrated the capacity to build food security through national policies and are affected by conflicts (northern Nigeria, Yemen, Burkina Faso, and Niger), weather conditions such as consecutive seasons of drought/below average rains (Kenya, South Sudan, and Somalia), and economic shocks.



The role of technology in achieving global food security becomes more important than ever. Big Data analytics, Artificial Intelligence, real-time monitoring will be helpful to tackle food security issues by enabling companies to develop food management solutions in order to optimise manufacturing processes and supply chain operations.



A number of food secure countries have announced and implemented national strategies specifically aimed at tackling food insecurity in 2022 and earlier, but that does not apply to the majority of countries in the developing world. Having a food security strategy policy that would encounter issues of domestic food insecurity to date must be considered by governments across the world during such times of uncertainty and global crises.

# Looking Ahead: Global Food Security State

Past decade as well as key developments from the beginning of 2022 have demonstrated the importance of examining hunger from both the food system and external shocks perspective. Hereby, our Food Security Index was constructed considering the issues of access to food, crisis risks, the resilience of the economy across 171 countries. The index is a dynamic quantitative and qualitative benchmarking model constructed from 40 unique factors that measure the drivers of food security across both developing and developed countries.

The numbers on hunger and people in acute food insecurity portray a grey image. As this report is being published, the ongoing conflict in Ukraine, involving two of the biggest producers of wheat, fertilizers, and oilseeds, is destabilising the existing supply chains and pushing food, energy, and fertilizer prices even higher.

Looking further, the need to weight up main factors shaping the food security such as food access, affordability, production, and presence of crisis situation globally is essential. Next iterations of the 'Global Food Security' reports series will add new submeasures, reflecting on distribution of wheat on food security and nutritional profile of countries and forecasting possible food security scenarios.

25

countries considered 'high risk' and deteriorating are in Sub-Saharan Africa and MENA region

8

countries considered most Food secure, according to the FSI

40%

wheat prices increase forecast in 2022

110

countries considered as moderate-level food secure, according to the FSI

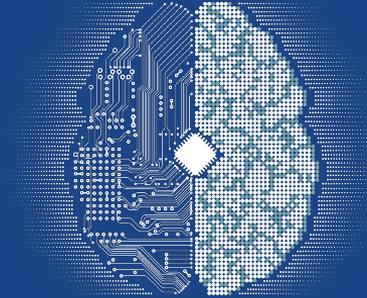
36

countries import more than 50% of their wheat from Russia and Ukraine

53

countries considered severely food insecure, according to the FSI





**Link to the Report:**

**[www.dka.global/global-foodtech-landscape-overview-2021-q4](http://www.dka.global/global-foodtech-landscape-overview-2021-q4)**

**E-mail: [info@dka.global](mailto:info@dka.global)**

**Website: [www.dka.global](http://www.dka.global)**

### **Deep Knowledge Analytics (DKA) Disclaimer**

The information and opinions in this report were prepared by Deep Knowledge Analytics. The information herein is believed by DKA to be reliable but DKA makes no representation as to the accuracy or completeness of such information. There is no guarantee that the views and opinions expressed in this communication will come to pass. DKA may provide, may have provided or may seek to provide advisory services to one or more companies mentioned herein. In addition, employees of DKA may have purchased or may purchase securities in one or more companies mentioned in this report. Opinions, estimates and analyses in this report constitute the current judgment of the author as of the date of this report. They do not necessarily reflect the opinions of DKA and are subject to change without notice. DKA has no obligation to update, modify or amend this report or to otherwise notify a reader thereof in the event that any matter stated herein, or any opinion, estimate, forecast or analysis set forth herein, changes or subsequently becomes inaccurate. This report is provided for informational purposes only. It is not to be construed as an offer to buy or sell or a solicitation of an offer to buy or sell any financial instruments or to participate in any particular trading strategy in any jurisdiction.