

A woman wearing a brown headscarf and a matching long-sleeved dress stands in the foreground on the left, smiling. She is barefoot. In the background, a large herd of sheep is grazing in a field. A person in a red shirt is visible in the distance on the right. The sky is clear and blue.

Improving food systems decision-making

Jess Fanzo

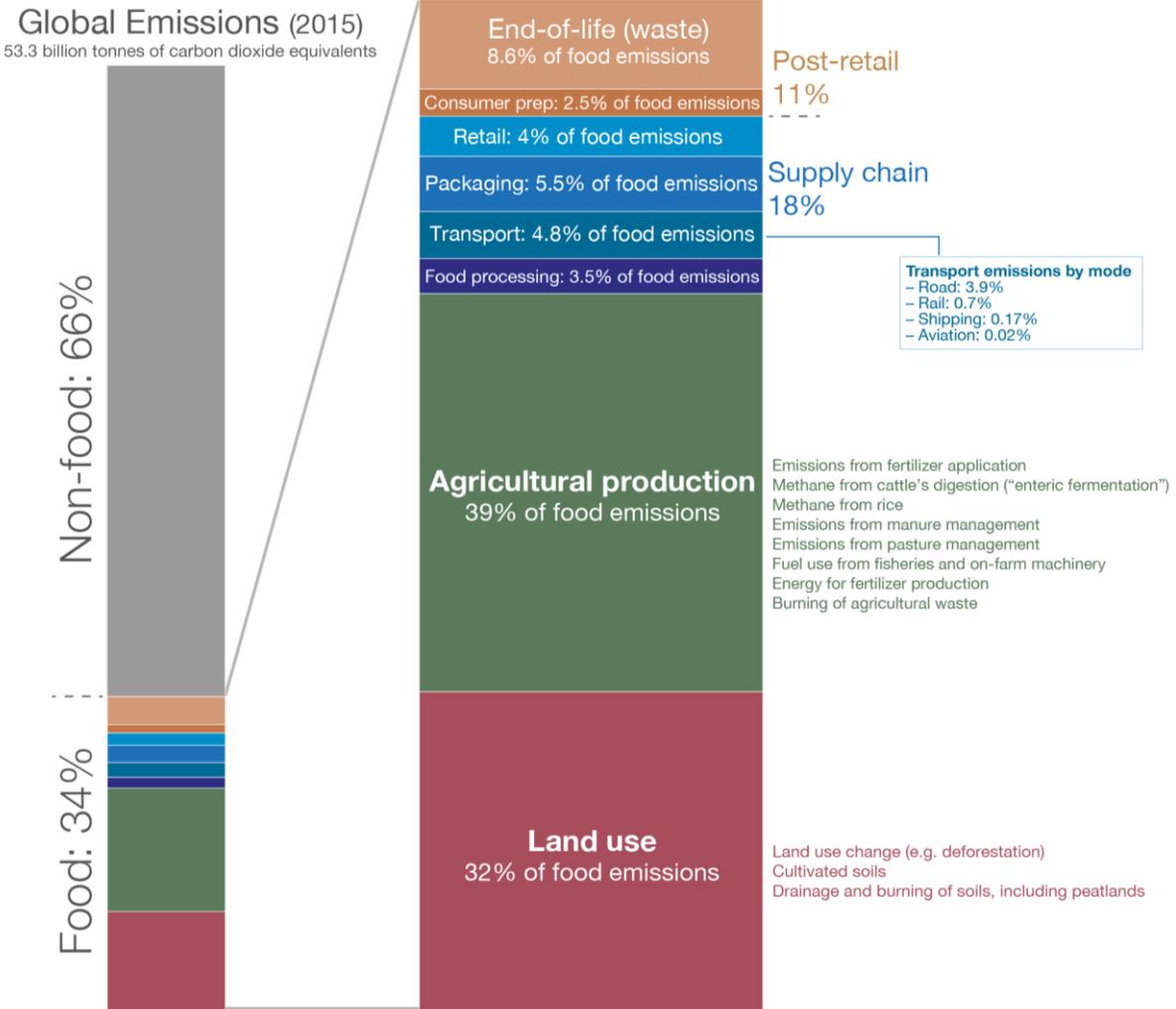
Bloomberg Distinguished Professor of Global Food Policy & Ethics

Johns Hopkins University

An aerial photograph of terraced rice fields. The terraces are arranged in a complex, winding pattern across a hillside, creating a series of green, stepped platforms. The fields are lush green, and the terraces are separated by narrow, earthen paths. Several palm trees are scattered throughout the landscape, particularly in the central and lower portions of the image. The overall scene is a vibrant display of agricultural engineering and natural beauty.

8 reasons why we are motivated to improve
food systems data science.

1. Food systems contribute to GHG emissions & environmental degradation



Food systems generate 21-37% of total greenhouse gas emissions

Agriculture uses 70% of all freshwater resources

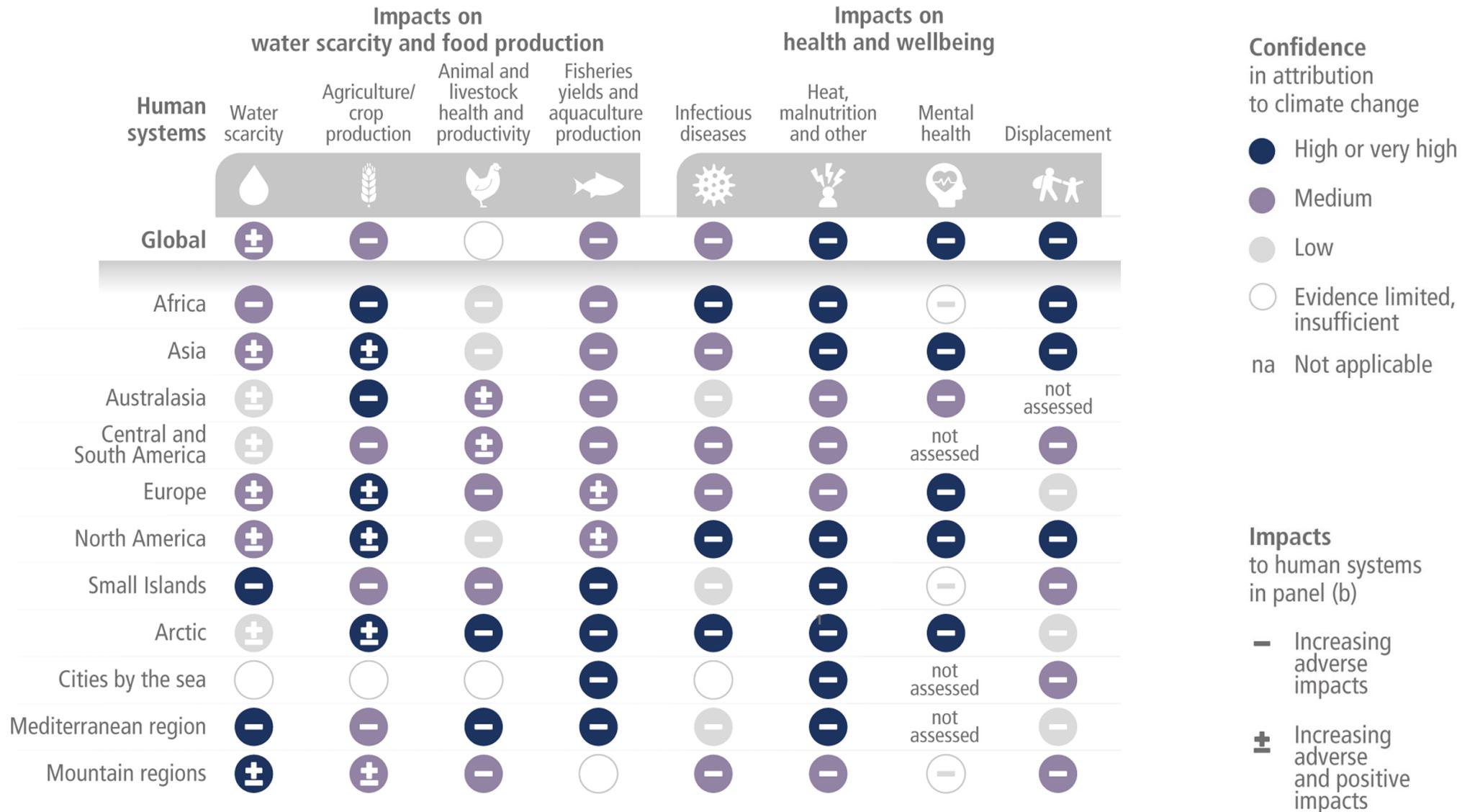
1 million animal and plant species are now threatened with extinction

Of the 400,000 food species, 12 make up 75% of the food supply

60% of marine fish stocks are maximally sustainably fished

Data source: Crippa, M., et al. (2021) Food systems are responsible for a third of global anthropogenic GHG emissions. *Nature Food*.
OurWorldinData.org - Research and data to make progress against the world's largest problems. Licensed under CC-BY by the author Hannah Ritchie.

2. Climate change is impacting every human system



Confidence in attribution to climate change

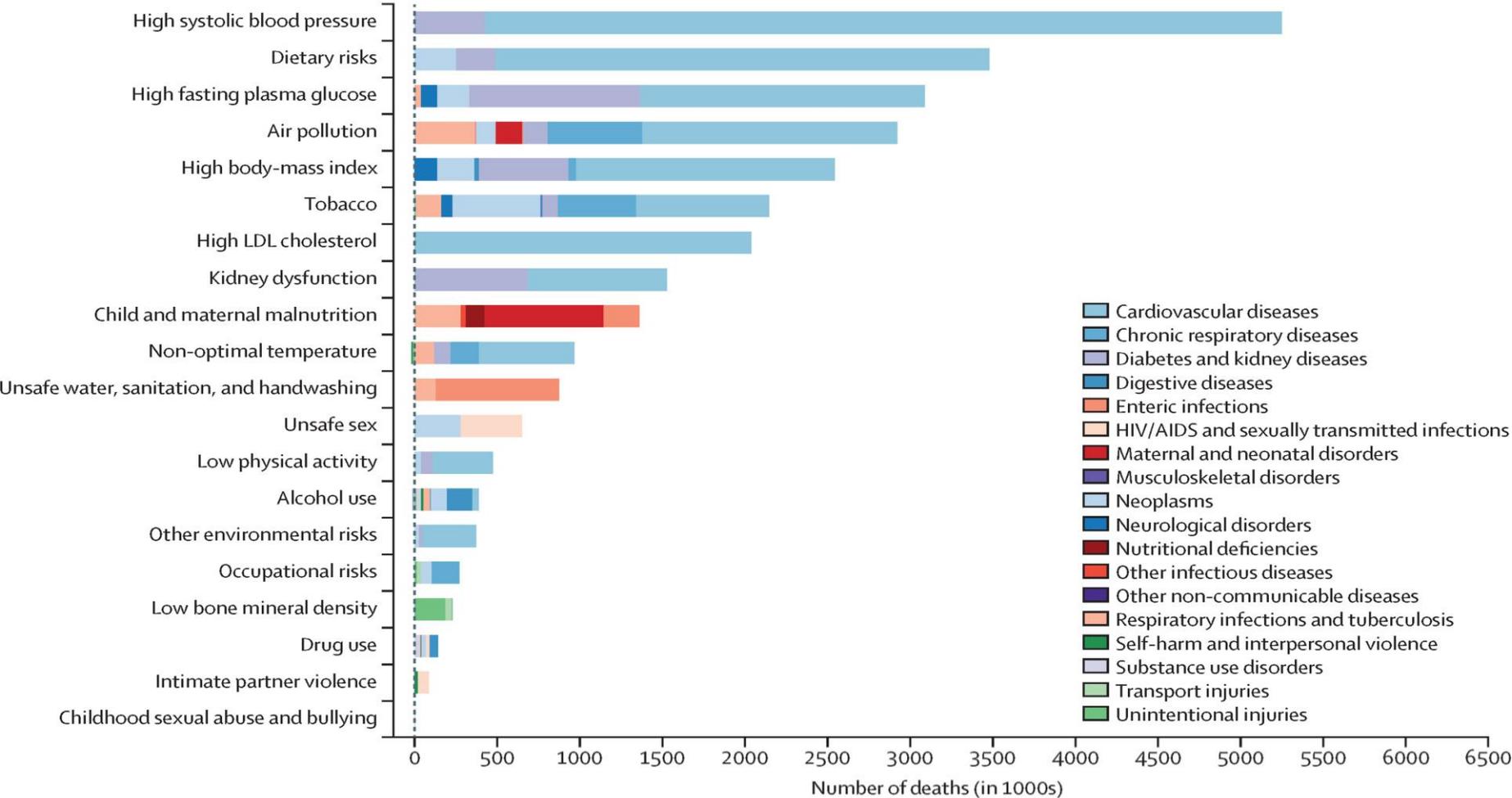
- High or very high
- Medium
- Low
- Evidence limited, insufficient
- na Not applicable

Impacts to human systems in panel (b)

- ⊖ Increasing adverse impacts
- ⊕ Increasing adverse and positive impacts

3. Sub-optimal diets are a top risk factor of death

Global number of deaths attributable to risk factors, by cause



Murray, C.J., et al 2020. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*, 396(10258), pp.1223-1249.

4. Malnutrition is universal and getting worse

720 - 811 million (10%)

of the world's population are undernourished

149 million

children under five years of age are stunted

45 million

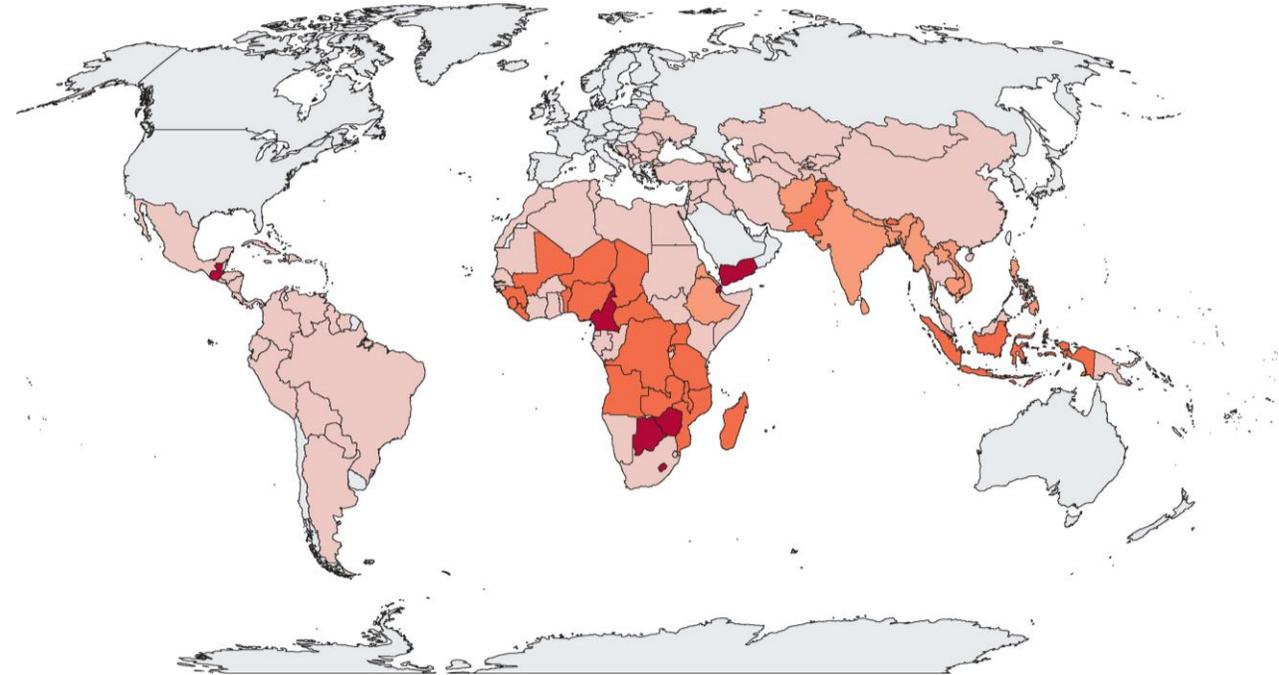
children under five years of age are wasted

39 million

children under five years of age are overweight

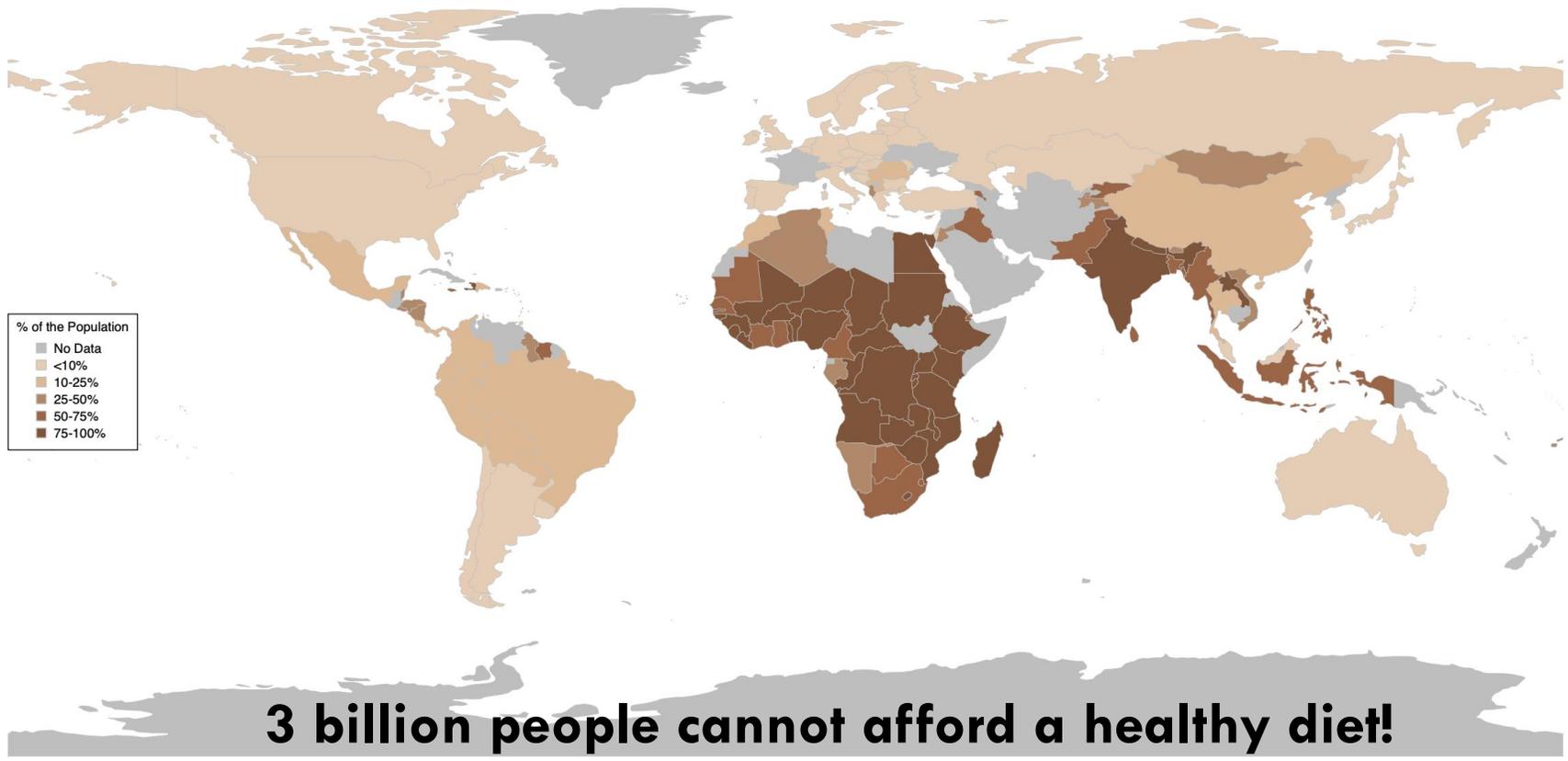
2.2 billion

adults are overweight or obese



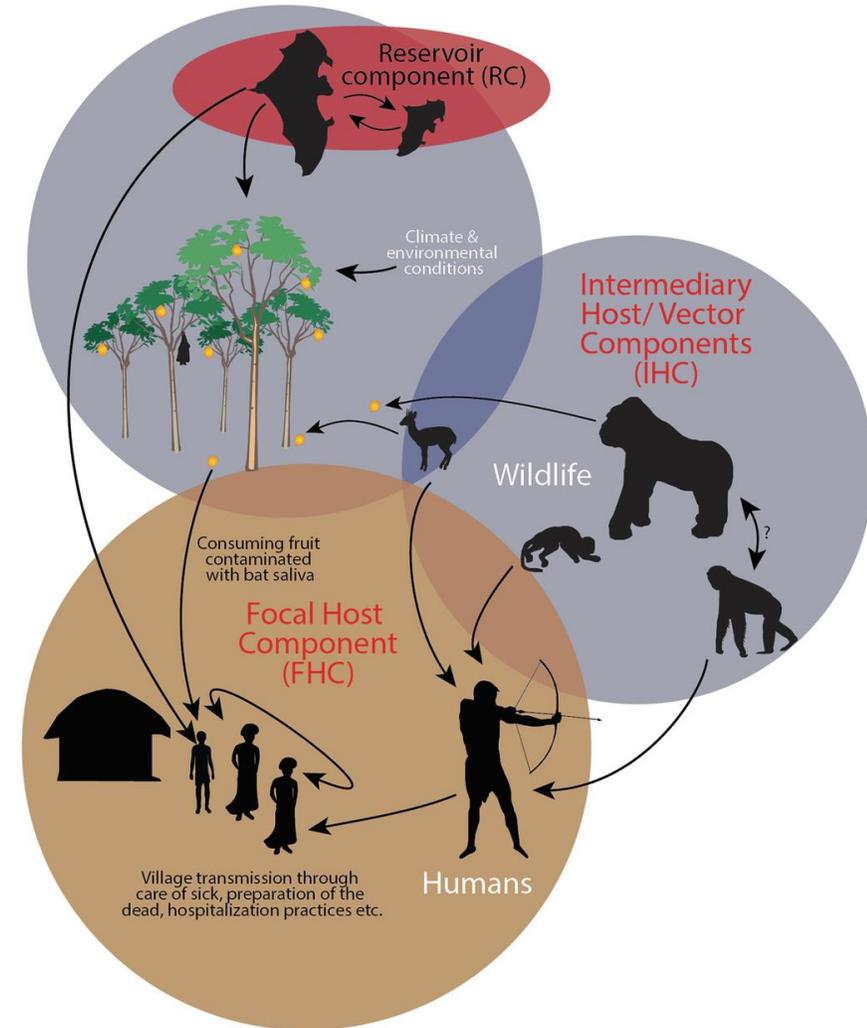
5. There are trade-offs in transforming food systems that come with a complex set of ethical and equity implications

% of the population who cannot afford a healthy diet

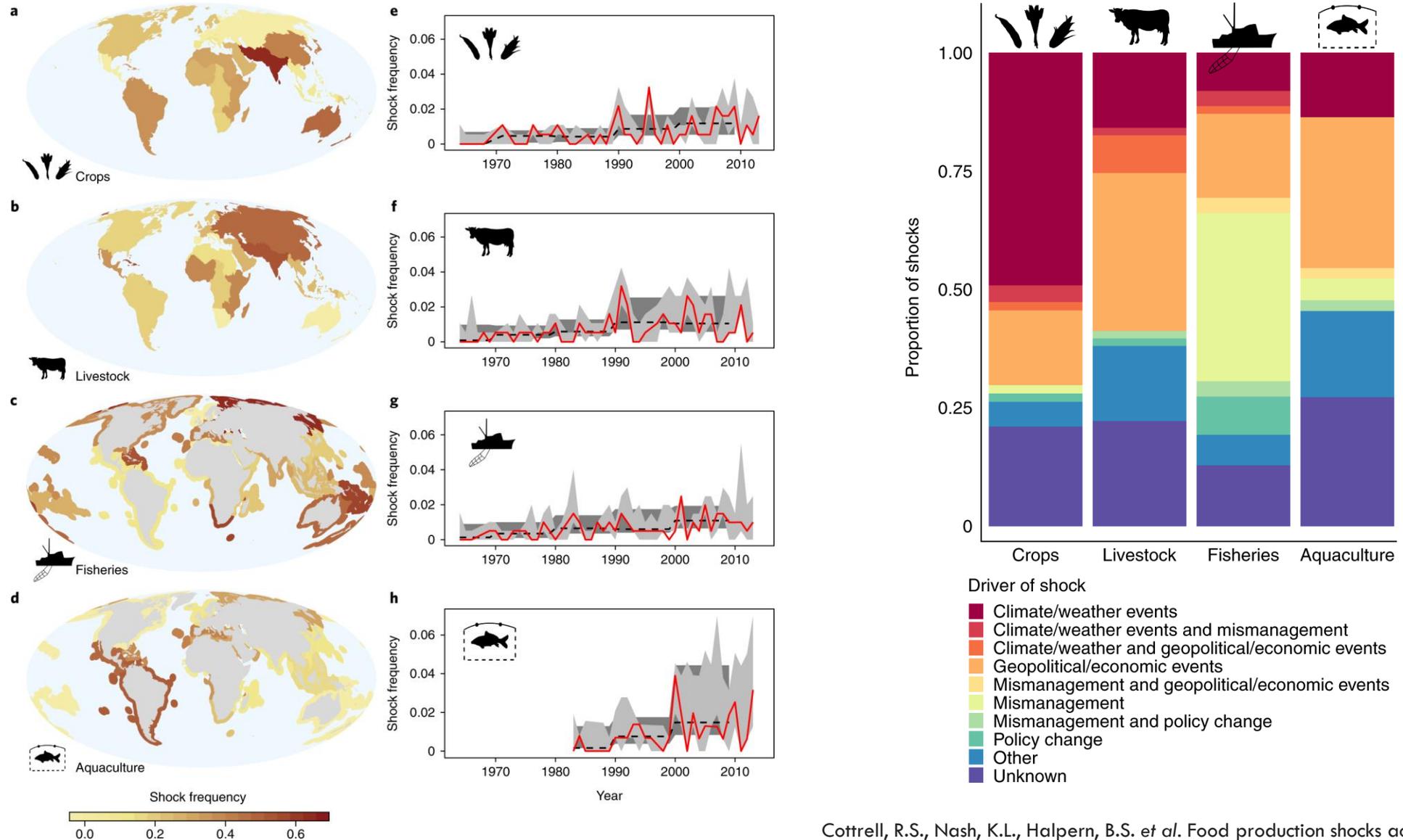


6. Zoonotic pandemics are not going anywhere

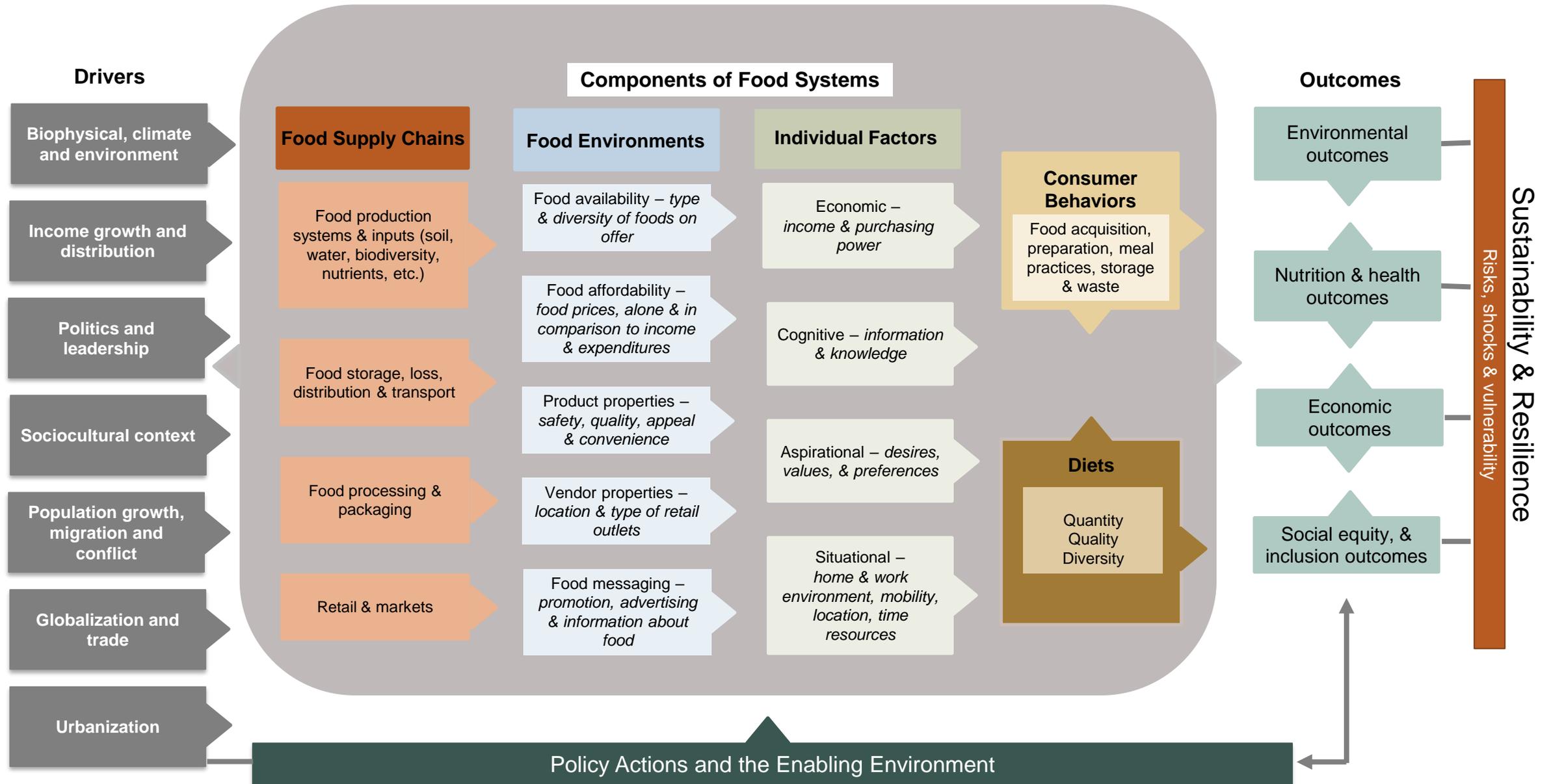
- COVID-19 is potentially a zoonotic disease due to a spillover event that jumped from animals to humans.
- 60% of emerging infectious diseases are zoonotic, and of that 60%, 72% originate in wildlife.
- Food and agriculture have a big part to in the rise of zoonotic spillover events - animals are in close proximity to humans, either because their natural habitat has shrunk or been destroyed, or they are moved from their habitats.



7. Food systems are vulnerable to shocks



8. Food systems are complex



Need to improve food systems decision-making with better food systems science

- Policymakers are often in the dark on how food systems are performing, potential near- and long-term risks, and where to intervene.
- Our research is developing global guidance & better data tools, metrics, and models to unpack some of the most complex food systems science issues to allow for better decision-making and potential trade-offs.
- The research is geared to better inform policy and programs that are geared towards improving food security; diets, nutrition and health; climate change and environment; and equitable livelihoods.



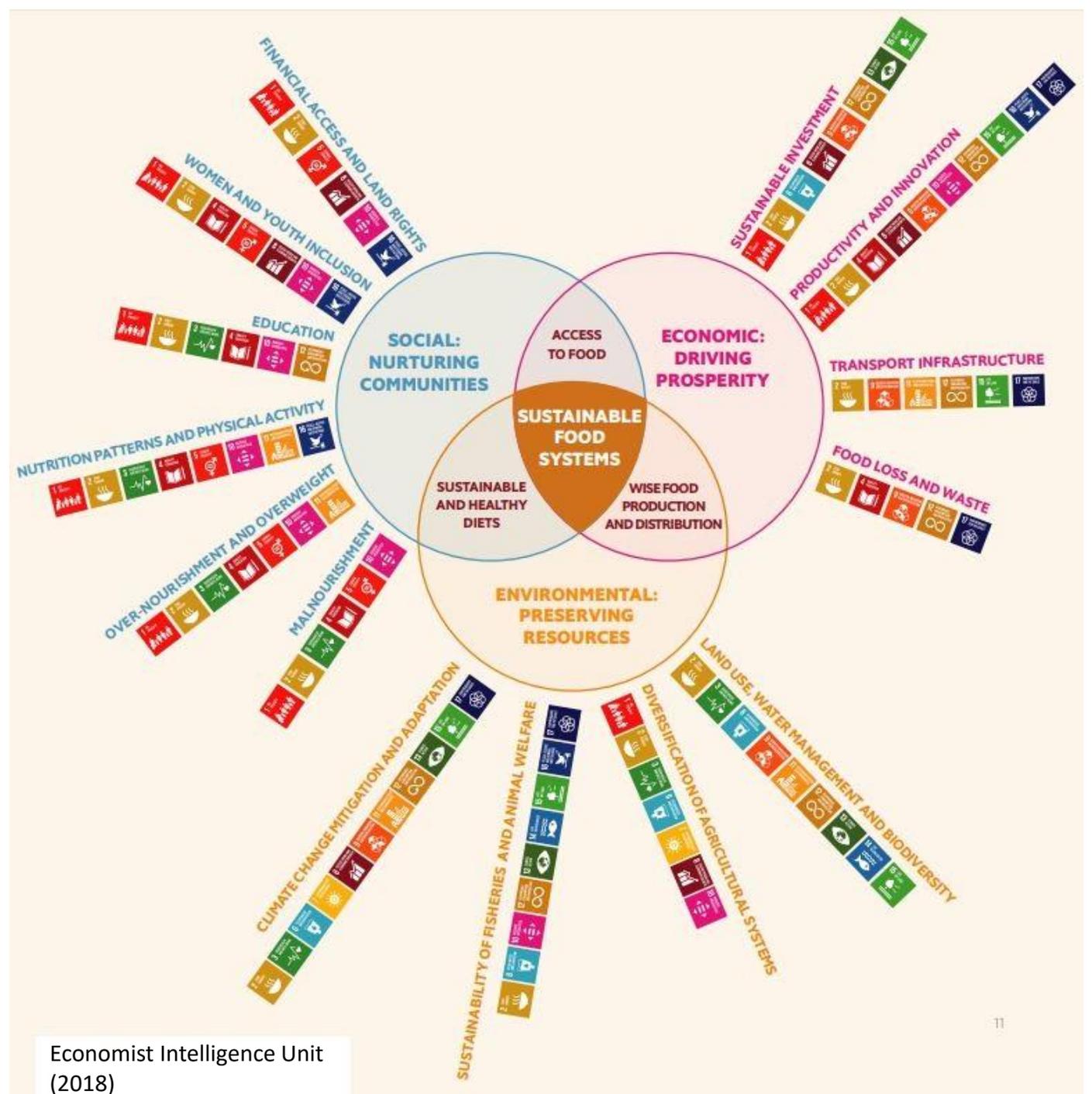


Food and Agriculture
Organization of the
United Nations

Food Systems Countdown Initiative

A diverse global partnership Tracking food systems performance to meet the
SDGs and other global goals

Food systems play a role in meeting all 17 sustainable development goals



Food systems transformation is urgent

Deliberately changing food systems **requires clear, rigorous indicators** to guide decision-makers and hold them accountable.

Food systems transformation is urgent

Deliberately changing food systems **requires clear, rigorous indicators** to guide decision-makers and hold them accountable.

Covering all aspects of food systems *and their interactions* requires **a comprehensive framework of metrics.**

Yet no rigorous mechanism exists to track food systems change

UN Food Systems Summit focused global attention on food systems

- Achieving needed transformation **must keep food systems on the policy agenda** for the next 8 years.
- Commitments and pathways need **metrics to guide decisions and track progress.**

Yet no rigorous mechanism exists to track food systems change

UN Food Systems Summit focused global attention on food systems

- **Decision-makers** need trustworthy, science-based metrics and assessment to guide action.
- **Food system actors and stakeholders** (e.g., civil society, governments, and international organizations) require trustworthy, science-based metrics and assessment to hold those in power to account.

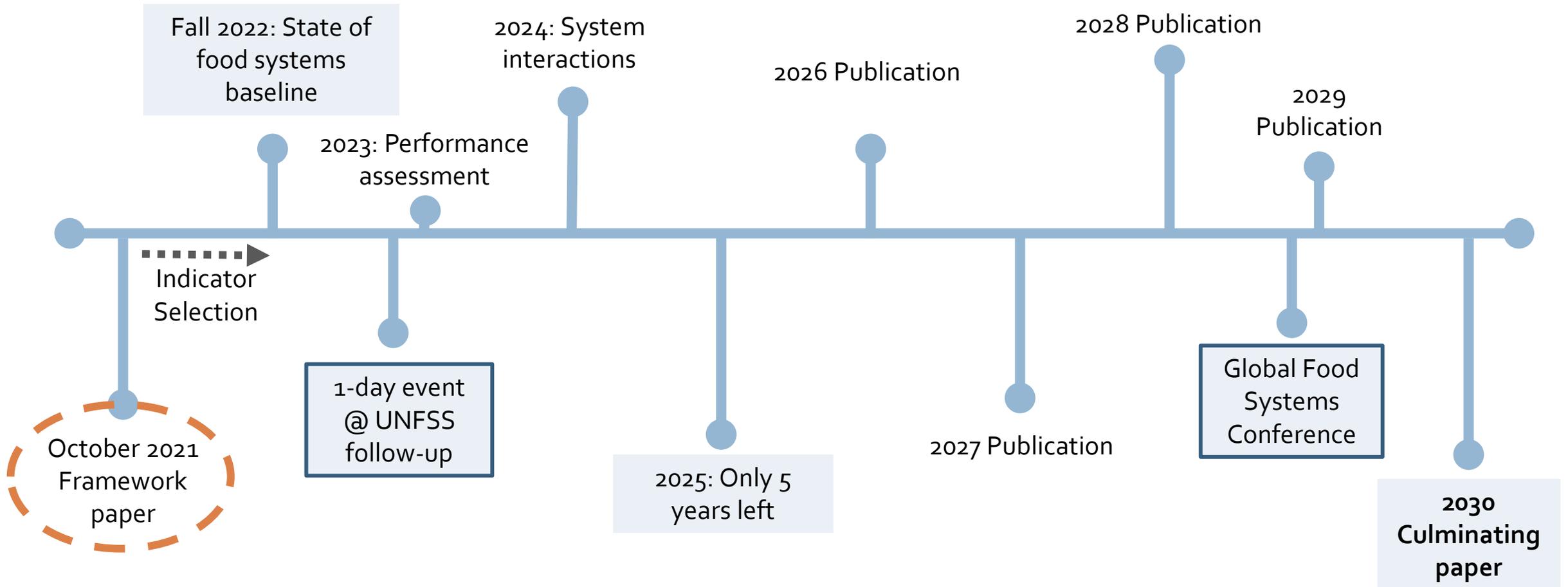
In 2021, the Food Systems Countdown Initiative (FSCI) formed to fill this gap.

Now to 2030, the FSCI will publish annual assessments that will:

Provide actionable evidence to track progress, guide decision-makers, and inform transformation.

Complement other monitoring and tracking of related goals at global and regional scales.

Vision to 2030

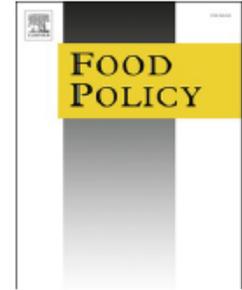




ELSEVIER

Contents lists available at ScienceDirect

Food Policy

journal homepage: www.elsevier.com/locate/foodpol

Viewpoint

Viewpoint: Rigorous monitoring is necessary to guide food system transformation in the countdown to the 2030 global goals[☆]



Jessica Fanzo^{a,b,c,*}, Lawrence Haddad^{d,1,2}, Kate R. Schneider^{a,1}, Christophe Béné^{e,3}, Namukolo M. Covic^{f,3}, Alejandro Guarín^{g,3}, Anna W. Herforth^{h,3}, Mario Herrero^{i,3}, U. Rashid Sumaila^{j,3}, Nancy J. Aburto^k, Mary Amuyunzu-Nyamongo^l, Simon Barquera^m, Jane Battersbyⁿ, Ty Beal^d, Paulina Bizzotto Molina^o, Emery Brusset^p, Carlo Cafiero^k, Christine Campeau^q, Patrick Caron^r, Andrea Cattaneo^k, Piero Conforti^k, Claire Davis^b, Fabrice A.J. DeClerck^s, Ismahane Elouafi^k, Carola Fabi^k, Jessica A. Gephart^t, Christopher D. Golden^u, Sheryl L. Hendriks^v, Jikun Huang^w, Amos Laar^x, Rattan Lal^y, Preetmoninder Lidder^k, Brent Loken^z, Quinn Marshall^c, Yuta J. Masuda^{aa}, Rebecca McLaren^b, Lynnette M. Neufeld^d, Stella Nordhagen^d, Roseline Remans^{ab}, Danielle Resnick^{ac}, Marissa Silverberg^c, Maximo Torero Cullen^k, Francesco N. Tubiello^k, Jose-Luis Vivero-Pol^{ad}, Shijin Wei^{ae}, Jose Rosero Moncayo^{k,2}

Framework Architecture: Thematic areas & indicator domains

Outcomes of food systems

Diets, nutrition, and health

Diet quality
Food security
Food environments
Policies affecting food environments

Environment and climate

Land use
Greenhouse gas emissions
Water use
Pollution
Biosphere integrity

Livelihoods, poverty, and equity

Poverty and income
Employment
Social protection
Rights

Crosscutting issues

Shared vision
Strategic planning and policies
Effective implementation
Accountability

Governance

Exposure to shocks
Resilience capacities
Agrobiodiversity
Food security stability
Food system sustainability index

Resilience and sustainability

Vision to 2030

- Annual assessments 2021 – 2030
- Occasional papers: topical briefs, thematic papers, methodological papers
- 2023 event alongside UNFSS follow-up
- 2029 capstone event leading up to 2030



FOOD SYSTEMS DASHBOARD

A collaboration between GAIN, Johns Hopkins University,
and Partners

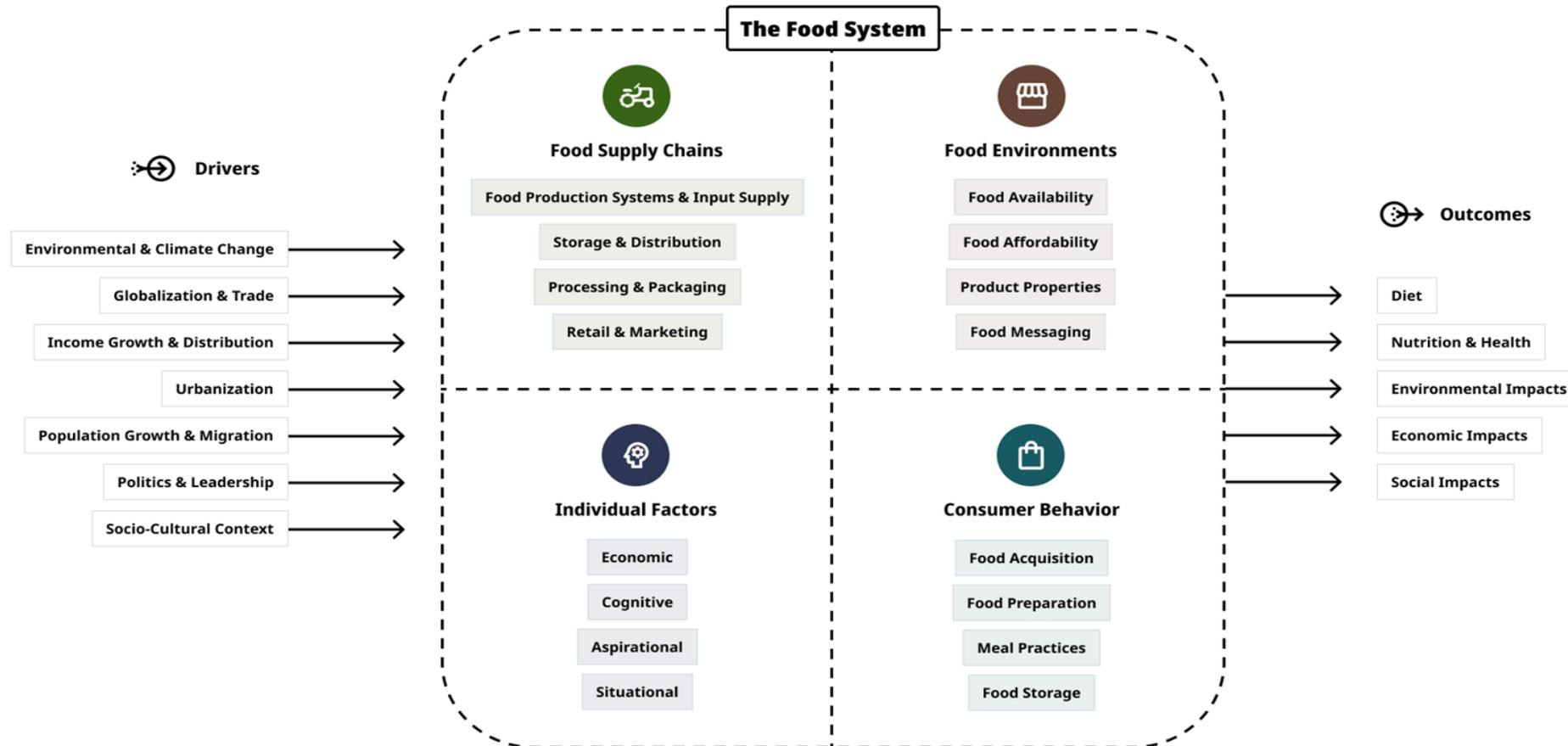


Why Is a Food Systems Dashboard needed?

- Evidence based policymaking requires sound advice, but the data (and tools) are fragmented
- Policymakers are often in the dark on how to manage their food systems and need to know where and how to start
- Need for tools that contextualize food systems and their linkages to diets, nutrition, and other development outcomes



The Dashboard organizes data using a modified CFS HLPE 2017 Report Food Systems framework



We have tried to make the dashboard construction as rigorous as possible

NATURE FOOD | VOL 1 | MAY 2020 | 243-246 | www.nature.com/natfood

Check for updates

comment

The Food Systems Dashboard is a new tool to inform better food policy

The Food Systems Dashboard brings together extant data from public and private sources to help decision makers understand their food systems, identify their levers of change and decide which ones need to be pulled.

Jessica Fanzo, Lawrence Haddad, Rebecca McLaren, Andrew Jones, Ty Beal, David Tschirley, Alexandra B. Arun Kapuria

The screenshot shows the article page for "Building a Global Food Systems Typology: A New Tool for Reducing Complexity in Food Systems Analysis" in the journal *Agriculture*. The page includes the journal logo, navigation menu, article title, authors (Quinn Marshall, Jessica Fanzo, Christopher B. Barrett, Andrew D. Jones, Anna Herforth, Rebecca McLaren), and a sidebar with "Article Menu" options like Abstract, Open Access and Permissions, Share and Cite, Article Metrics, and Order Article Reprints. It also features "Article Versions" and "Related Info Links" sections.

Open Access Editor's Choice Article

You Say You Want a Data Revolution? Taking on Food Systems Accountability

by Quinn Marshall^{1,*}, Alexandra L. Bellows¹, Rebecca McLaren², Andrew D. Jones³ and Jessica Fanzo^{1,2,4}

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Academic Editor: Martin Caraher

Agriculture 2021, 11(5), 422; <https://doi.org/10.3390/agriculture11050422>

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(This article belongs to the Special Issue *Agriculture and Food Systems – Global and Local Comparisons*)

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FOOD SYSTEMS DASHBOARD

DESCRIBE. DIAGNOSE. DECIDE.

Food systems data for improving diets and nutrition



COMPARE
AND ANALYZE



COUNTRY
PROFILES



POLICIES
AND ACTIONS

WHAT'S NEW?

Goals of the Dashboard

- Describe: Improve stakeholder understanding of national food systems
- Diagnose: Enable stakeholders to determine the challenges each country faces in their food systems
- Decide: Suggest priority areas of action and necessary actors to improve food systems contributions to sustainable diets and nutrition



Describe



Over 200 Indicators Across Food Systems

EXAMPLE DATA

HOUSES OVER **200**
INDICATORS
THAT MEASURE
ELEMENTS OF FOOD
SYSTEMS, DRIVERS,
AND OUTCOMES

FOOD
ENVIRONMENTS
45
INDICATORS

IYCF AND DIETARY
INTAKE
42
INDICATORS

CONSUMER
BEHAVIOR
0
INDICATORS

NUTRITIONAL
STATUS AND
NCDs
23
INDICATORS

DRIVERS of FOOD
SYSTEMS
CHANGES
26
INDICATORS

FOOD SUPPLY
CHAINS
31
INDICATORS

INDIVIDUAL
FACTORS
13
INDICATORS

ENVIRONMENT
22
INDICATORS



COMPARE & ANALYZE



Look at any indicator in various ways

Food Systems Dashboard

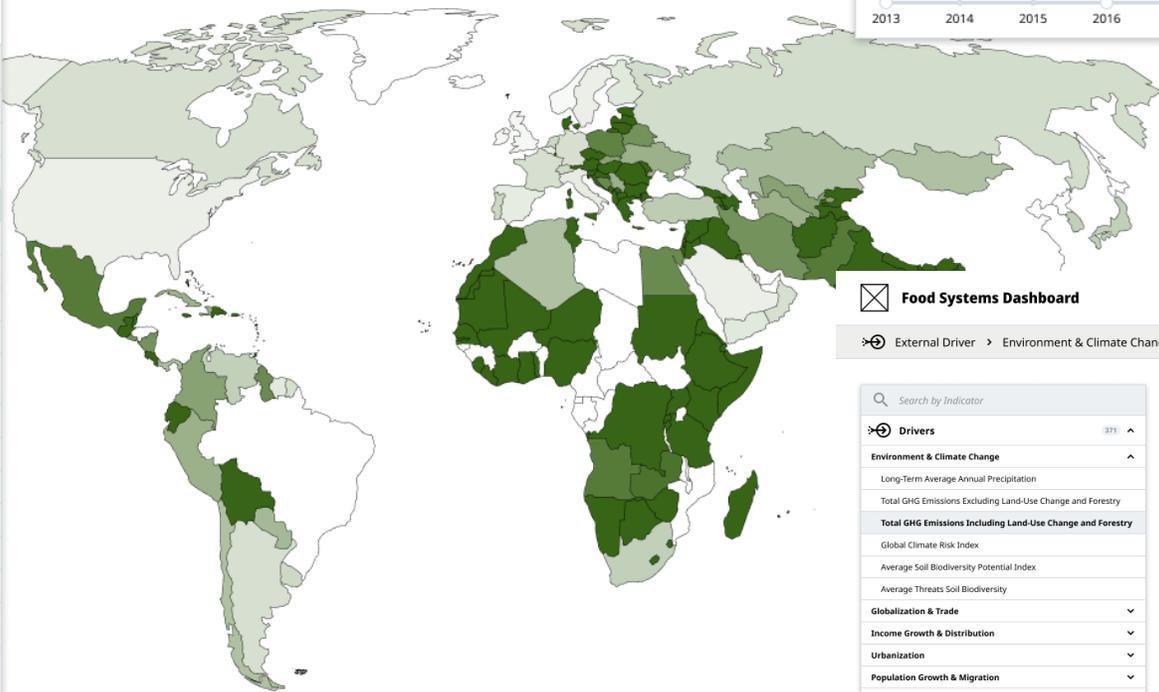
Worldwide Data Country Index Background Information

Food Supply Chains > Production Systems & Input Supply > Share of Employment in Agriculture

Map View Graph View Table View

Search by Indicator

- Drivers 371
- Food Supply Chains 137**
- Production Systems & Input Supply
 - Percentage of Cultivated Land Equipped for Irrigation
 - Agriculture, forestry, & Fishing, Valued Added Per Worker
- Share of Employment in Agriculture**
- Cereal Yield
- Fertilizer Consumption
- Proportion of Population with an Account in a Financial Institution
- Average Size of Agricultural Holding
- Comprehensiveness of Conservation of Useful Wild Plants (Mean Value)
- Vegetable Yield
- Biofortified Crops Released, in Testing, in the Pipeline
- National Biofortification Policies & Programs
- Proportion of Area with Small to Very Small Fields (Areas <2.56ha)
- Storage & Distribution
- Processing & Packaging
- Food Environments 208
- Individual Factors NO DATA
- Consumer Behavior NO DATA
- Outcomes 82



Food Systems Dashboard

External Driver > Environment & Climate Change > Total GHG Emissions Including Land-Use Change and Forestry

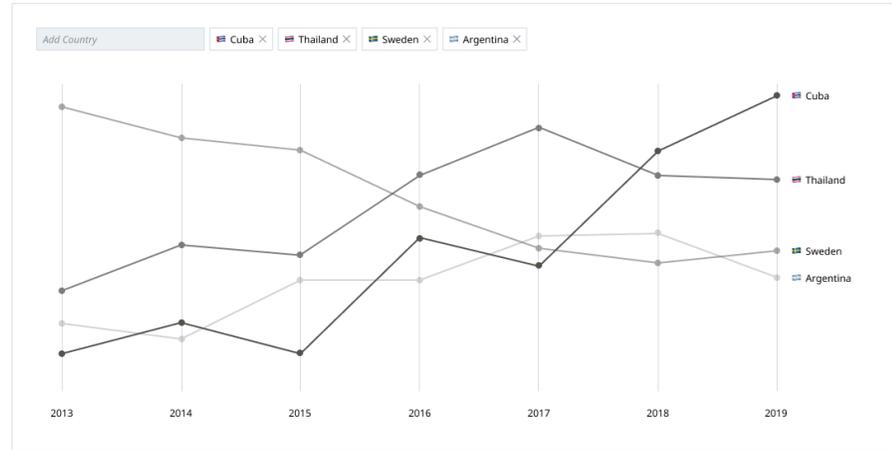
Map View Graph View Table View

Search by Indicator

- Drivers 371
- Environment & Climate Change
 - Long-Term Average Annual Precipitation
 - Total GHG Emissions Excluding Land-Use Change and Forestry
 - Total GHG Emissions Including Land-Use Change and Forestry**
 - Global Climate Risk Index
 - Average Soil Biodiversity Potential Index
 - Average Threats Soil Biodiversity
- Globalization & Trade
- Income Growth & Distribution
- Urbanization
- Population Growth & Migration
- Politics & Leadership
- Socio-Cultural Context
- Food Supply Chains 137
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Total GHG Emissions Including Land-Use Change and Economy

in MtCO2e

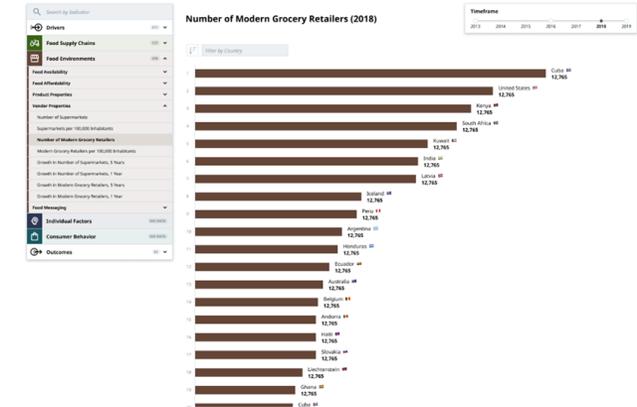


Food Systems Dashboard

Worldwide Data Country Index Background Information

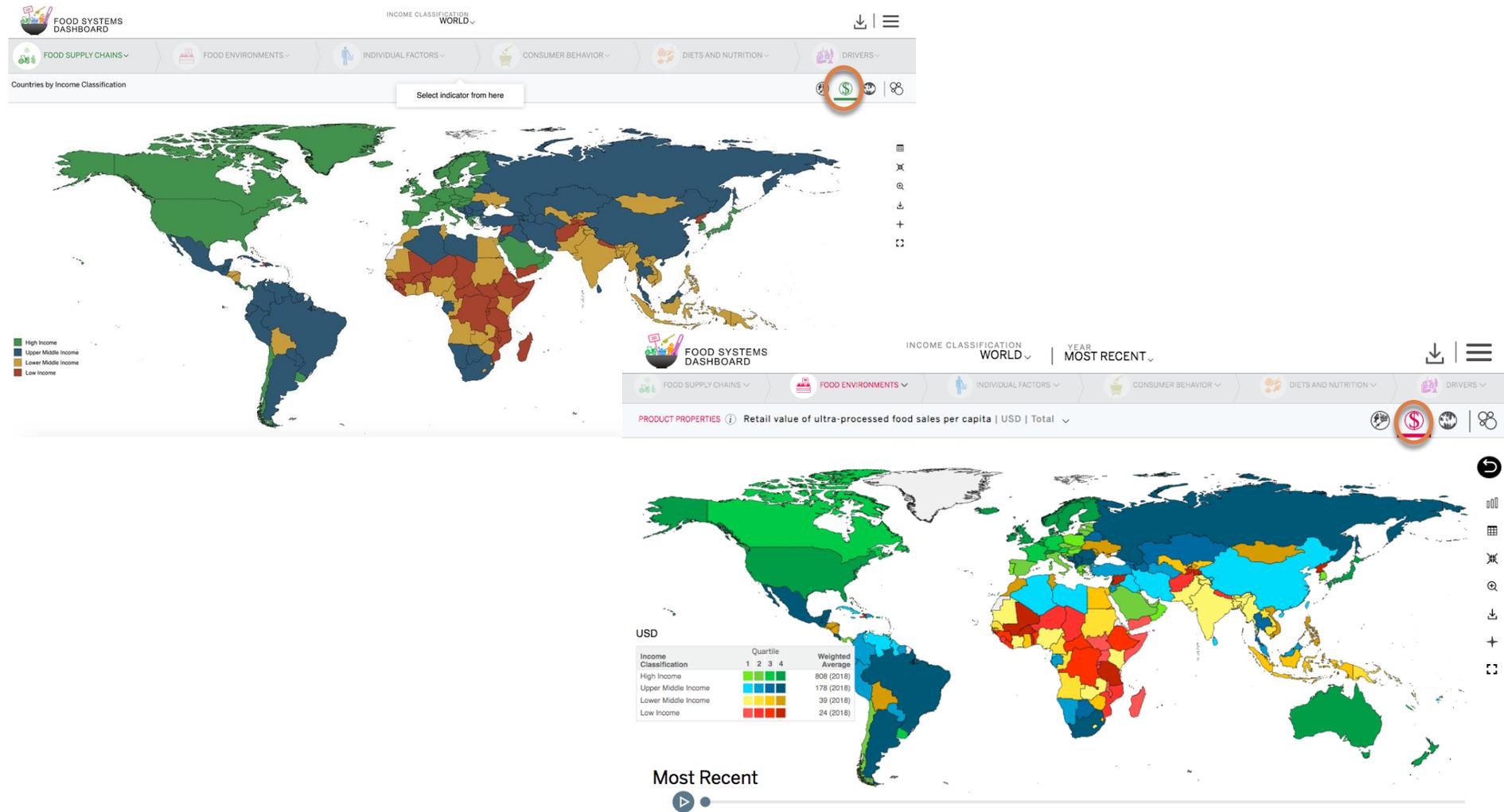
Food Environments > Vendor Properties > Number of Modern Grocery Retailers

Map View Graph View Table View



Worldwide Data Country Index Background Information

Exploring Data by Income Classification



Compare by food typologies for decision-making



Agriculture value added per worker (USD)



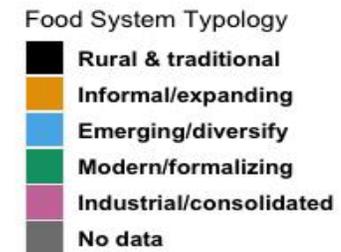
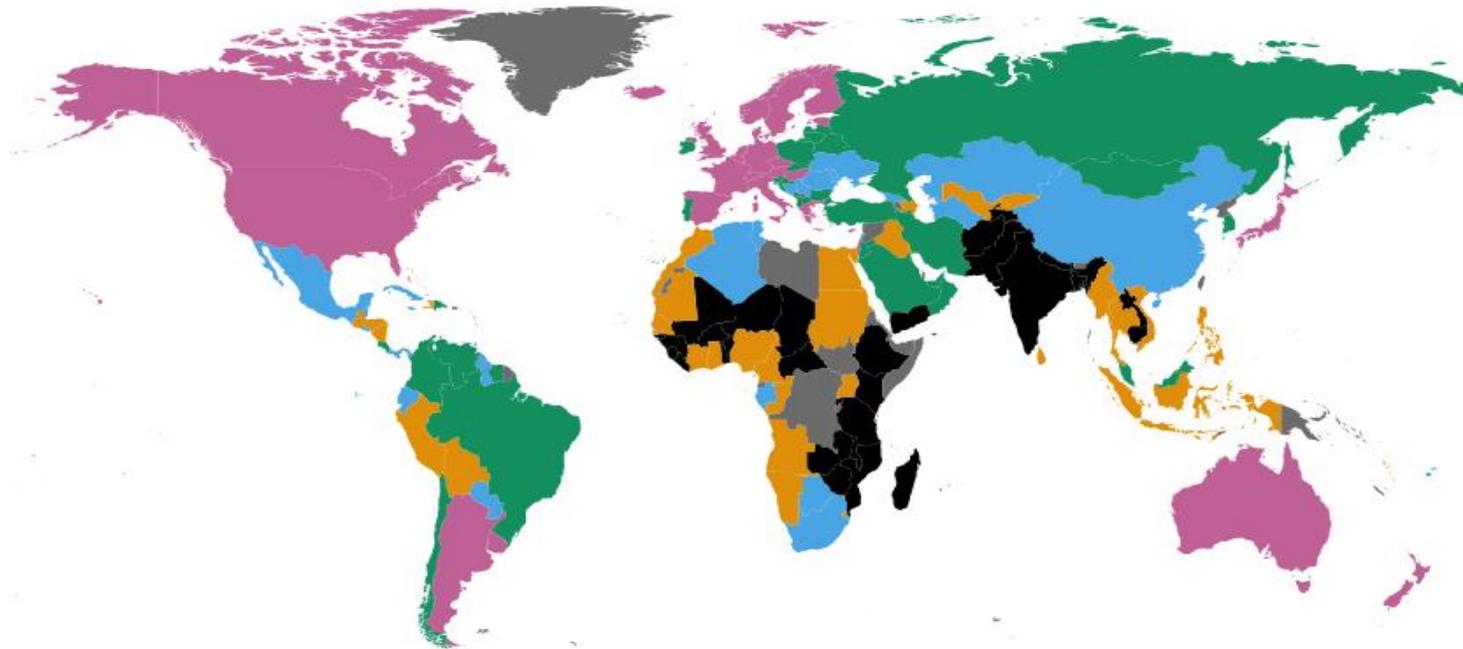
Share of dietary energy from staples



Supermarkets per 100,000 inhabitants



% Urban population





COUNTRY PROFILES





All Countries → Central America

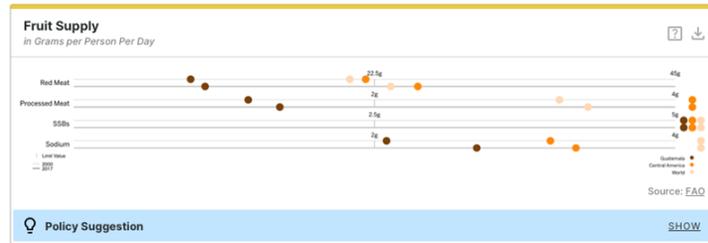
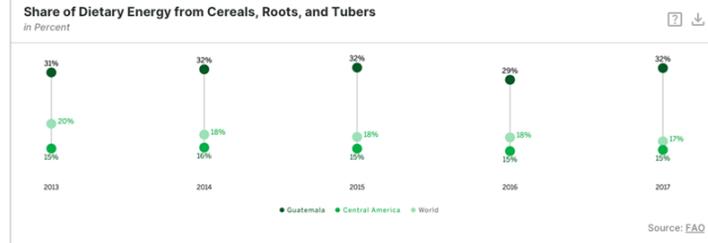
Guatemala

FOOD SYSTEMS PROFILE

Compare to: Central America World Another Country

Data last updated 2021-12-08 [Get Notified via Email When this Data is Updated](#)

Food Environments



SUGGESTION Deliver agricultural extension programmes, infrastructure and education to support farmers to grow and market nutritious foods.

POTENTIAL IMPACT Increase availability and affordability of nutritious foods to local populations

Food Supply Chains



DIAGNOSE & DECIDE SCORECARD

Food Supply Chains

- Cereal Losses
- Fruit Losses
- Pulse Losses
- Vegetable Losses

Food Environment

- Energy in Food Supply
- Energy from CHOs
- Fruit Supply
- Vegetable Supply
- Pulse Supply
- UPF Sales

Nutrition Outcomes

- Adult Raised BP
- Adult Diabetes
- Child Wasting
- Child Stunting
- WRA Underweight
- WRA Anemia
- Child Overweight
- Adult Obesity
- Infant MDD
- Undernourishment
- Food Insecurity

Environmental Outcomes

- Soil Threats
- Crop Species Richness
- Production Footprint
- Ag Land Change
- Biodiversity Impact
- GHGe
- Water Consumption
- Eutrophication
- Consumption Footprint

KEY

- Unlikely Challenge Area
- Potential Challenge Area
- Likely Challenge Area



All Countries → Central America

Guatemala

FOOD SYSTEMS PROFILE

Compare to: Central America World Another Country

Data last updated 2021-12-08 [Get Notified via Email When this Data is Updated](#)

DIAGNOSE & DECIDE SCORECARD

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KEY

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- Potential Challenge Area
- Likely Challenge Area

Drivers & Non-Diagnostic Indicators



Diagnose and Decide



Diagnose: Food Systems Performance

Goal: Use the data to measure food systems performance to better inform policy recommendations

Aims:

- Start from the main goals we want food systems to influence
 - Diets, nutrition, and health
 - Environmental health and sustainability
 - Livelihoods (future work)
- Identify sentinel indicators that are associated with achieving these goals
- Develop targets and a traffic light system - red, yellow, green - for each sentinel indicator



Diagnose: Food Systems Performance

Sector	Subsector	Indicator	Green	Yellow	Red	Number of Countries	Year	Cutoff Type	How cutoffs were determined	Histogram
Diets and nutrition	NCDs	Adult raised blood pressure	<20% (n=36)	20-25% (n=68)	>25% (n=86)	190	2015	4	No global cutoffs or thresholds currently exist in the literature for adult raised blood pressure. A histogram of country-level prevalences shows close to a normal distribution. We choose to roughly divide the distribution into tertiles. A prevalence of $\geq 25\%$ of adults with raised blood pressure signifies a likely challenge area for the country's food system.	
Diets and nutrition	NCDs	Diabetes Prevalence	<6% (n=28)	6-9% (n=98)	$\geq 10\%$ (n=75)	201	2014	4	No global cutoffs or thresholds currently exist in the literature for adult diabetes prevalence. A histogram of country-level prevalences shows a right skewed distribution. We choose to roughly divide the distribution into tertiles. A prevalence of $\geq 10\%$ of adults with diabetes signifies a likely challenge area for the country's food system.	
Diets and nutrition	Nutritional status	Wasting in children under 5 years	<5% (n=70)	5-10% (n=39)	$\geq 10\%$ (n=16)	125	2010-2019	1	Prevalence thresholds for wasting in children under 5 have been proposed by De Onis et al (2019) ¹ . Less than 5% prevalence of	

Food systems diagnosis by country

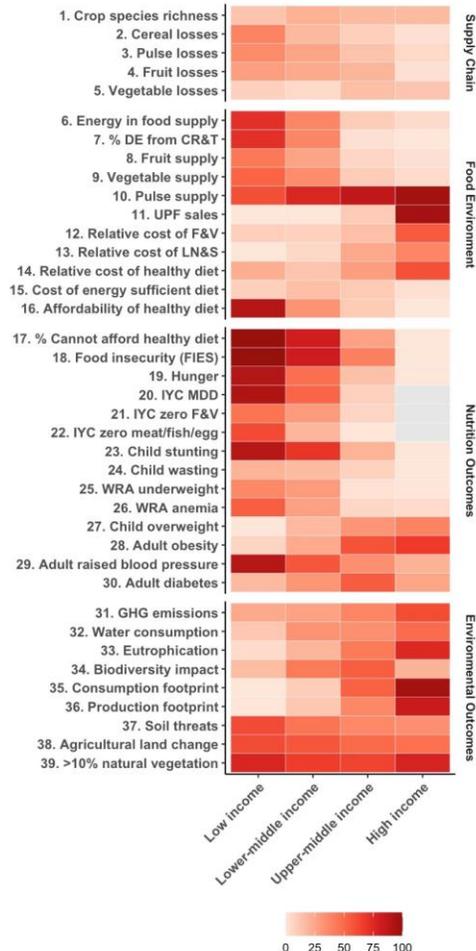
18 countries were randomly selected from each income group to display food system diagnosis patterns across income group.



DE: dietary energy; CR&T: cereals, roots, and tubers; UPF: ultra-processed foods; F&V: fruits and vegetables; LN&S: legumes, nuts & seeds; IYC: infant young child; MDD: minimum dietary diversity; WRA: women of reproductive age, GHG: greenhouse gases

Diagnose

Percentage of countries with “likely challenge areas” by income status



The color indicates the percentage of countries facing likely challenge areas. Grey indicates <5 countries within an income group had data for the indicator

DE: dietary energy; CR&T: cereals, roots, and tubers; UPF: ultra-processed foods; F&V: fruits and vegetables; LN&S: legumes, nuts, and seeds; IYC: infant and young child; MDD: minimum dietary diversity; WRA: women of reproductive age, GHG: greenhouse gases

Begin to take decisions based on the diagnostics



Agricultural actions

Action	What impact could the action have?
1 Deliver agricultural extension programmes, infrastructure and education to support farmers to grow and market nutritious foods	Increase availability and affordability of nutritious foods to <i>local populations</i>
2 (Re)design agricultural development programmes intended to increase food producers' income to also focus on producing, and accessing markets for, nutritious crops and providing nutrition education	Increase availability and affordability of nutritious foods to <i>local populations</i>
3 Provide women with agricultural assets, training and support to increase agriculture productivity and output, and access to markets to sell nutritious foods	Increase availability and affordability of nutritious foods to <i>local populations</i>
4 Provide low-income households, including women, with support for animal-husbandry and training for animal rearing, safety management and processing along with nutrition education	Increase availability, affordability and appeal of animal-source foods to <i>producer households</i>
5 Support the production and consumption of nutritious indigenous crops through agrobiodiverse cropping systems, agricultural extension, breeding programmes, subsidies, land tenure rights, regulatory protection, market development and public awareness	Increase availability and appeal of nutritious foods to <i>producer households and all other populations</i>
6 Deliver (peri-)urban agriculture programmes which provide land and other inputs, support local market development and deliver training and nutrition education	Increase availability, access, affordability and appeal of nutritious foods to <i>urban populations</i>
7 Provide inputs and training to develop and maintain home gardens along with nutrition education	Increase availability, access, affordability and appeal of nutritious foods to <i>populations with access to home gardens (i.e., cultivated plots around or close to people's homes)</i>



Regulations and laws

Action	What impact could the action have?
33 Set mandatory limits on trans fats, sugar, salt/sodium and/or saturated fat in packaged foods	Reduce availability of foods high in fats, sugars and salt to <i>all populations</i>
34 Require nutrition labelling on packages/menus to indicate if foods are high in calories, fats, sugars and/or salt and/or in positive nutrients	Reduce appeal and availability of foods high in fat, sugar and salt and increases appeal of nutritious foods to <i>all populations</i>
35 Restrict all forms of marketing, advertising and in-store promotions of HFSS foods, particularly to children	Reduce appeal foods high in fat, sugar and salt to <i>children</i>
36 Use zoning laws to restrict numbers of "fast food" outlets and vendors in select geographic areas	Reduce availability and access of foods high in fats, sugars and salt to <i>local populations</i>
37 Establish and enforce safety regulations, surveillance mechanisms and protocols throughout the supply chain for nutritious foods, taking into consideration the importance of access to affordable nutritious foods among low-income populations through the informal sector	Increase safety of nutritious foods to <i>all populations</i>

The Sustainability of the Dashboard

WWW.FOODSYSTEMSDASHBOARD.ORG

Collaborate with partner organizations

Curate and maintain

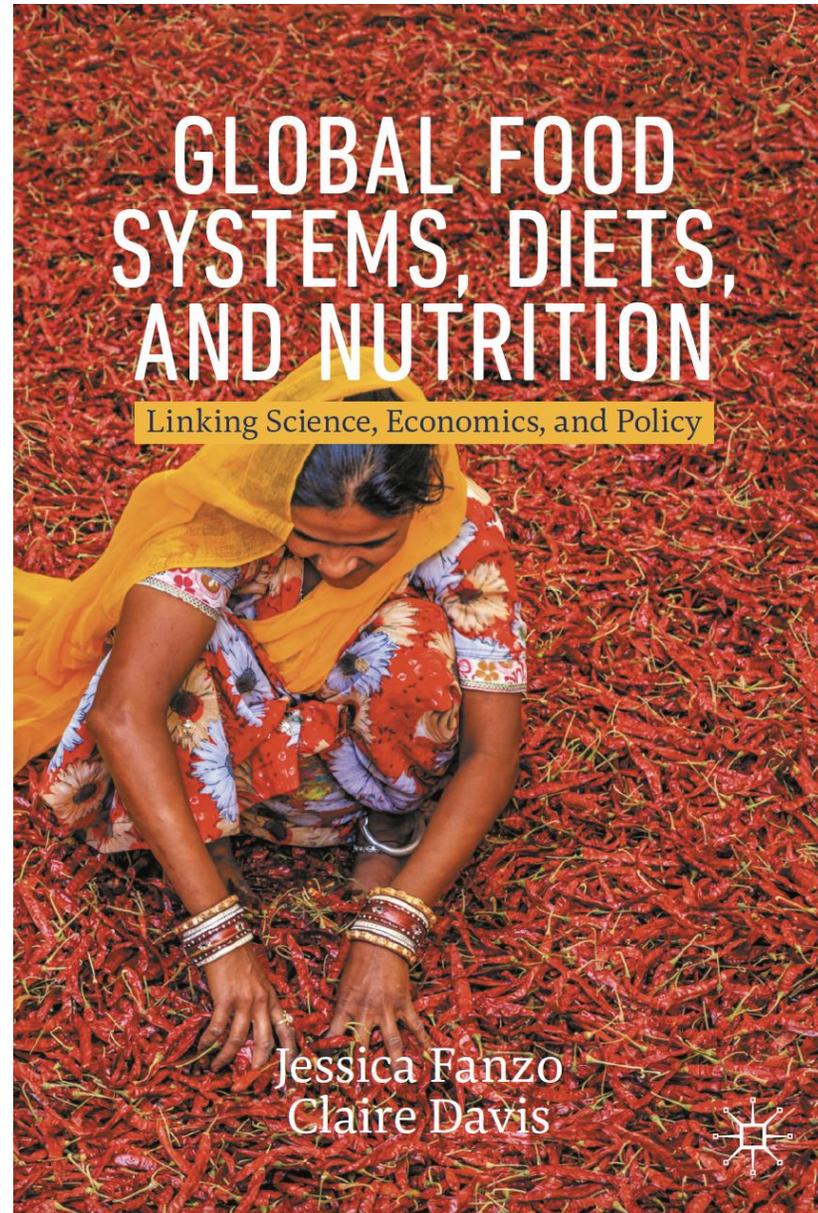
Add new data as it emerges

Make it useful with the hopes of country ownership through country engagement and subnational dashboards

Thank you!

@jessfanzo

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JESSICA FANZO

Can Fixing Dinner Fix the Planet?



JOHNS HOPKINS
WAVELENGTHS