Nourishing the Future: Sustainable Food Systems for Nutrition and Dietetic Students

JOHNS HOPKINS
CENTER *for* A LIVABLE FUTURE

FOOD + PLANET

Presented by:
Johns Hopkins Center for a Livable Future
Food + Planet

Introduction to Sustainable Food Systems

Module 1

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Four Modules

Module 1

Introduction to Sustainable Food Systems

Module 2

Food Systems for All

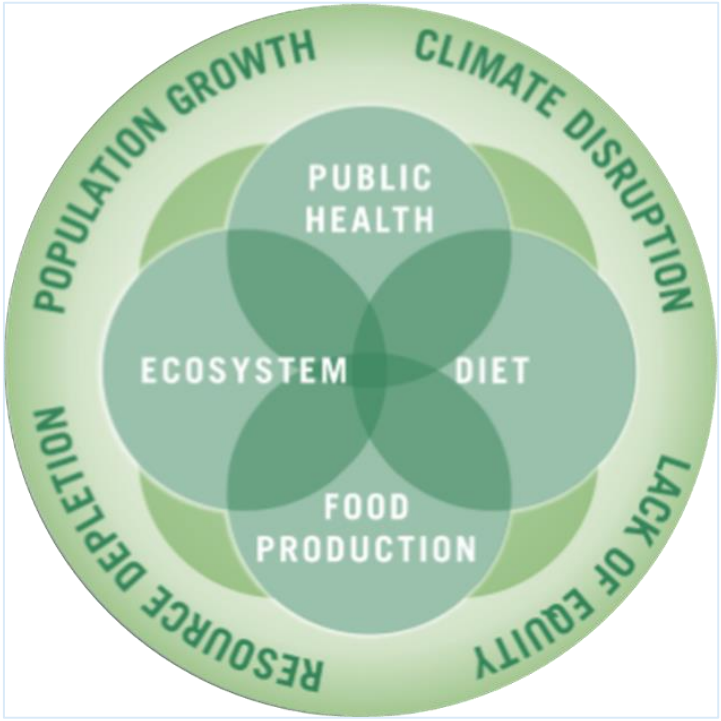
Module 3

Food and our Climate

Module 4

Aquatic Foods, Nutrition, and Sustainability

The Johns Hopkins Center for a Livable Future



- Interdisciplinary academic center at the Johns Hopkins Bloomberg School of Public Health
- Education, research, policy, and practice
- Vision: a healthier, sustainable and resilient food system for all

Image source:

Food + Planet

- *A collective, visionary 501c3 founded by four registered dietitians with varied experience in the food system*
- *Aim: empower health care professionals to be leaders in sustainable food systems*

Vision: a science and practice of nutrition that honors nature as the foundation of health through the four dimensions of sustainability

Image source: Vogliano, C., Geagan, K., Chou, S., Palmer, S. (2021). Empowering nutrition professionals to advance sustainable food systems [White Paper]. *Food and Planet. Figure 1. The 4 dimensions of sustainable diets*. [Infographic]. Retrieved September 14, 2025, from https://7157e75ac0509b6a8f5c-5b19c577d01b9ccfe75d2f9e4b17ab55.ssl.cf1.rackcdn.com/GVISUTJI-PDF-1-675987-4519061561.pdf

Learning Objectives

- Describe food systems and their impact on human and planetary health
- Discuss the various dimensions of sustainable food systems
- Explain three strategies to make our food systems more sustainable
- State the role of RDNs as leaders in food system change and how it aligns with the RDN Scope of Practice

Section A: What Are Food Systems?



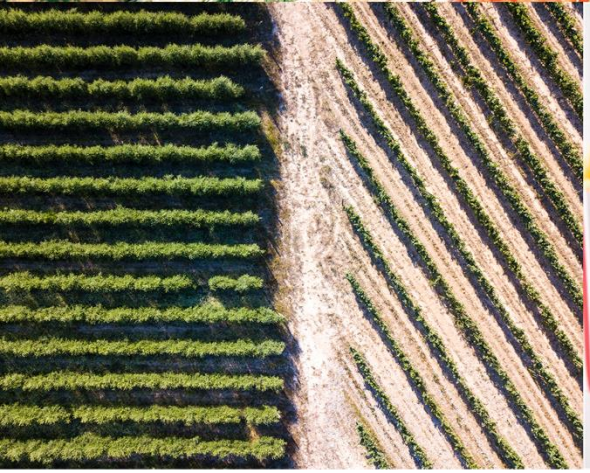



Image sources: Collage created by the Center for a Livable Future from available Microsoft Office stock images and purchased Shutterstock images.

Food Systems—1

Image source: Johns Hopkins Center for a Livable Future (2023).

Food Systems—2

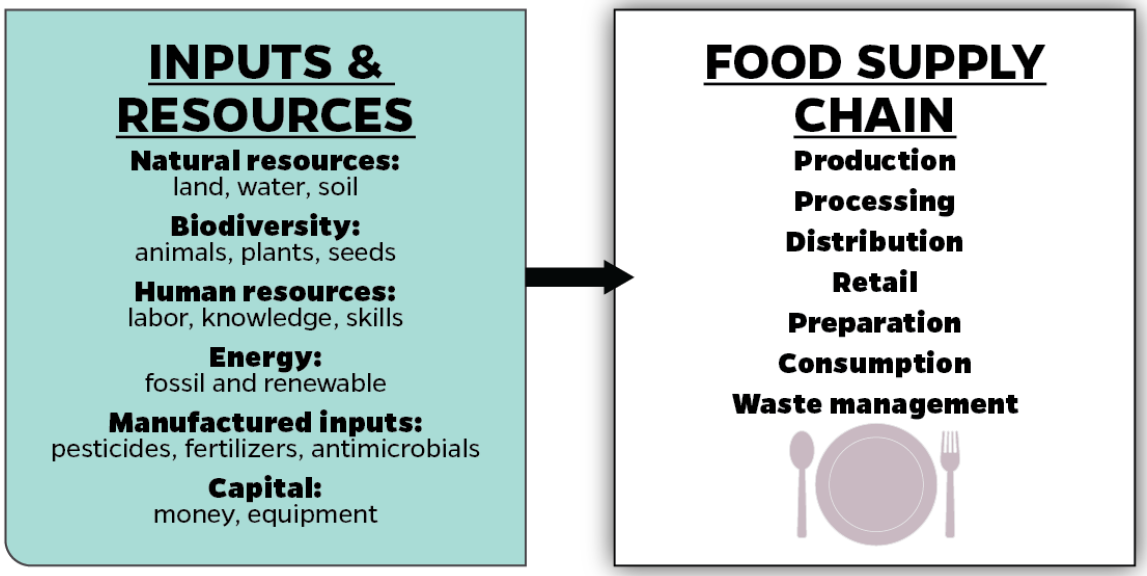


Image source: Johns Hopkins Center for a Livable Future (2023).

Food Systems—3

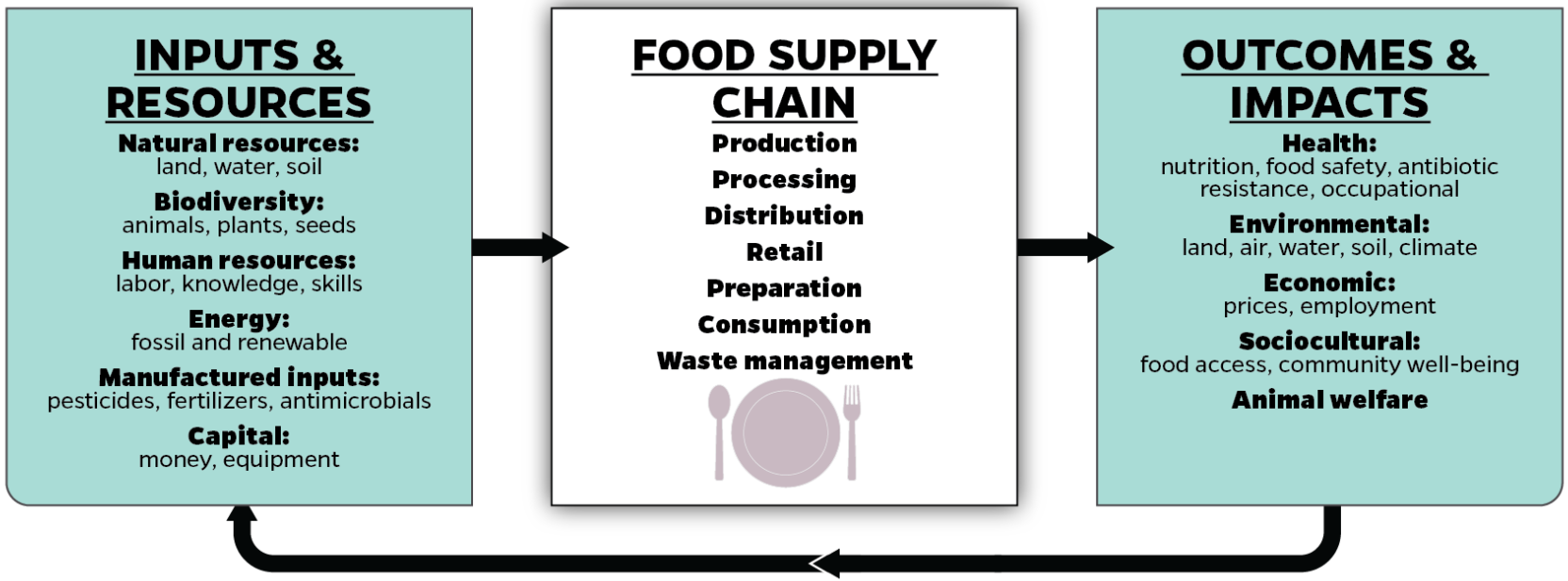


Image source: Johns Hopkins Center for a Livable Future (2023).

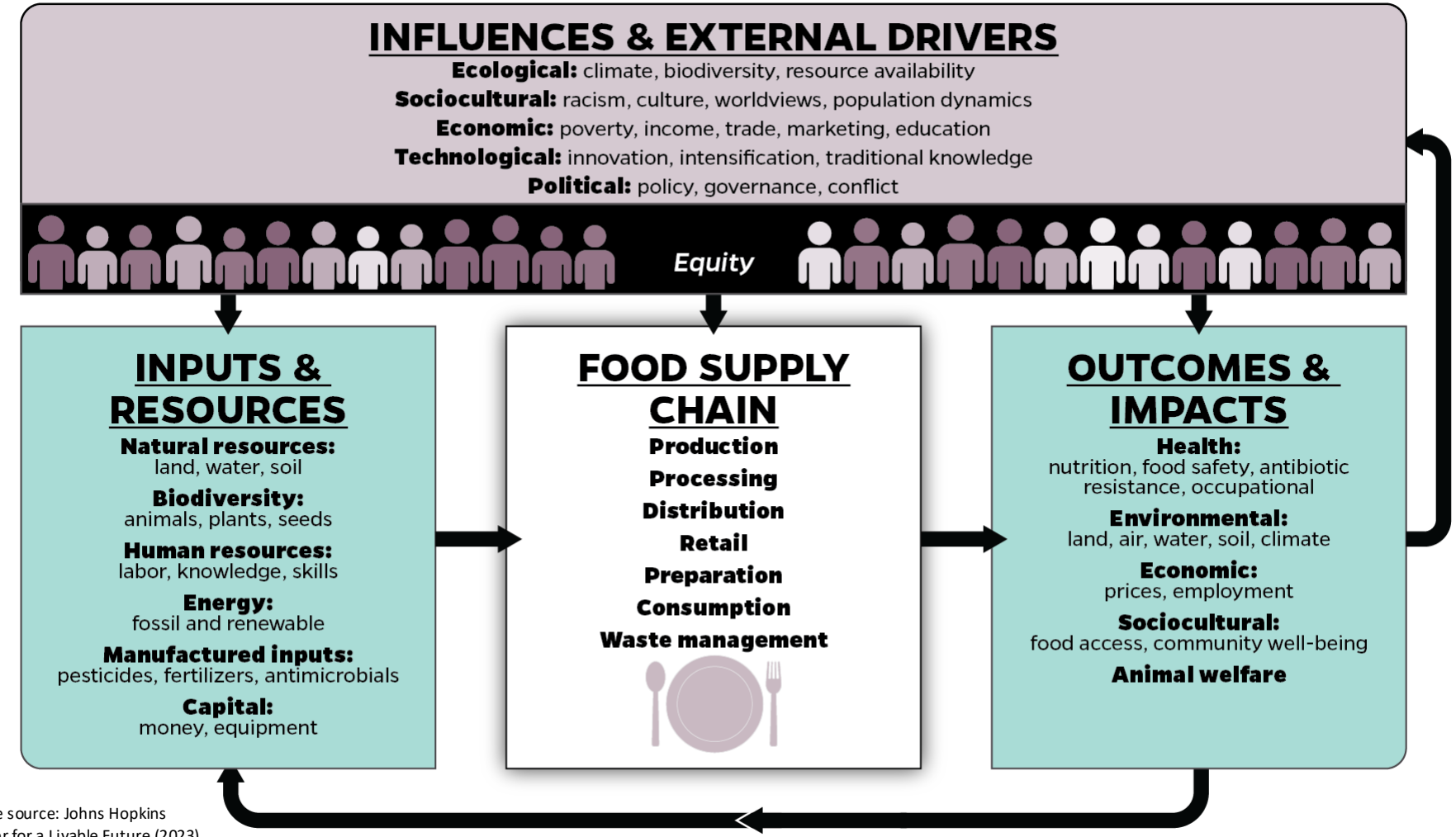


Image source: Johns Hopkins Center for a Livable Future (2023).

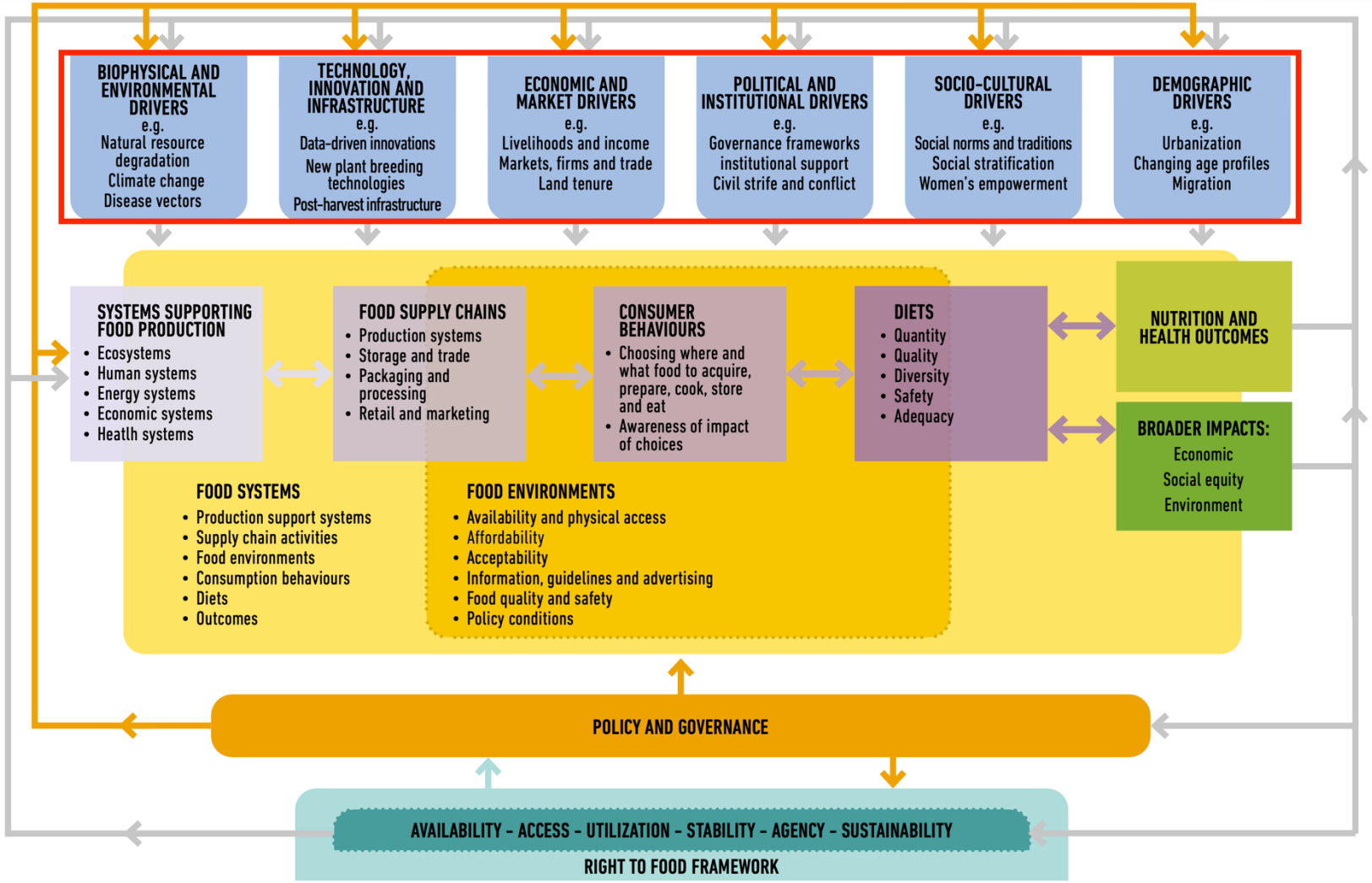


Image source: HLPE. (2020). *Food security and nutrition: building a global narrative towards 2030.* A report by the High Level Panel. *Figure 2, Sustainable Food System Framework.* [Chart]. https://openknowledge.fao.org/server/api/core/bitstreams/8357b6eb-8010-4254-814a-1493faaf4a93/content

Systems Thinking

Systems thinking is a discipline for seeing wholes. It is a framework for seeing interrelationships rather than things, for seeing ‘patterns of change’ rather than static ‘snapshots.’

—Peter Senge

Source: Senge, P. *The Fifth Discipline: The Art & Practice of The Learning Organization.*

Examples of Reductionism in Nutrition Research

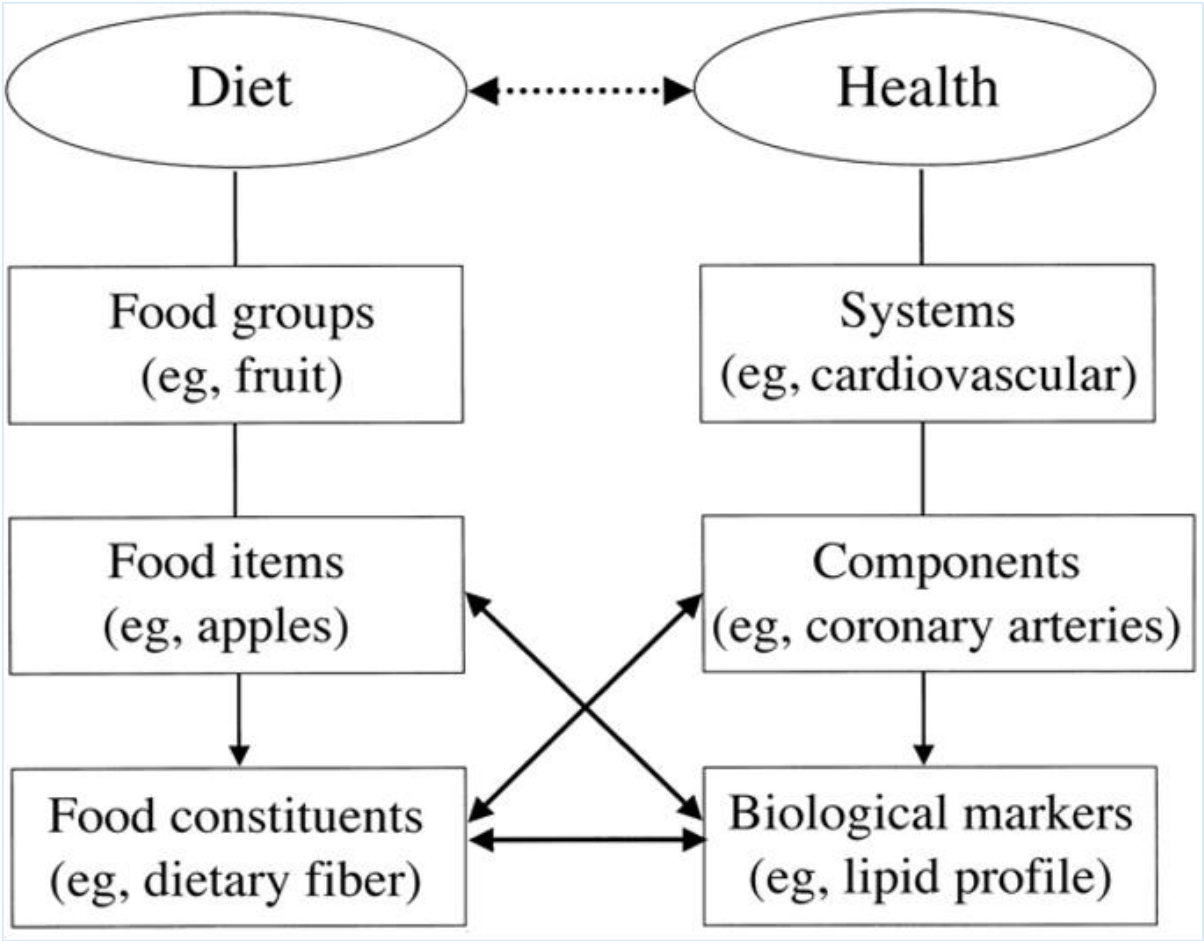
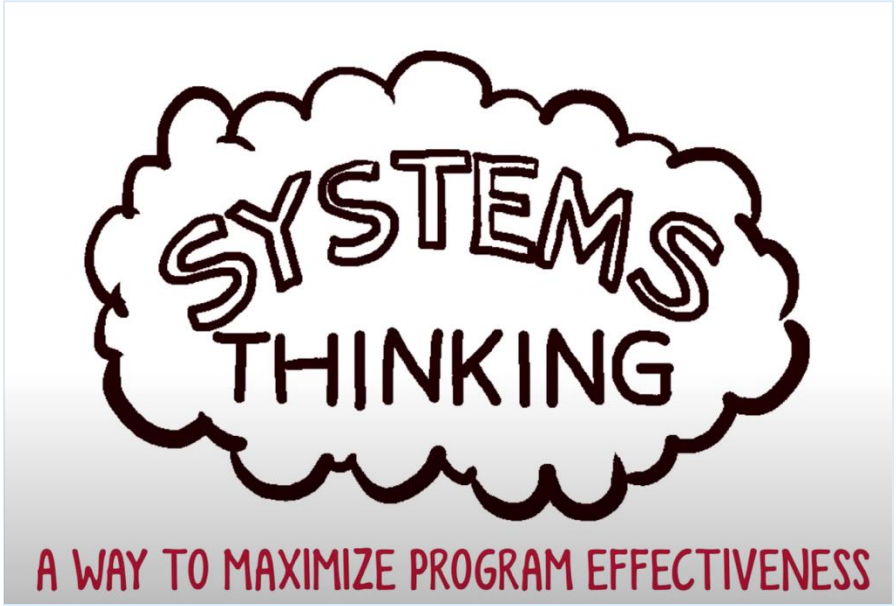


Image source: Hoffmann, I. (2003). Transcending reductionism in nutrition research. Figure 1. [Chart]. *The American Journal of Clinical Nutrition, 78*(3), 514S–516S. https://doi.org/10.1093/ajcn/78.3.514S

Watch This Five-Minute Video

Systems thinking applied to an obesity program

Systems Thinking: A Way to Maximize Program Effectiveness



Video source: James Swanson. (2014). *Systems Thinking!* [Video recording]. Dipstick Audio. https://www.youtube.com/watch?v=GPW0j2Bo_eY

Discussion 1: Reductionism vs. Systems Thinking

- What are the benefits of reductionist thinking in nutrition research and practice?
- What connections and relationships might be missed in reductionist thinking?
- How could a systems approach fill these gaps and contribute to improved perspectives and solutions?
- Have you ever experienced a situation where systems thinking may have led to a better outcome?

Section B: Why Do Food Systems Matter?

Watch This Video from the World Health Organization

More About Food Systems

Food Systems: Our food, our health, our future

Video source: WHO. (2021). *Food Systems: Our food, our health, our future* [Video recording]. https://www.youtube.com/watch?v=6Y499vq7tDg

8.7 Trillion Meals Each Year

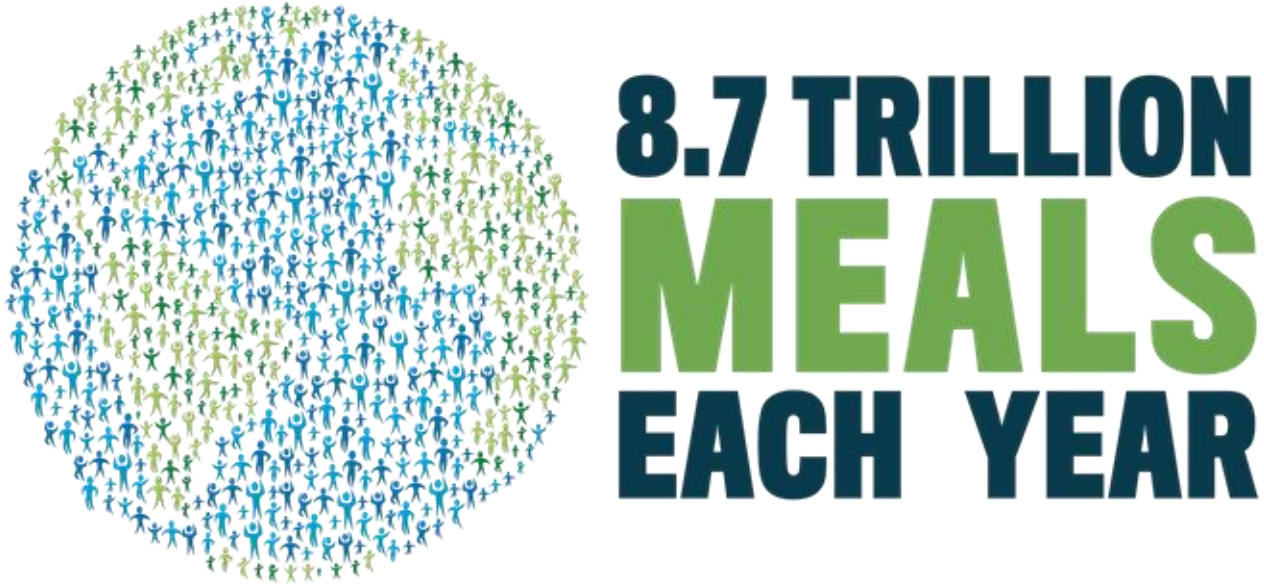


Image source: Johns Hopkins Center for a Livable Future.

Suboptimal Diets Are a Top Risk Factor of Mortality

Global number of deaths attributable to level 2 risk factors, by cause (females, 2019)

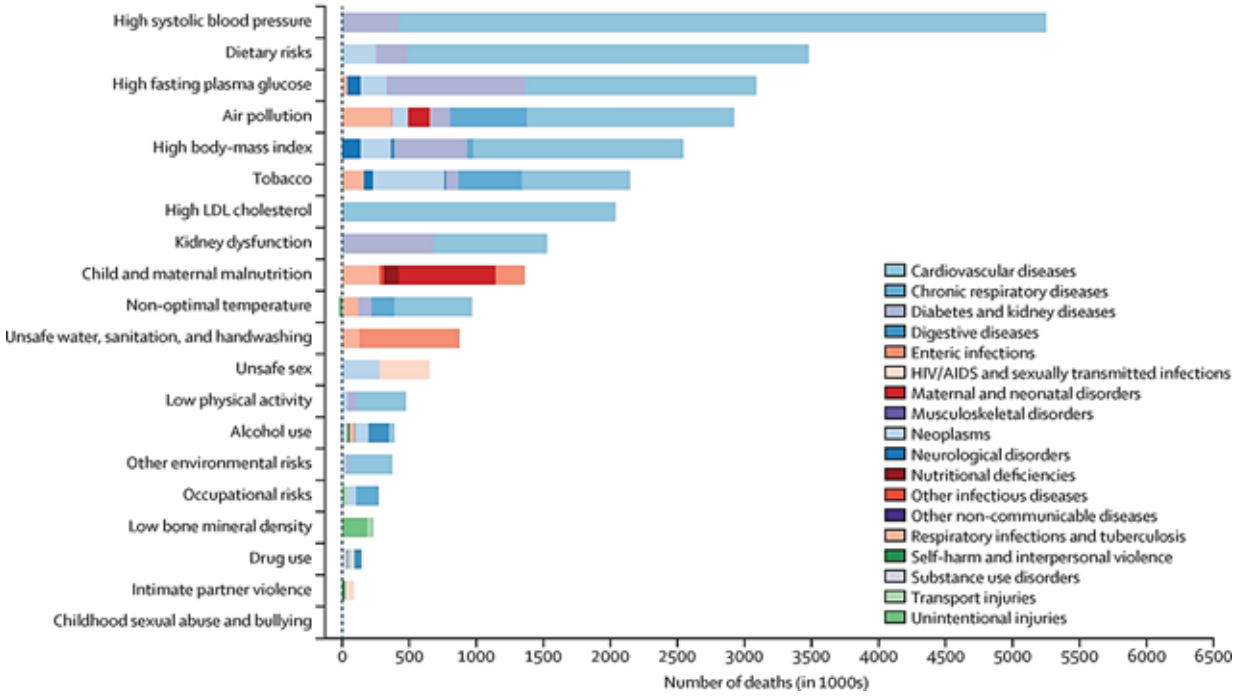


Image source: GBD 2019 Risk Factors Collaborators (2020). Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Figure 3, Global number of deaths and percentage of DALYs attributable to Level 2 risk factors, by cause and sex, 2019.* [Chart]. *Lancet* (London, England), 396(10258), 1223–1249. https://doi.org/10.1016/S0140-6736(20)30752-2

Planetary Health

The health of human civilization and the state of natural systems on which it depends

Source: EAT-Lancet Commission. (2025). Food, planet, health: A sustainable and healthy dietary pattern for all. Figure 1. [Graphic]. EAT. https://eatforum.org/wp-content/uploads/2025/09/EAT-Lancet_Commission_Summary_Report.pdf

Agriculture Has an Outsized Impact on Planetary Health

Image source: Adapted by the Center for a Livable Future from Ritchie, H., Rosado, P., & Roser, M. (2022). Environmental impacts of food production. *Our World in Data*. https://ourworldindata.org/environmental-impacts-of-food

Food System Greenhouse Gas Emissions

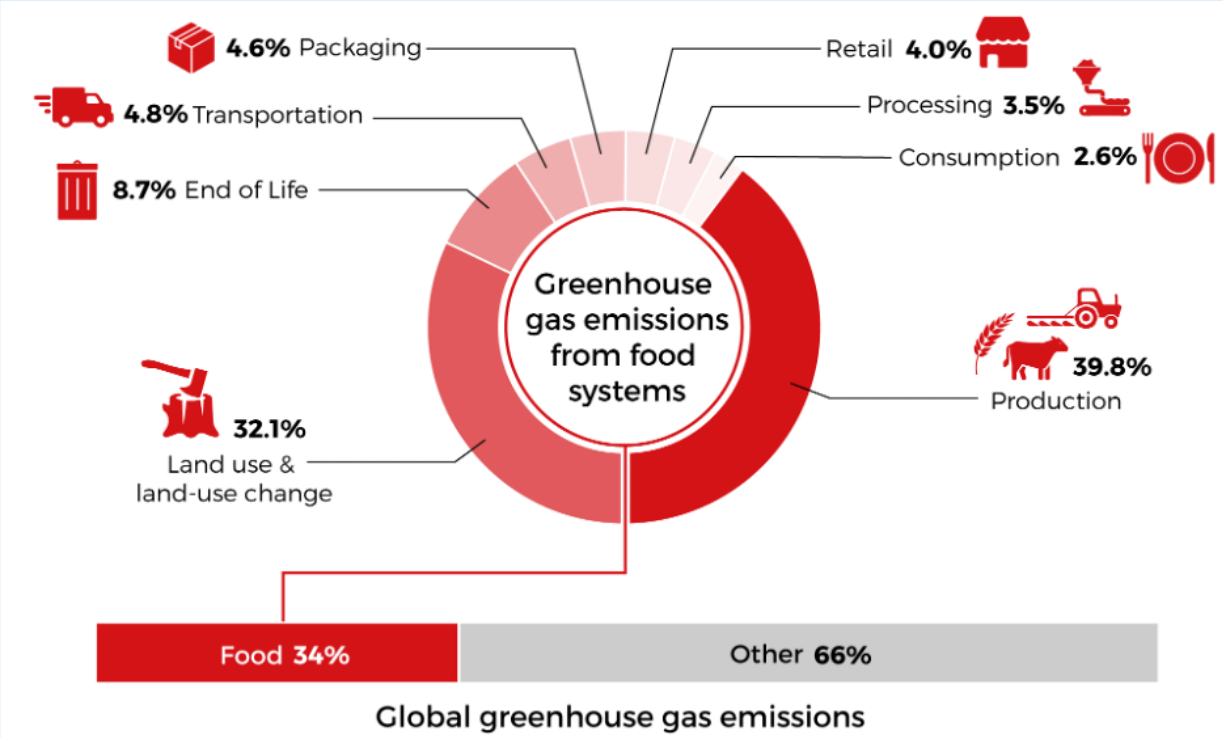
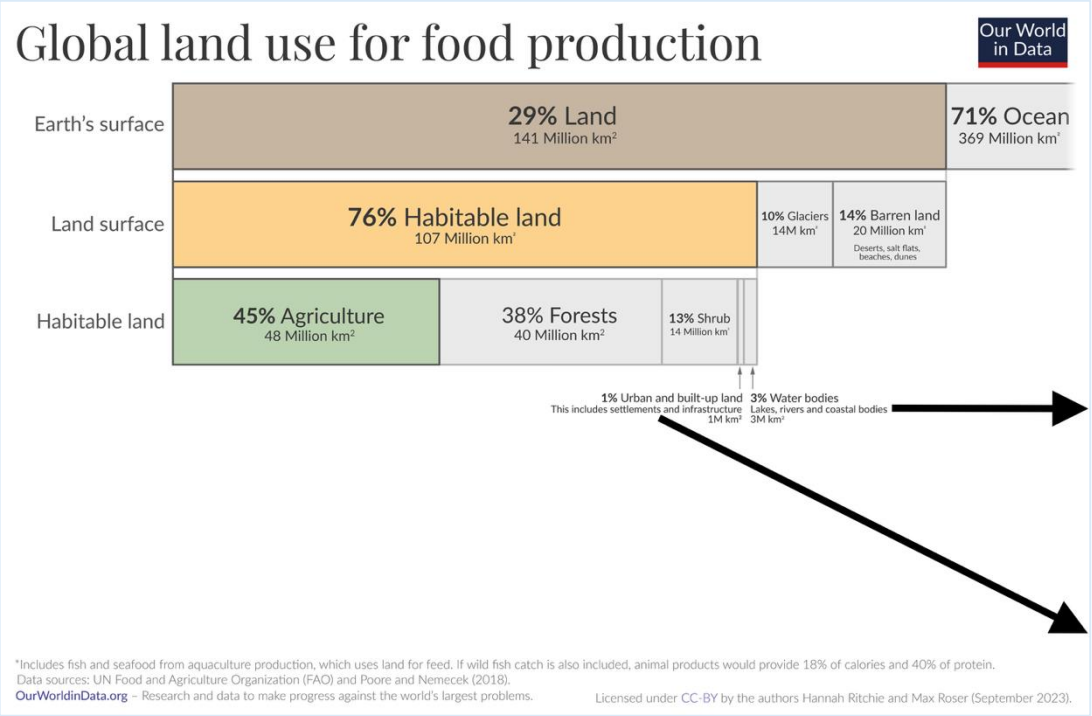


Image source: Halloran, A. (2021). COP26 failed to tackle the biggest GHG emitter: the food system. *Food Planet Prize*. https://foodplanetprize.org/news/cop26-fails-to-systemically-tackle-the-biggest-ghg-emitter-the-food-system/

Global Land Use for Food Production—1

Image source: Ritchie, H., and Roser, M. (2019). Half of the world's habitable land is used for agriculture. OurWorldinData.org. Accessed September 19, 2025, from https://ourworldindata.org/global-land-for-agriculture

Global Land Use for Food Production—2



3% water bodies: Lakes, rivers and coastal bodies—3 km^2

1% urban and build-up land: This includes settlements and infrastructure—1M km^2

Image source: Ritchie, H., and Roser, M. (2019). Half of the world's habitable land is used for agriculture. OurWorldinData.org. Accessed September 19, 2025, from https://ourworldindata.org/global-land-for-agriculture

Global Land Use for Food Production—3

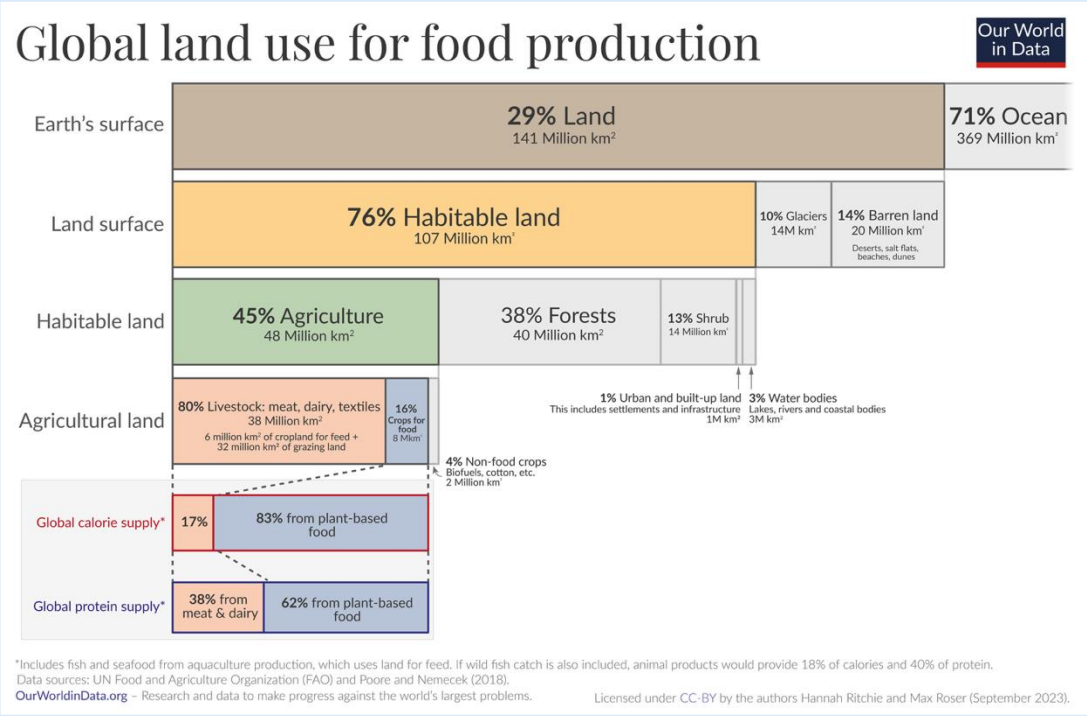
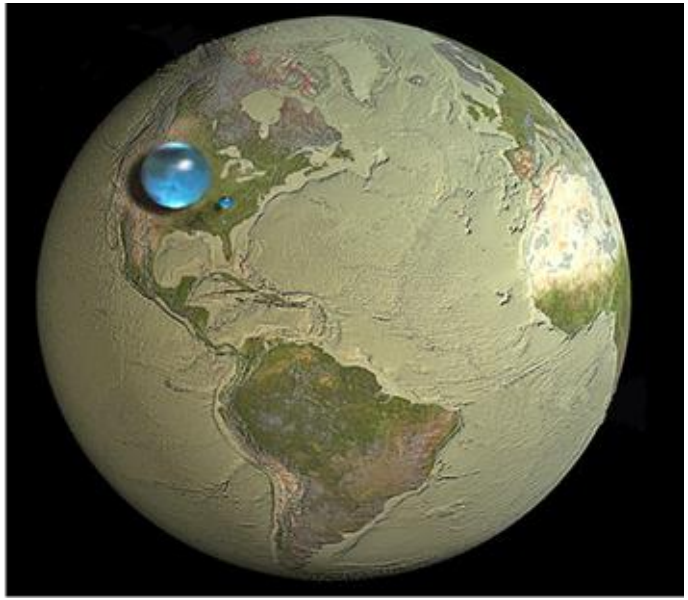
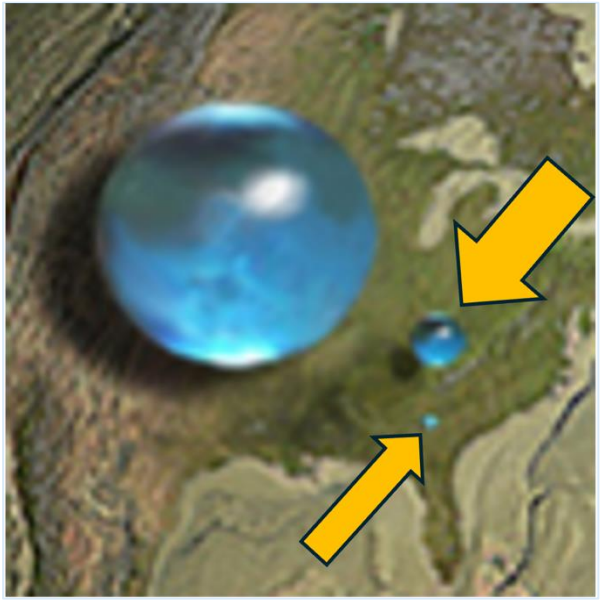


Image source: Ritchie, H., and Roser, M. (2019). Half of the world's habitable land is used for agriculture. OurWorldinData.org. Accessed September 19, 2025, from https://ourworldindata.org/global-land-for-agriculture

Freshwater Use

- Only 0.5% of all water on Earth is freshwater available for drinking and other uses
- About 70% of all freshwater we withdraw is for agriculture





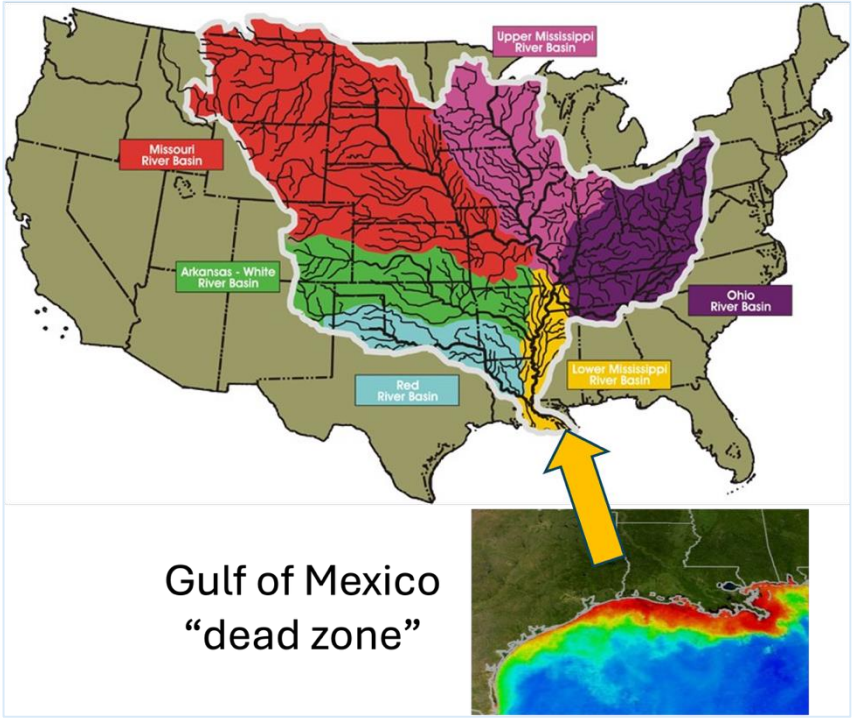
Sources: U.S. Geological Survey's (USGS) Water Science School. (2019). How Much Water is There on Earth? Accessed September 19, 2025, from https://www.usgs.gov/water-science-school/science/how-much-water-there-earth; Falkenmark, M., & Rockström, J. (2013). Balancing water for humans and nature: The new approach in ecohydrology. EarthScan. https://doi.org/10.4324/9781849770521

Image source: Jack Cook, Woods Hole Oceanographic Institution. (2013). *A Drop in the Ocean.* Accessed September 19, 2024, from https://www.whoi.edu/ocean-learning-hub/multimedia/a-drop-in-the-ocean/

Eutrophication

- Excess nitrogen and phosphorus fuels an overgrowth of algae, which deplete oxygen in water, killing aquatic life

- Agriculture in the primary source:
  - Animal waste
  - Chemical fertilizers
  - Pesticides



Source: Restore the Mississippi River Delta. (n.d). Explaining the Gulf of Mexico Dead Zone. Accessed September 19, 2025, from https://mississippiriverdelta.org/learning/explaining-the-gulf-of-mexico-dead-zone/

Biodiversity

> The variability among living organisms from all sources including terrestrial and aquatic ecosystems and the ecological complexes of which they are a part.
>
> —Convention on Biodiversity

- Supports ecosystems services essential to food production (soil, pollination, etc.)
- Protects food systems from climate change, extreme weather, pests, and diseases
- The global food system is the primary driver of biodiversity loss

Sources: Secretariat of the Convention on Biological Diversity. (2006). Article 2. Use of Terms. In *Convention on Biological Diversity*. https://www.cbd.int/convention/articles?a=cbd-02; FAO, IFAD, UNICEF, WFP, & WHO. (2021). *In Brief: The State of Food Security and Nutrition in the World 2021.* https://doi.org/10.4060/cb5409en

Diverse Diets are Healthy Diets

- Of the 300,000 known edible plant species, only 150–200 are used by humans
- Only three of these crops provide more than half of calorie needs
- Today, 75% of the world's food is generated from only 12 plants and five animal species

Sources: Lachat, C., Raneri, J., Walker Smith, K., Kolsteren, P., Van Damme, P., Verzelen, K., Penafiel, D., Vanhove, W., & Kennedy, G. (2018). Dietary species richness as a measure of food biodiversity and nutritional quality of diets. *PNAS, 115*(1), 127–132. https://doi.org/10.1073/pnas.1709194115; FAO, IFAD, UNICEF, WFP, & WHO. (2021*). The State of Food Security and Nutrition in the World 2021: Transforming food systems for food security, improved nutrition and affordable healthy diets for all.* FAO. https://doi.org/10.4060/cb4474en; Image source: Microsoft Office stock photo.

Association: Nutritional Quality, Number of Plant Species Eaten

Association of mean adequacy ratio (MAR) with species richness (SR) for 6,226 women and children in seven countries (wet and dry season combined)

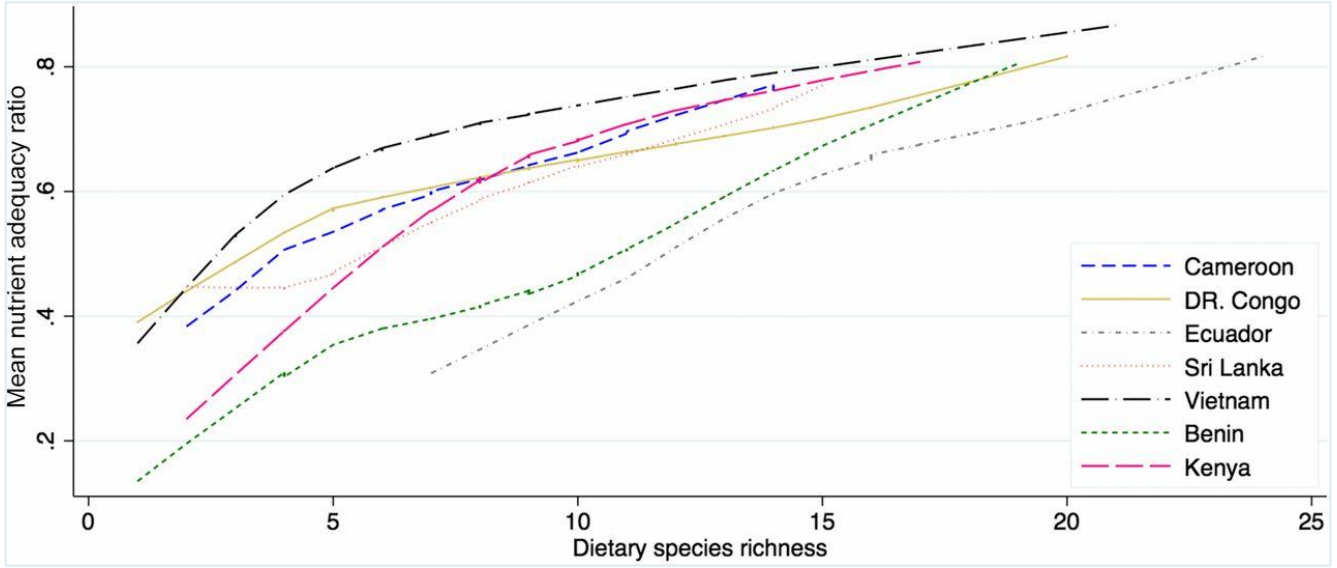


Image source: Lachat, C., Raneri, J., Walker Smith, K., Kolsteren, P., Van Damme, P., Verzelen, K., Penafiel, D., Vanhove, W., & Kennedy, G. (2018). Dietary species richness as a measure of food biodiversity and nutritional quality of diets. *Figure 3, Association of MAR with SR for 6,226 women and children in seven countries (wet and dry season combined).* [Chart]. *PNAS, 115(1)*, 127–132. https://doi.org/10.1073/pnas.1709194115

Wasted Food = Wasted Resources

- Globally: 31–40%
- United States: approximately 38%
- Environmental impacts (US data)
  - 22% of freshwater consumption
  - 16% of cropland
  - 6% of greenhouse gas (GHG) emissions
  - Largest component of municipal solid waste
- Increased 50% in the US since the 1970s

Source: United Nations Environment Programme. (2021). *Food Waste Index Report 2021*. https://www.unep.org/resources/report/unep-food-waste-index-report-2021; images of vegetables and fruits are from Shutterstock.

Impacts of Wasted Food on Nutrition in the United States

Image source: Adapted by the Johns Hopkins Center for a Livable Future from data in Spiker, M. L., Hiza, H. A. B., Siddiqi, S. M., & Neff, R. A. (2017). Wasted food, wasted nutrients: nutrient loss from wasted food in the United States and comparison to gaps in dietary intake. *Journal of the Academy of Nutrition and Dietetics*, *117*(7), 1031–1040.e22. https://doi.org/10.1016/j.jand.2017.03.015

State of the World's Fisheries

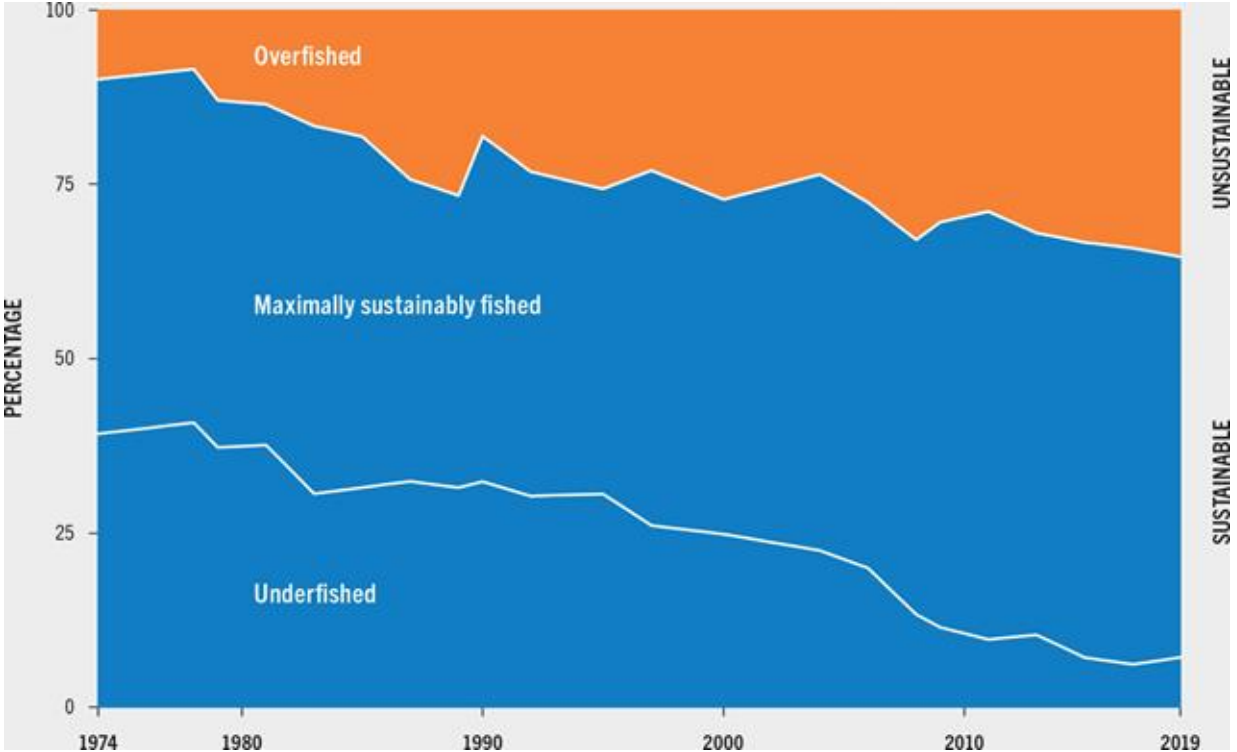


Image source: Food and Agriculture Organization of the United Nations. (2022). The State of World Fisheries and Aquaculture 2022. Towards Blue Transformation. *Figure 23, Global trends in the state of the world's marine fishery stocks, 1974-2019.* [Chart]. Rome, FAO. https://doi.org/10.4060/cc0461en

Health and Environmental Impacts of Foods—1

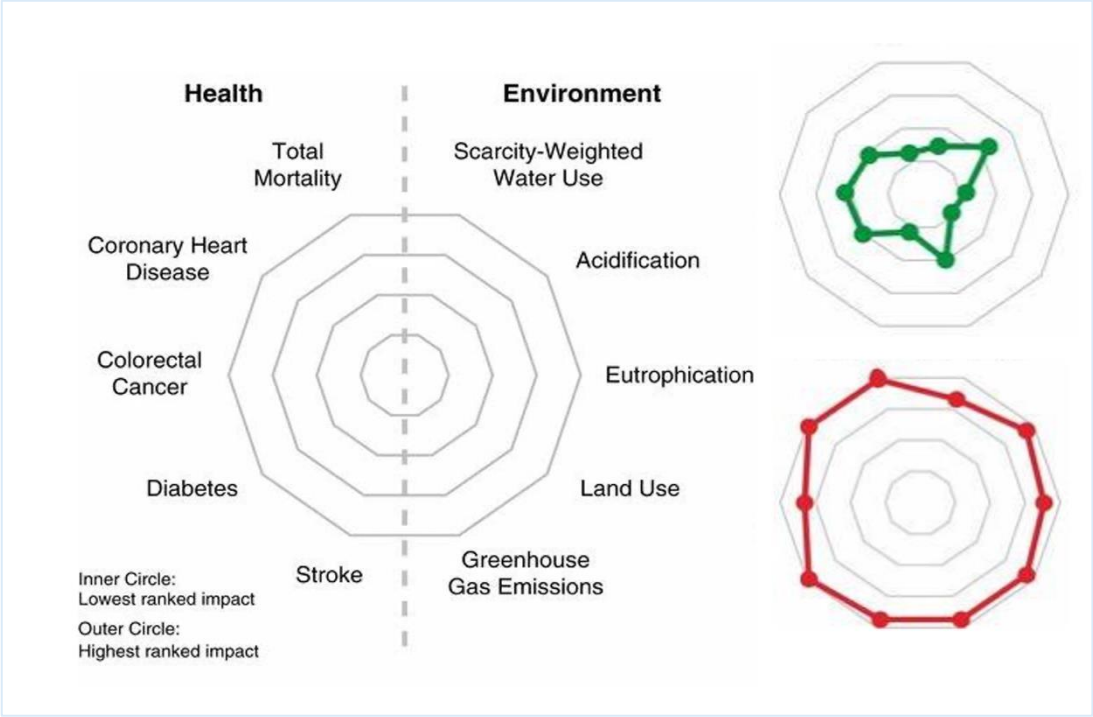


Image source: Clark, M., Springmann, M., Hill, J., & Tilman, D. (2019). Multiple health and environmental impacts of foods. *Figure 2, Radar plots of rank-ordered health and environmental impacts per serving of food consumed per day.* [Chart]. *PNAS, 116*(46), 23357–23362. https://doi.org/10.1073/pnas.1906908116

Health and Environmental Impacts of Foods—2

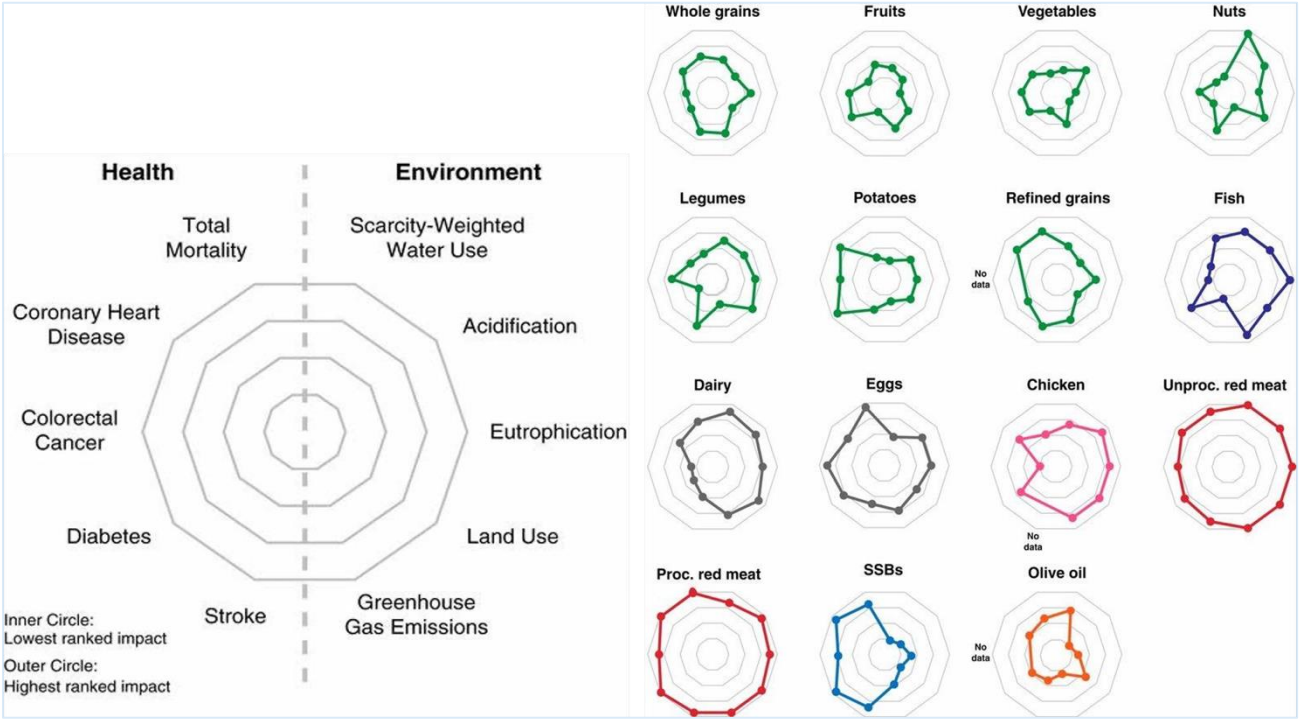
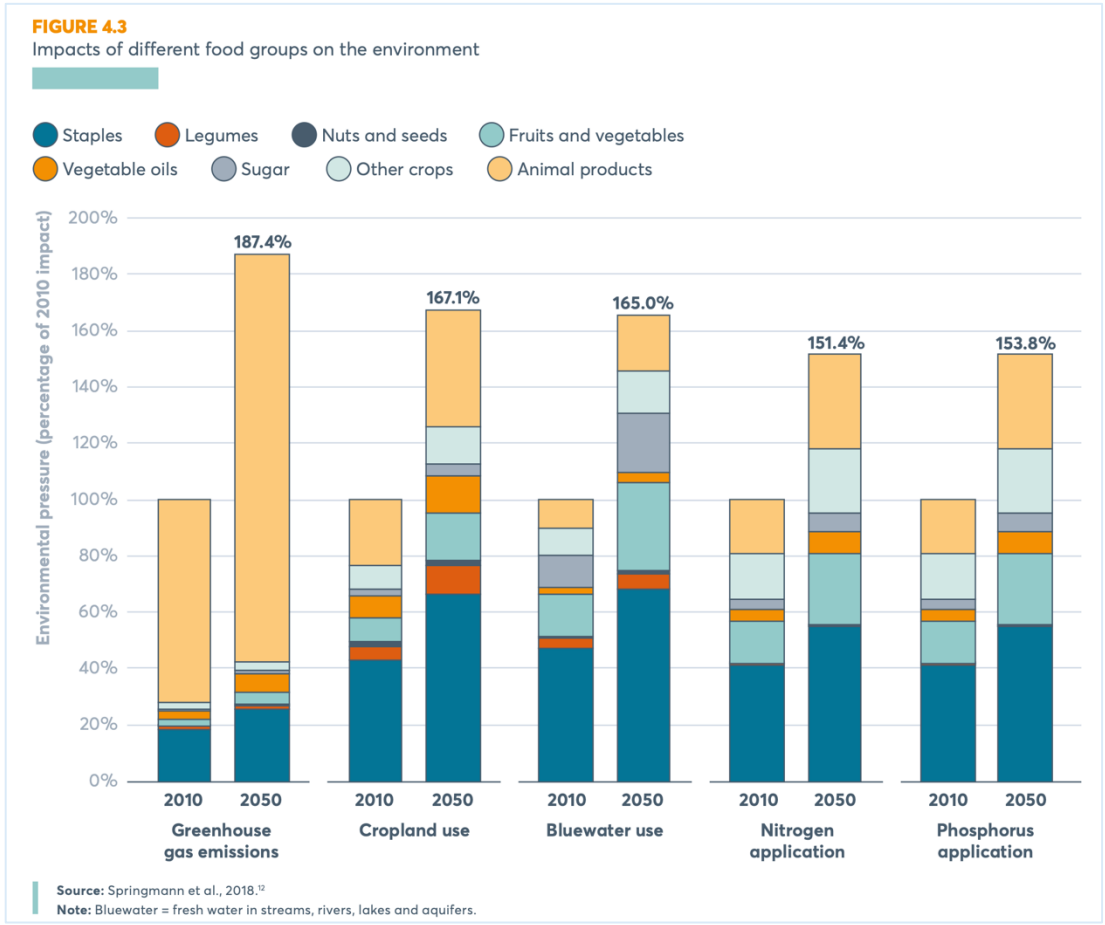


Image source: Clark, M., Springmann, M., Hill, J., & Tilman, D. (2019). Multiple health and environmental impacts of foods. *Figure 2, Radar plots of rank-ordered health and environmental impacts per serving of food consumed per day.* [Chart]. *PNAS, 116*(46), 23357–23362. https://doi.org/10.1073/pnas.1906908116

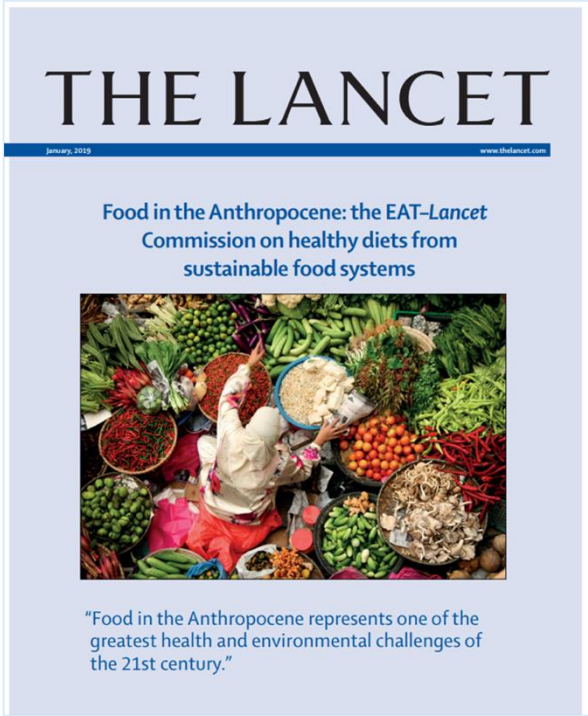
2050 Scenario



Source: *2020 Global Nutrition Report: Action on equity to end malnutrition. Figure 4.3, Impacts of different food groups on the environment.* [Chart]. Bristol, UK: Development Initiatives.
https://media.globalnutritionreport.org/documents/2020_Global_Nutrition_Report_2hrssKo.pdf

Section C: What Is a Sustainable Food System?

EAT-Lancet Commission



> Food is the single strongest lever to optimize human health and environmental sustainability on Earth. However, food is currently threatening both people and the planet. An immense challenge facing humanity is to provide a growing world population with healthy diets from sustainable food systems.
>
> —The Lancet Commissions, 2019

Source: Willett, W., Rockström, et al. (2019). Food in the Anthropocene: The EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet, 393*(10170), 447–492. https://doi.org/10.1016/S0140-6736(18)31788-4

What Is a Sustainable Food System?

> A sustainable food system … delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised.
>
> —United Nations, 2015

Source: The Secretary-General's High-Level Task for on Global Food and Nutrition Security. (2015). *All Food Systems are Sustainable (Zero Hunger Challenge Working Groups).* FAO, UNCTAD, UNIDO, World Bank, IFAD & UNEP. https://www.un.org/en/issues/food/taskforce/pdf/All%20food%20systems%20are%20sustainable.pdf

17 Sustainable Development Goals

> Sustainable food systems don't just help to end hunger. They can help the world achieve critical progress on all 17 Sustainable Development Goals.
>
> —United Nations

Source: UN Food Systems Summit 2021. (2021). Food Systems Summit x SDGs. United Nations; United Nations. https://www.un.org/en/food-systems-summit/sdgs

Principles for Sustainable Diets and Food Systems for Planetary Health—1

Human health

- Nutritious and healthy
- Balanced and diverse
- Appealing and acceptable
- Safe to consume

Image source: Kraak, V. I., & Stanley, K. C. (2023). An economic lens for sustainable dietary guidelines. *The Lancet Planetary Health, 7*(5), e350–e351. https://doi.org/10.1016/S2542-5196(23)00075-X

Principles for Sustainable Diets and Food Systems for Planetary Health—2

Ecological health

- Adaptive and agroecological
- Resilient and regenerative
- Protects/restores biodiversity
- Humane, supports OneHealth

Image source: Kraak, V. I., & Stanley, K. C. (2023). An economic lens for sustainable dietary guidelines. *The Lancet Planetary Health, 7*(5), e350–e351. https://doi.org/10.1016/S2542-5196(23)00075-X

Principles for Sustainable Diets and Food Systems for Planetary Health—3

Social equity

- Equitable and fair
- Ethical and inclusive
- Democratic, participatory
- Rights-based approach

Image source: Kraak, V. I., & Stanley, K. C. (2023). An economic lens for sustainable dietary guidelines. *The Lancet Planetary Health, 7*(5), e350–e351. https://doi.org/10.1016/S2542-5196(23)00075-X

Principles for Sustainable Diets and Food Systems for Planetary Health—4

Economic prosperity

- Profitable and sufficient
- Distributive and shared
- Livable wages
- Accessible and affordable
- Clean and green innovation

Image source: Kraak, V. I., & Stanley, K. C. (2023). An economic lens for sustainable dietary guidelines. *The Lancet Planetary Health, 7*(5), e350–e351. https://doi.org/10.1016/S2542-5196(23)00075-X

Principles for Sustainable Diets and Food Systems for Planetary Health—5

> Human hands were purposefully incorporated into the images for each domain because humans have agency to facilitate or hinder actions toward sustainable diets.
>
> —Kraak & Stanley, 2023

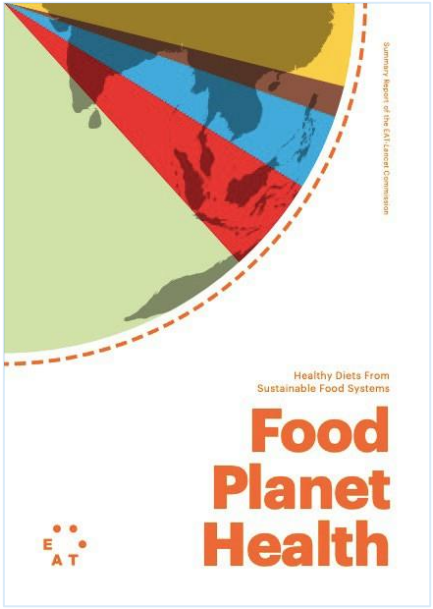
Image source: Kraak, V. I., & Stanley, K. C. (2023). An economic lens for sustainable dietary guidelines. *The Lancet Planetary Health, 7*(5), e350–e351. https://doi.org/10.1016/S2542-5196(23)00075-X

Case Study 1

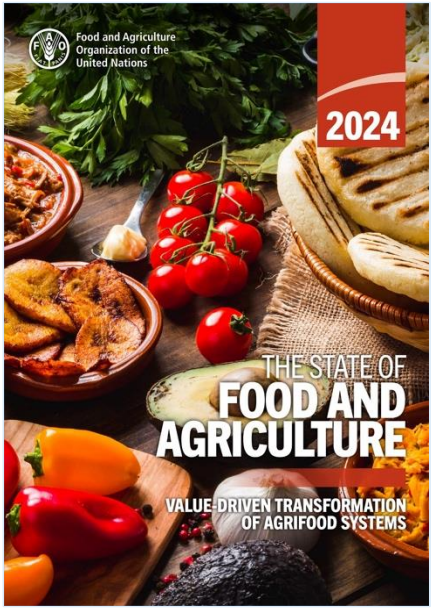
Section D: How Can RDNs Promote Sustainable Diets and Food Systems for Planetary Health?

A New Way of Thinking About Healthy Diets

Nutritious diets



Diet + planetary health



Diet + planet + cost

Image sources: Report covers courtesy of Dietary Guidelines for Americans (DGA) 2020-2025; Food Planet Health: Healthy Diets from Sustainable Food Systems; The State of Food and Agriculture 2024: Value-driven transformation of agrifood systems.

Planetary Health Diet

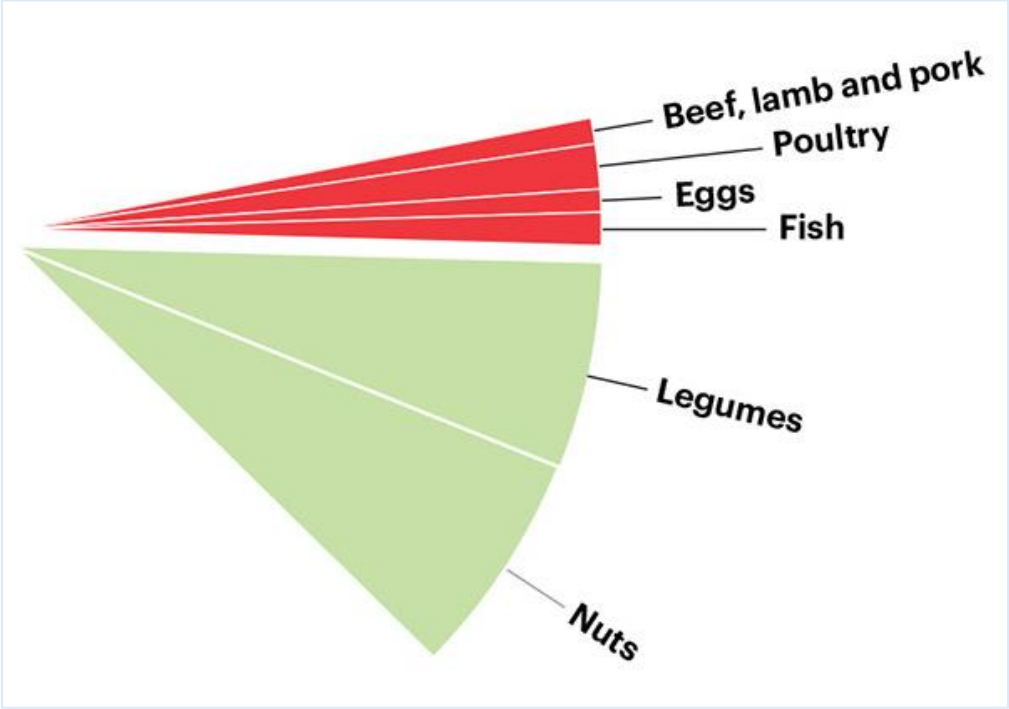


Image source: The EAT-Lancet Commission on Food, Planet, Health. (n.d.). *The Planetary Health Diet. EATForum.* Accessed July 24, 2025, from https://eatforum.org/eat-lancet-commission/the-planetary-health-diet-and-you/

Key Strategies for Food System Sustainability

1. Significantly reduce wasted food
2. Shift diets towards plant-based
3. Improve food production practices without expanding agriculture onto new land

Image source: Collage of logos created by the Center for a Livable Future.

Recommendation 1: Reduce Wasted Food

- Strategies for dietitians
  - Promote meal planning and appropriate portion sizes
  - Understand and educate about food safety and date labels
  - Encourage creativity with leftovers
  - Reduce waste in food service and encourage composting
  - Support local food recovery initiatives

Recommendation 2: Shift Towards Plant-Based Diets

- Strategies for dietitians
  - Provide guidance on healthy food choices that are plant-forward and culturally appropriate, affordable, available, and tasty
  - Use the planetary health diet as a framework
  - Support initiatives that introduce consumers to tasty, appealing plant-forward meals
    - For example, Meatless Monday
  - Balance plant-forward diets with life cycle nutrition needs

Recommendation 3: Improve Agricultural Practices

- Strategies for dietitians
  - Make the case for co-benefits (health, cost, sustainability, social)
  - Bridge consumers to food from producers who integrate sustainable practices
  - Provide guidance on making food choices that reflect best practices through labels, etc.
  - Support diversification of our food system by promoting diverse diets

Case Study 2

Consumer Survey about Climate and Food

2023 International Food and Information Center (IFIC) Climate Change Perceptions and Purchase Impact Survey

- Three in four Americans are concerned about climate change
  - Over 70% are concerned about food-related issues

- Climate concern impacts foods and beverage choice in only 25%
  - Health and cost play a larger role

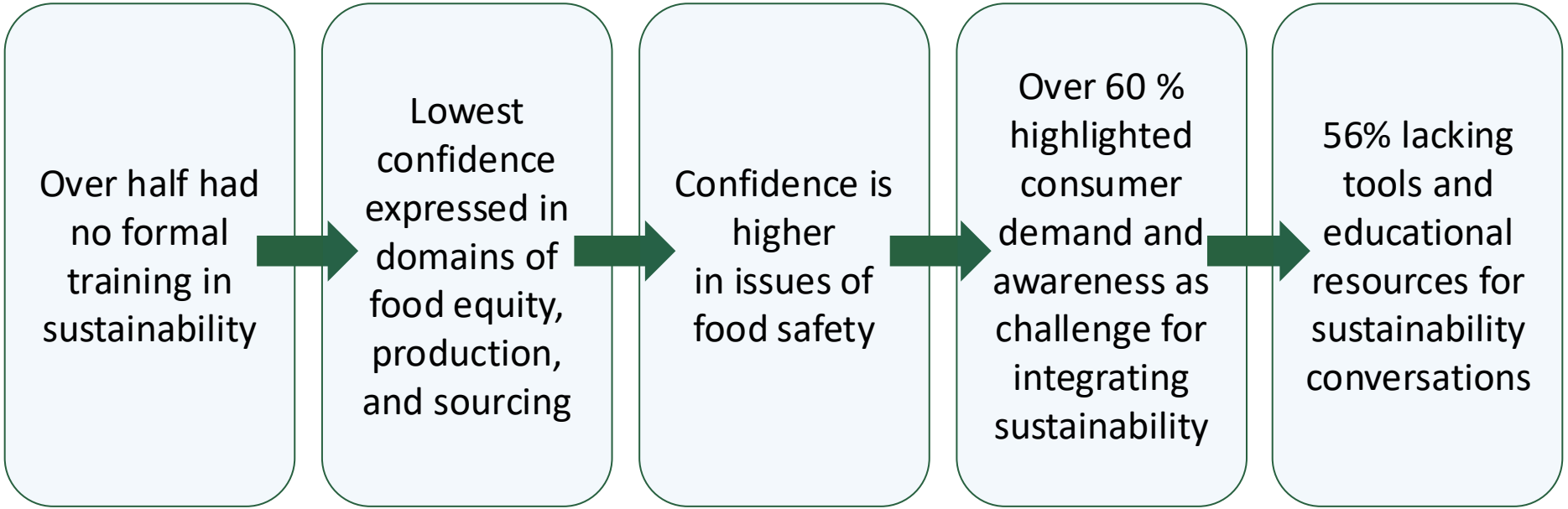
- Half of Americans heard about food and climate change from the media

- Labels that indicate recyclable or reusable packaging are perceived as very meaningful when looking for climate-friendly food and beverage options

Source: IFIC. (2023). Consumer climate change perceptions and purchase impacts. International Food Information Council. https://foodinsight.org/wp-content/uploads/2023/10/Oct23-IFIC-Climate-Change.pdf

Nutrition Professionals Interest in Sustainability

RDNs shared gaps in knowledge, practice, and confidence in Sustainability Insights survey



Source: Food + Planet & Today's Dietitian. (2024). 2024 Sustainability and Food Insights Dietitian Survey. Food + Planet. https://drive.google.com/file/d/1CI52BwytgGxerc0ubSjqyqkN91IgjyfB/view?usp=embed_facebook

Opportunities for RDNs to Impact Food Systems

1

Leverage consumers' growing interest in food systems and sustainability as an opportunity **to guide individuals toward nutritious, sustainable choices**

2

Amplify the effectiveness of individual level interventions (e.g., education and behavior change) that **complement** actions at policy, systems and environmental levels

3

Identify **multi-level actions** (institutions, policy) and food choices that generate positive changes in the food system (equitable access to culturally appropriate, affordable, tasty foods)

Source: AND. (2021). *Primer on Sustainable Food Systems for RDNs and NDTRs*. Academy of Nutrition and Dietetics Foundation.
https://higherlogicdownload.s3.amazonaws.com/THEACADEMY/332b30df-e065-46ce-94da-9c8a13541862/UploadedImages/Foundation/files/Resources/SFSprimer-HANDOUT.pdf

Core Skills of Nutrition and Dietetics Professionals

Helping people navigate dietary choices amid complexity and uncertainty

Fulfilling multiple goals through food: not just nutritious, but also safe, delicious, affordable

Critically evaluating and translating research from a variety of scientific disciplines

Collaborating as part of interprofessional teams and engaging with other sectors

Source: AND. (2021). *Primer on Sustainable Food Systems for RDNs and NDTRs*. Academy of Nutrition and Dietetics Foundation.
https://higherlogicdownload.s3.amazonaws.com/THEACADEMY/332b30df-e065-46ce-94da-9c8a13541862/UploadedImages/Foundation/files/Resources/SFSprimer-HANDOUT.pdf

Discussion 2: Strategies for Action

What are some strategies for RDNs to …

1. … significantly reduce food waste?
2. … shift diets towards plant-based?
3. … improve food production practices without expanding agriculture onto new land?

Thank You!

Practice and Resources Booklet

About This Presentation

Produced by the Center for Teaching and Learning at the Johns Hopkins Bloomberg School of Public Health.

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