

Engaging Nutrition Leaders in Food Systems

Marie Spiker, PhD, MSPH, RDN
Assistant Professor, University of Washington School of Public Health
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UNIVERSITY of WASHINGTON



Learning Outcomes

- > Describe how nutrition leaders and other interprofessional health colleagues are a key part of leveraging food systems to support population health
- > Describe current food systems topics that are relevant to nutrition leaders including sustainability and food waste
- > Discuss strategies for leveraging inter-professional connections as part of systems change

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About Marie

- > **Assistant Professor, University of Washington School of Public Health**
 - Nutritional Sciences Program and Department of Epidemiology
 - Core faculty in Food Systems, Nutrition, and Health
- > **Healthy & Sustainable Food Systems Fellow, Academy of Nutrition & Dietetics**
 - Growing the capacity of nutrition & dietetics professionals to work in sustainable food systems
- > **Johns Hopkins Bloomberg School of Public Health: PhD, MSPH, RDN training**
 - CLF-Lerner Fellow at the Johns Hopkins Center for a Livable Future
 - Senior Analyst at the Global Obesity Prevention Center at Johns Hopkins
- > **Research Interests:** Public health nutrition, sustainable food systems, food loss and waste, value chains for nutrition, systems modeling, food systems governance
- > **Contact:** mspiker@uw.edu,  @mariespiker

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Agenda

- > **1:05-1:50pm PST: Presentation**
- > **1:50-2:00pm PST: 10-minute break**
- > **2:00-2:55pm PST: Breakout rooms**
 - 15 minutes: Breakout Room 1: 5 Whys Analysis
 - 10 minutes: Share highlights / challenges with the larger group
 - 15 minutes: Breakout Room 2: Network Mapping
 - 10 minutes: Share highlights / challenges with the larger group

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Let's start with a 30,000 foot view...

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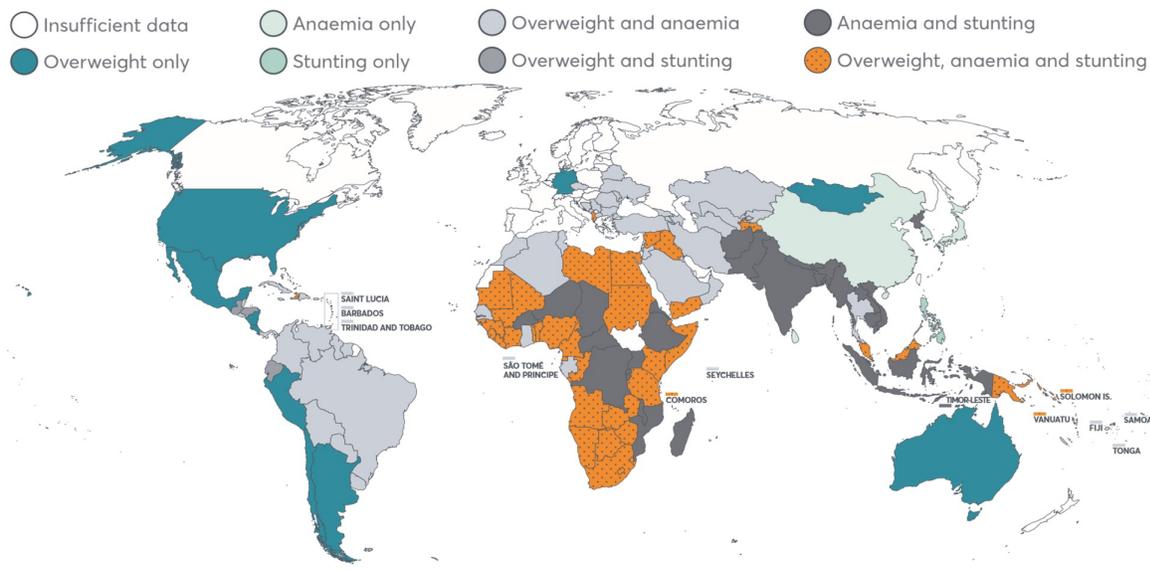
Big picture: Most countries are dealing with multiple burdens of malnutrition



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Source: 2018 Global Nutrition Report, globalnutritionreport.org

Big picture: Most countries are dealing with multiple burdens of malnutrition



Source: 2018 Global Nutrition Report, globalnutritionreport.org

Big picture: Our global food supply is unevenly distributed and is not nutrient-rich

Do we have enough food for our current global population?

- > Enough on average (2,884 kcal/person/d and 83 g protein/person/d) ¹
- > However: **big inequities in distribution** between & within countries

Do we have enough of the right kinds of food?

- > Most countries lack an adequate supply of micronutrient-rich food sources ²
- > **Fruits and vegetables:**
 - US: 1.6 cups vegetables / person / day in the US (short of recommended 2.5 cups) ³
 - Globally: 45% live in countries that lack WHO target of 400 g FV / person / day ⁴
- > **Seafood:** Would need to double the US seafood supply to meet recommendations in the US alone (8 oz / person / week) ⁵

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Sources: (1) FAO Food Balance Sheets (2) Beal T et al. Global trends in dietary micronutrient supplies and estimated prevalence of inadequate intakes. *PLoS one*. 2017;12(4):e0175554. (3) Bentley J, USDA ERS, 2017: US trends in food availability. (4) Mason D-Croz 2019: Gaps between fruit and vegetable production, demand, and recommended consumption. *Lancet Planetary Health*. (5) National Research Council, 2015: Framework for assessing the effects of the food system.

Big picture: Our food system has a big footprint, and 1/3 all food is lost or wasted

Globally, agricultural practices account for:

- > 11% of greenhouse gas emissions ¹
- > 34% of global land use ²
- > 70% of water withdrawn for human purposes ³

Globally, 1/3 of all food produced is ultimately lost or wasted

- > In the US, waste contains equivalent of 66% iron RDA, 40% calcium RDA, 27% fiber RDA ⁴

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Sources: (1) Global Emissions. Center for Climate and Energy Solutions website. (2) Ramankutty N, Evan AT, Monfreda C, Foley JA. Farming the planet: Geographic distribution of global agricultural lands in the year 2000. *Global biogeochemical cycles*. 2008 Mar;22(1). (3) Molden, D., et al., 2007. Pathways for increasing agricultural water productivity. In: Molden, D. (Ed.), *Water for Food, Water for Life*. (4) Spiker ML, Hiza HA, Siddiqi SM, Neff RA. Wasted food, wasted nutrients. *Journal of the Academy of Nutrition and Dietetics*. 2017 Jul 1;117(7):1031-40.

What do we mean by food systems?

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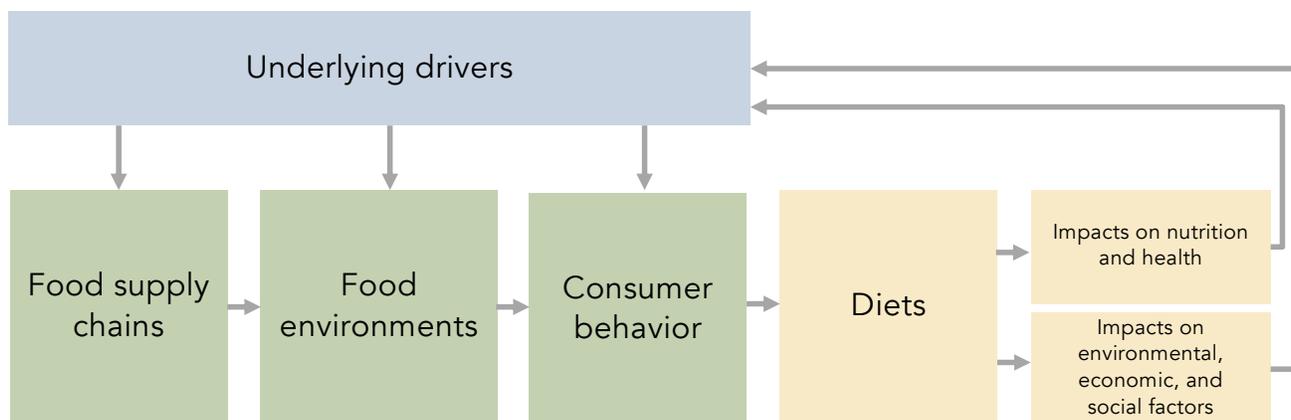
What is the food system?

Neff and Lawrence define the food system as:

“A system encompassing all the activities and resources that go into producing, distributing, and consuming food; the drivers and outcomes of those processes; and, the extensive and complex relationships between system participants and components.”

Source: Neff and Lawrence, 2014. See handout for full reference.

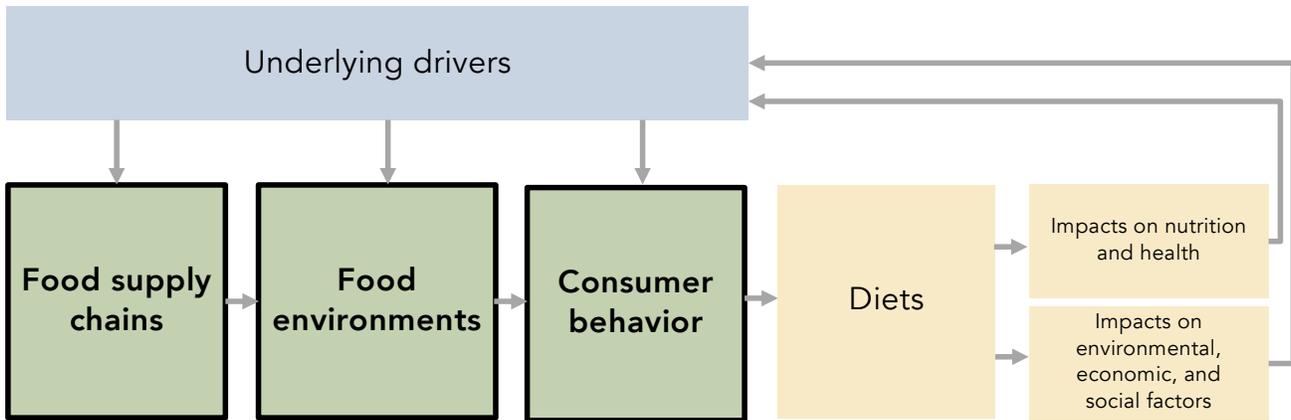
Preview of the food systems conceptual framework



“a system encompassing all the activities and resources that go into producing, distributing, and consuming food; the drivers and outcomes of those processes; and, the extensive and complex relationships between system participants and components”

Sources: Definition from Neff and Lawrence, 2014. Framework adapted from HLPE, 2017.

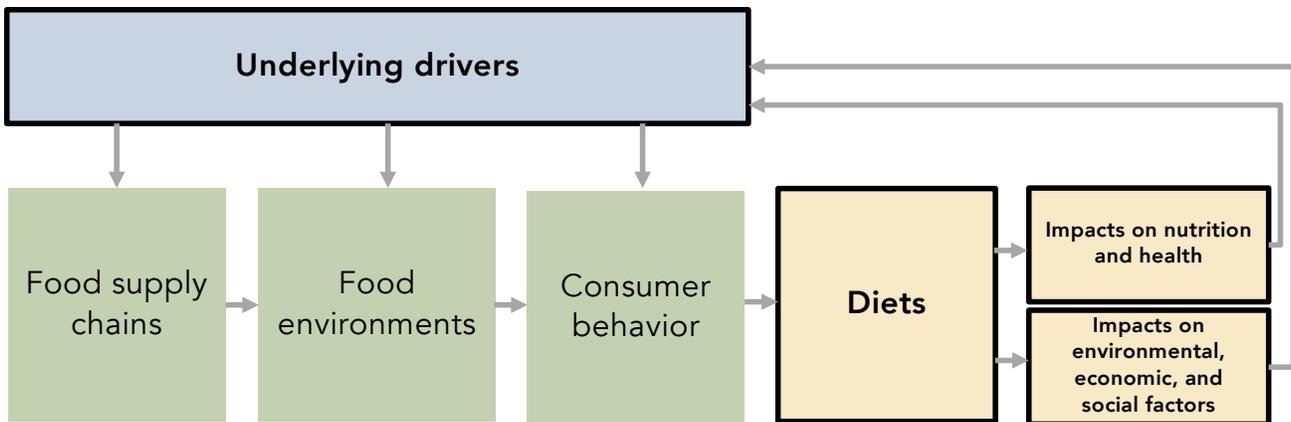
Preview of the food systems conceptual framework



“a system encompassing all the activities and resources that go into **producing, distributing, and consuming food**; the drivers and outcomes of those processes; and, the extensive and complex relationships between system participants and components”

Sources: Definition from Neff and Lawrence, 2014. Framework adapted from HLPE, 2017.

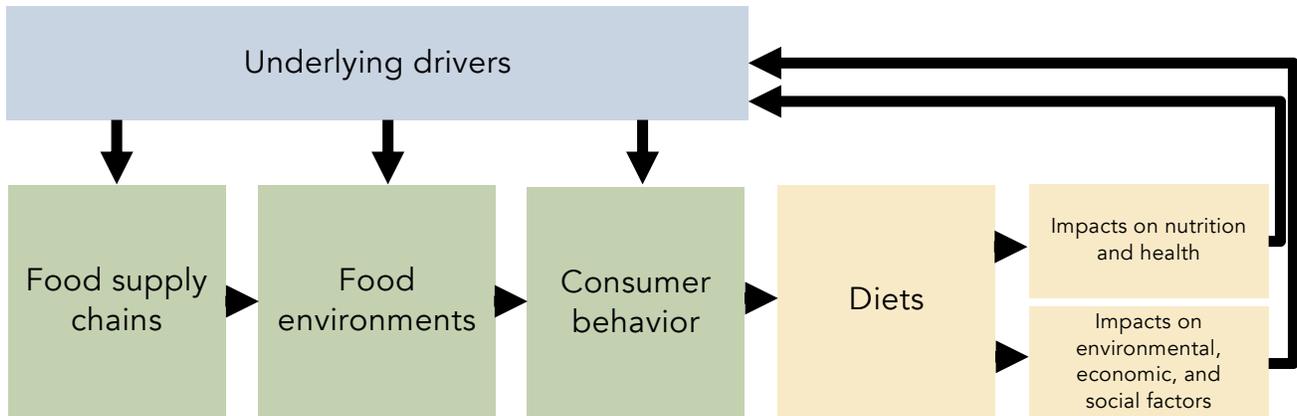
Preview of the food systems conceptual framework



“a system encompassing all the activities and resources that go into producing, distributing, and consuming food; the **drivers and outcomes of those processes**; and, the extensive and complex relationships between system participants and components”

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Preview of the food systems conceptual framework



“a system encompassing all the activities and resources that go into producing, distributing, and consuming food; the drivers and outcomes of those processes; and, the **extensive and complex relationships between system participants and components**”

Sources: Definition from Neff and Lawrence, 2014. Framework adapted from HLPE, 2017.

We produce many kinds of food – crops, livestock, marine plants & animals



Image Sources: Left: 6okean via Getty Images. Middle: Astrid860 via Getty Images. Top Right: EoNaYa via Getty Images. Bottom Right: Irenadragan via Getty Images.

We produce food for many purposes – subsistence, income, community



Image Sources: Left: Nikhil Patil via Getty Images. Middle: Alffoto via Getty Images. Right: Monkeybusinessimages via Getty Images.

We produce food at many different scales



Image Sources: Left: Branex via Getty Images. Right: Tfoxfoto via Getty Images.

We produce food using different ways of providing & recycling nutrients



Image Sources: top Left: Crystalclear, CC BY-SA 3.0. Bottom Left: Sharon Loxton CC BY-SA 2.0. Middle: Marie Spiker. Top Right: Ryan Somma CC BY-SA 2.0. Bottom Right: kjolb CC BY-SA 3.0.

We produce food using water from different sources – irrigated, rainfed



Image Sources: Top Left: Simazoran via Getty Images. Top Right: DiyanaDimatrova via Getty Images. Bottom Left: Hitesh Singh via Getty Images. Bottom Right: North-Tail via Getty Images.

We have different methods of on-farm storage...

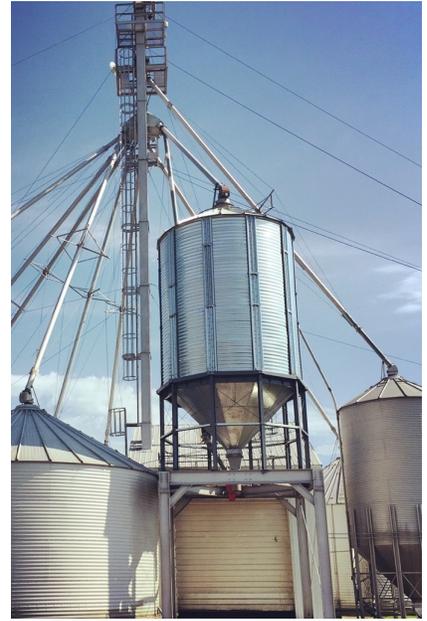


Image Sources: Left: Marie Spiker, used with permission. Middle: Dieudonné Baributsa, Purdue University, used with permission. Right: Marie Spiker, used with permission.

... and many ways of transporting food...



Image Sources: Left: Photo by Marie Spiker, used with permission. Middle: Vitpho via Getty Images. Right: Eugenesergeev via Getty Images

... and distributing large quantities of food



Image Sources: Left: Photo by Marie Spiker, used with permission. Middle: Deniscostille via Getty Images. Right: Balonici via Getty Images

We sort and process food, ranging from minimally- to ultra-processed



Image Sources: Left: Wabeno via Getty Images. Middle: Herraez via Getty Images. Right: G Annison via Getty Images.

We package food for food safety, preservation, quality, and convenience



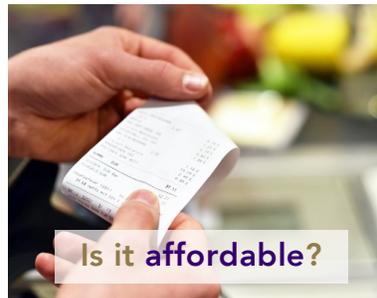
Image Sources: Left: JackF via Getty Images. Middle: DuxX via Getty Images. Right: AlexWang_AU via Getty Images

The supply chains that brings food to us depend on many workers



Image Sources: Left: Rightdx by Getty Images. Middle: 21597185 via Getty Images. Right: Pixfly via Getty Images

Our food environments have many characteristics



	Per serving	Per container
Calories	245	490
	% DV*	% DV*
Total Fat	12g 14%	24g 29%
Saturated Fat	2g 10%	4g 20%
Trans Fat	0g	0g
Cholesterol	0mg 0%	16mg 5%
Total Carb	124g	248g
	100%	248%

What info do we have access to?

Image Sources: Top Left: Zephyr18 via Getty Images. Top Middle: Industryview via Getty Images. Top Right: Public Domain. Bottom Left: The World Traveller via Getty Images. Bottom Right: Maradaisy via Getty Images

We sell food in markets, for preparing at home...



Image Sources: Left: Balaji Srinivasan via Getty Images. Middle: Vera_Petrunina via Getty Images. Right: Danielvfung via Getty Images.

... and we sell foods prepared away from home

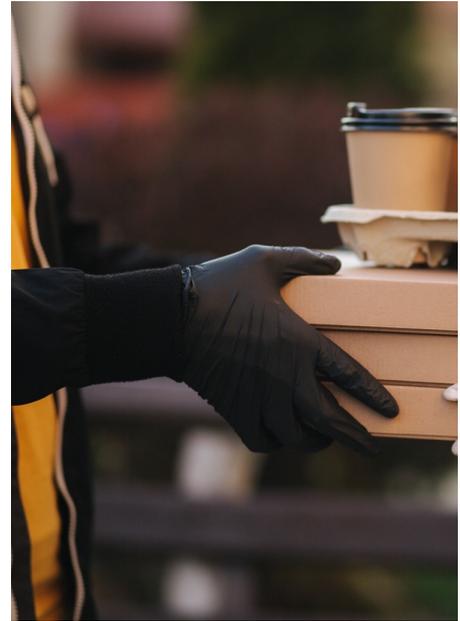


Image Sources: Left: Ciara Sherry via Getty Images (Hawker). Middle: Photo by Corbin Cunningham, used with permission. Right: Oleksandr Hyrtsiv via Getty Images.

As consumers, our food-related behaviors are complex



Image Sources: Left: Caymia via Getty Images. Middle: Monkeybusinessimages via Getty Images. Right: Aleksandr_Vorobev via Getty Images.

We don't just eat food, we also waste it



Image Sources: Left: ChiccoDodiFC via Getty Images. Middle: Highwaystarz-Photography via Getty Images. Right: Martin Poole via Getty Images

We know that dietary intake affects human nutrition and health



Image Sources: Left: Vinhдав via Getty Images. Right: Foxys_forest_manufacture via Getty Images.

Dietary intake also has **environmental, economic, and societal impacts**

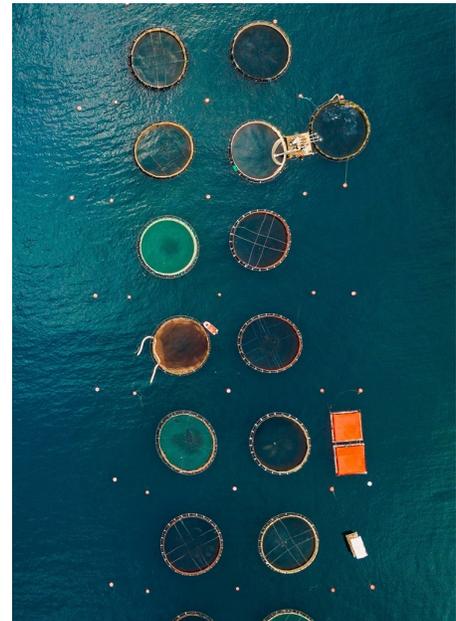


Image Sources: Left: Gnomeandi via Getty Images. Right: Wmaser890 via Getty Images.

Additionally, there are **underlying drivers influencing the system (pt. 1)**



Environmental drivers, including climate change



Innovation, technology, and infrastructure drivers



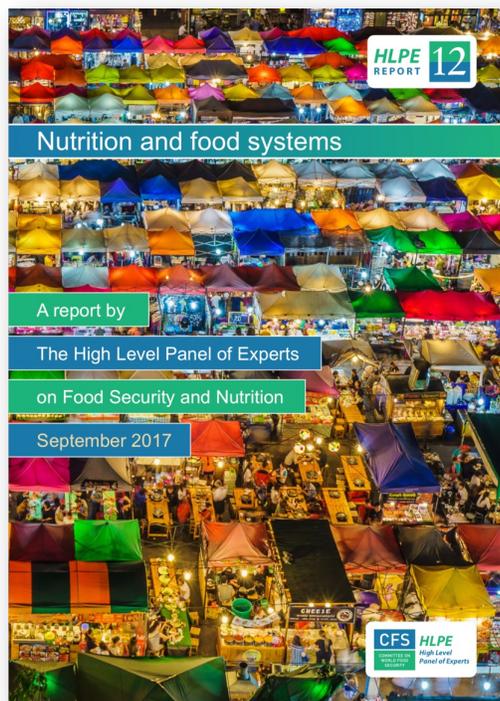
Political and economic drivers

Image Sources: Left: 3bsworld via Getty Images. Middle: Thomas Northcut via Getty Images. Right: DorSteffen via Getty Images

Additionally, there are underlying drivers influencing the system (pt. 2)

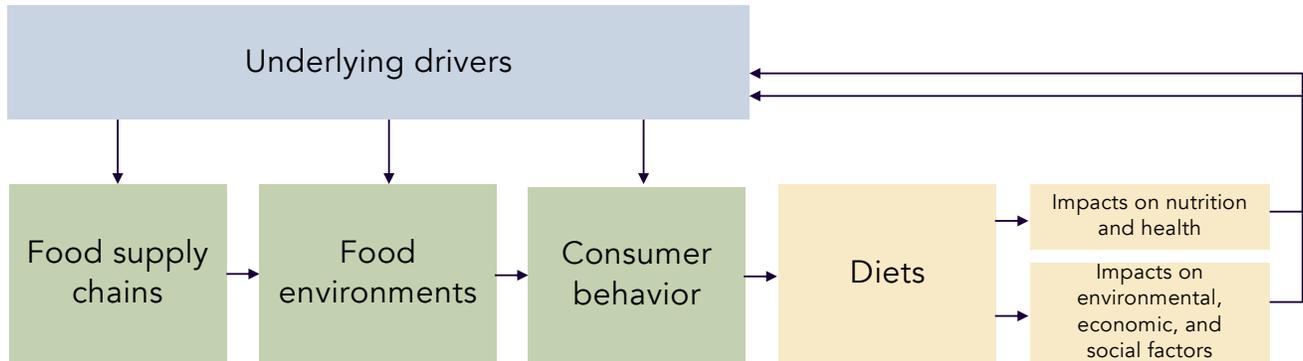


Image Sources: Left: AGL_Photography via Getty Images. Right: Badahos via Getty Images.



A food systems conceptual framework

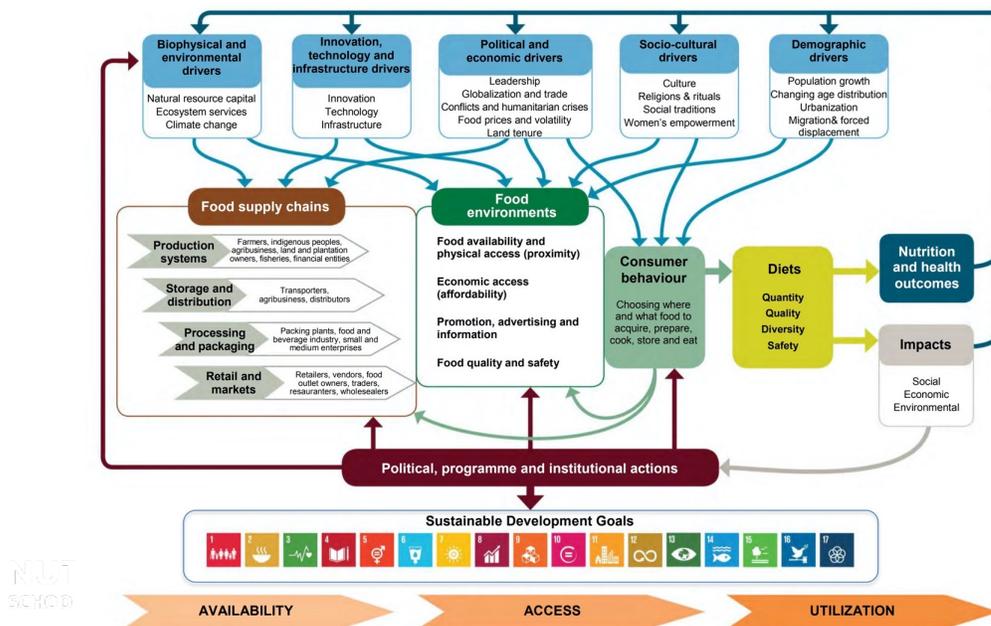
Preview of UN High Level Panel of Experts (HLPE) conceptual framework



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Source: Adapted from HLPE. 2017. Nutrition and food systems. A report by the High-Level Panel of Experts on Food Security and Nutrition.

UN High Level Panel of Experts (HLPE) conceptual framework of food systems

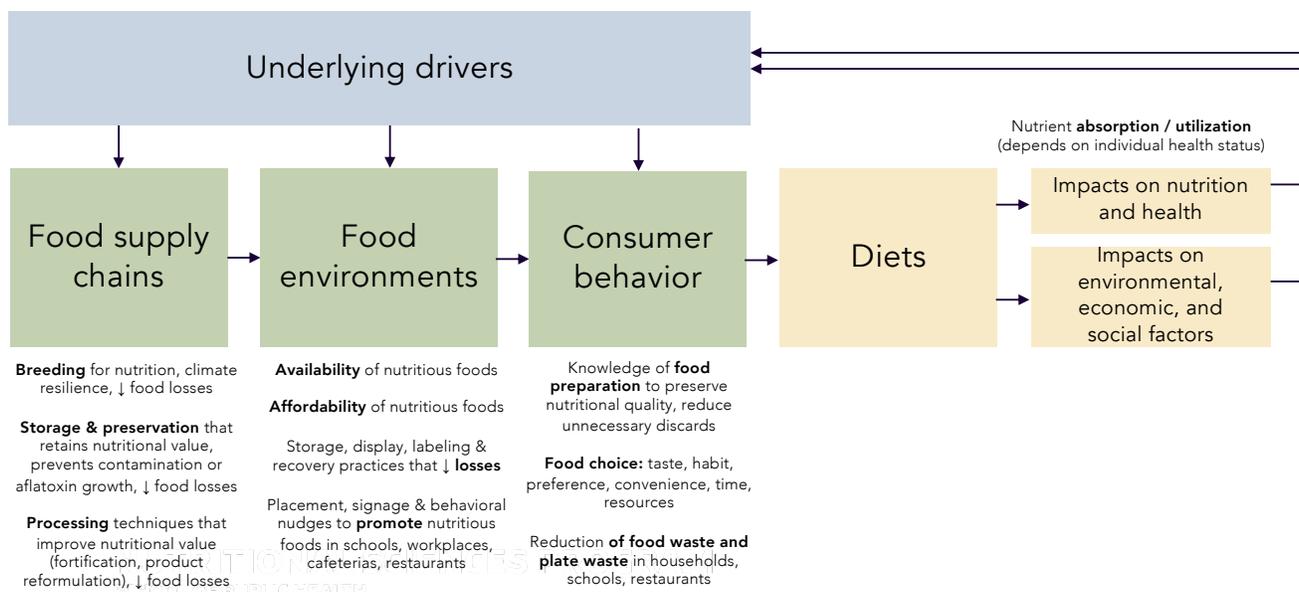


Source: HLPE. 2017. Nutrition and food systems. A report by the High-Level Panel of Experts on Food Security and Nutrition.

How do food systems affect nutrition and health?

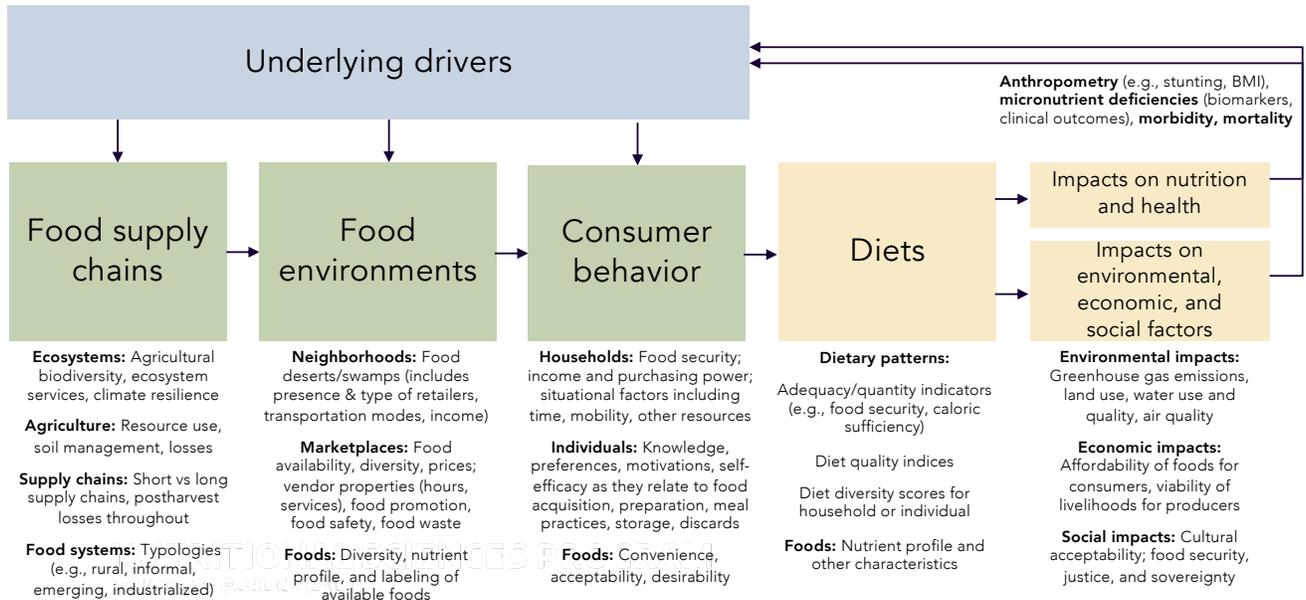
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What are some of the entry points for nutrition throughout food systems?

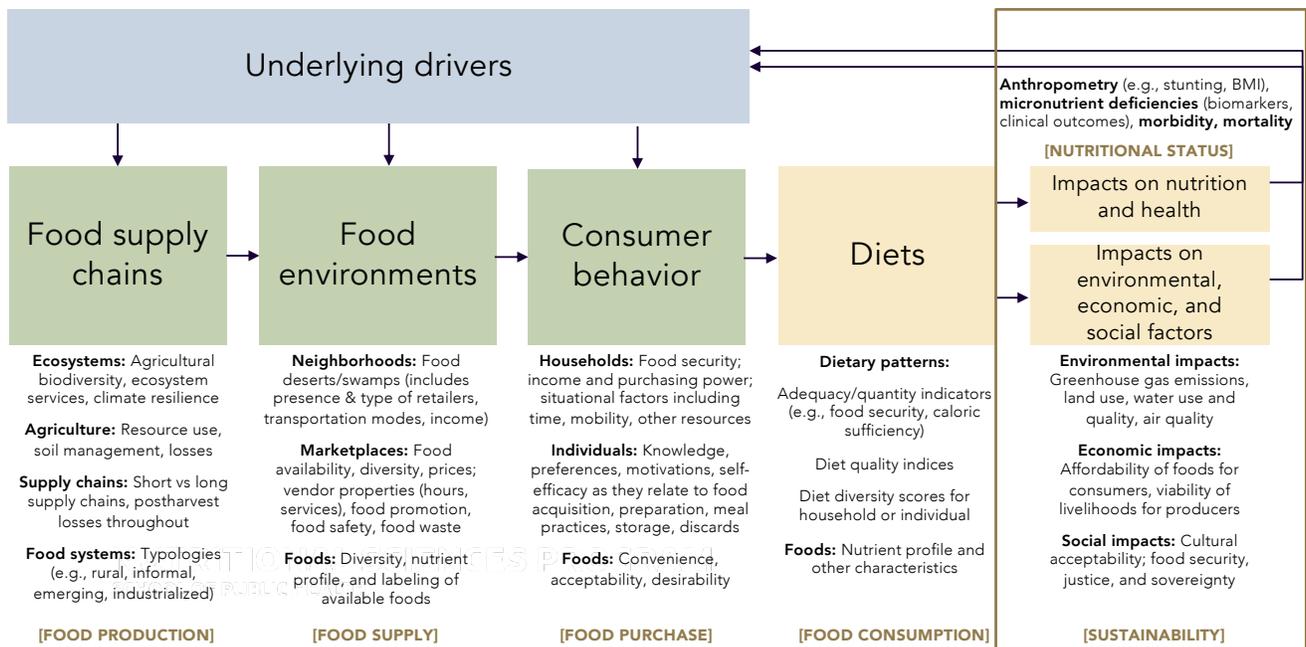


Sources: (Food systems framework) adapted from HLPE 2017, Nutrition and Food Systems. (Concept of nutrition entry points and exit points) adapted from Fanzo JC, Downs S, Marshall QE, de Pee S, Bloem MW. Value chain focus on food and nutrition security. In: Nutrition and health in a developing world 2017 (pp. 753-770). Humana Press.

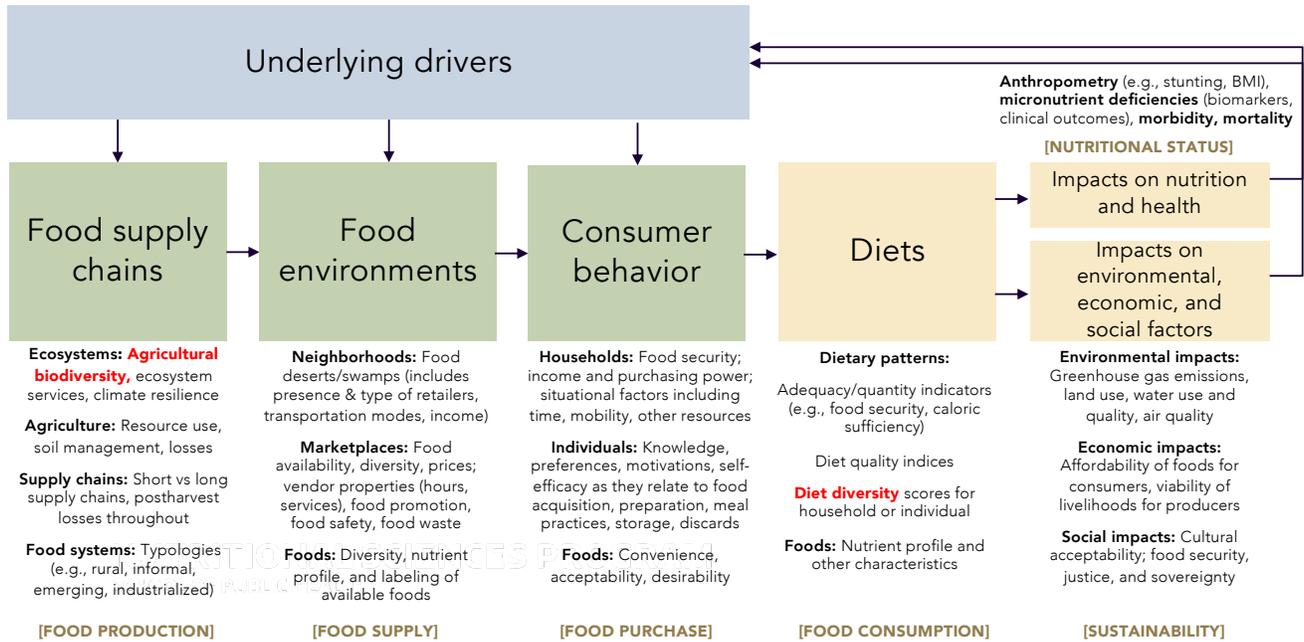
What are some of the ways we characterize the impact of food systems on nutrition?



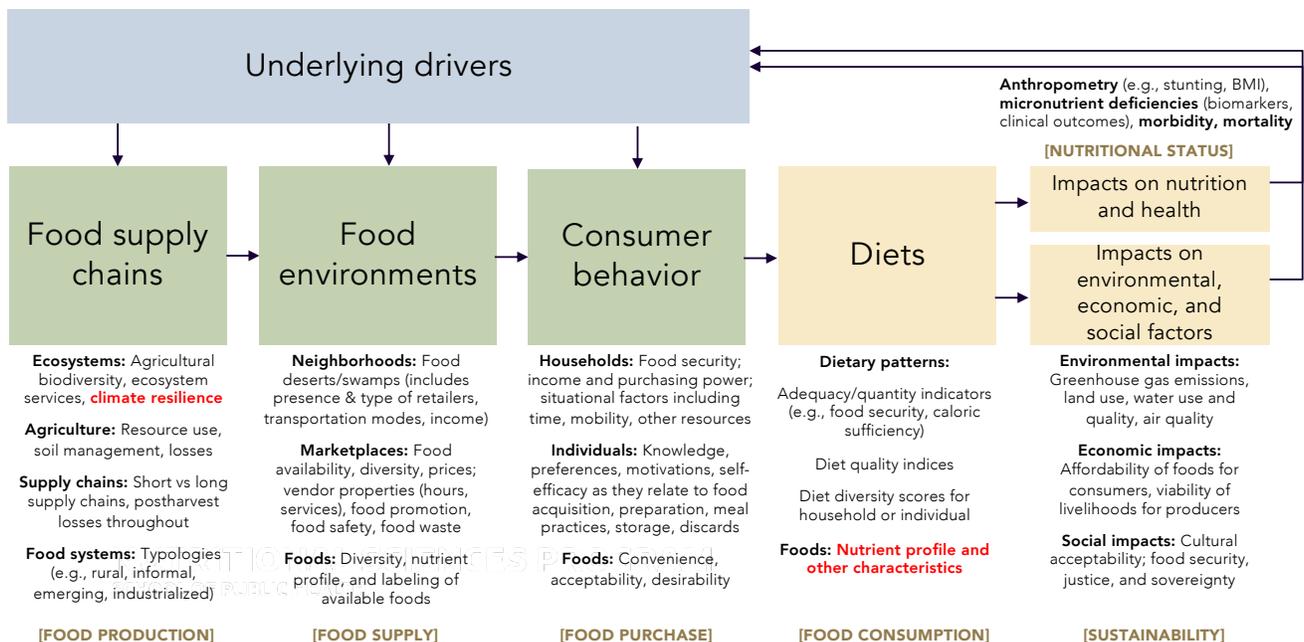
What are some of the ways we characterize the impact of food systems on nutrition?



What are some of the ways we study connections within food systems?

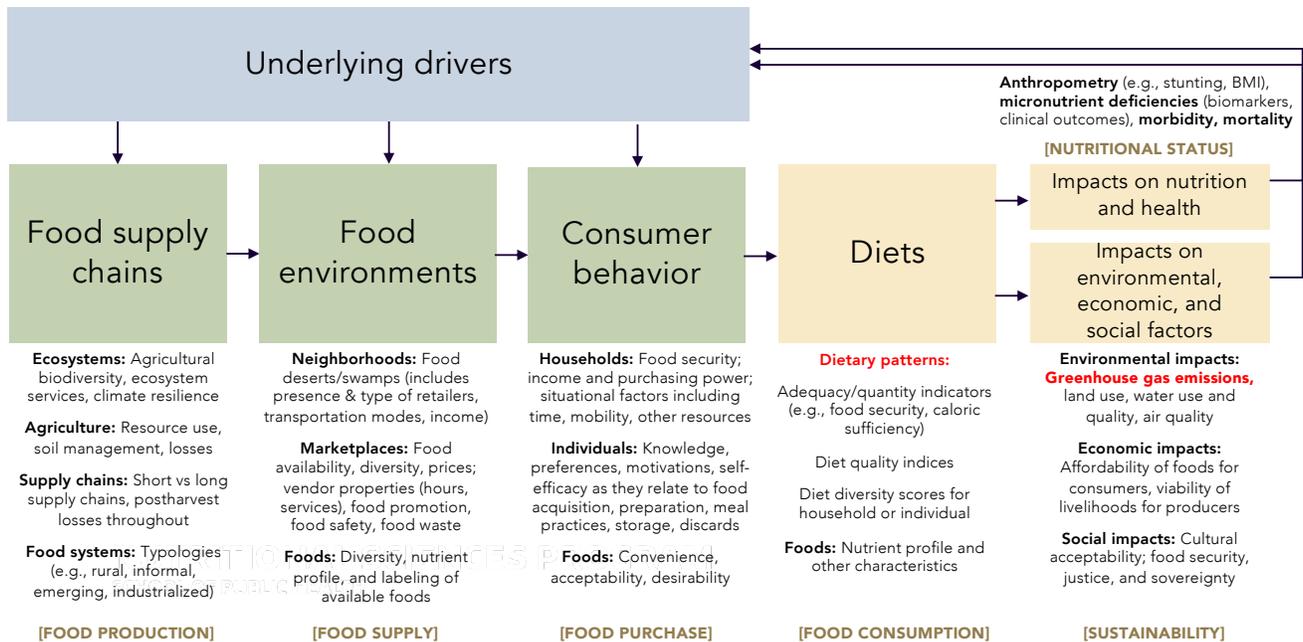


What are some of the ways we study connections within food systems?





What are some of the ways we study connections within food systems?





Plates, pyramids, planet

Developments in national healthy and sustainable dietary guidelines: a state of play assessment



What exactly do we mean by sustainable, resilient, and healthy food and water systems?

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Key definition: Sustainability

Isolating the concept of sustainability:

Can a system be maintained over the long term?

Thinking about what sustainability means in the food system:

A sustainable food system meets the needs of individuals and communities in the present moment, but also:

- Does not jeopardize the ability of future generations to meet their needs
- Adjusts over time to accommodate future generations

Source: Spiker, Reinhardt, and Bruening, Revised 2020 SOPP, Journal of the Academy of Nutrition and Dietetics.

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Sustainability example: Importance of soil health

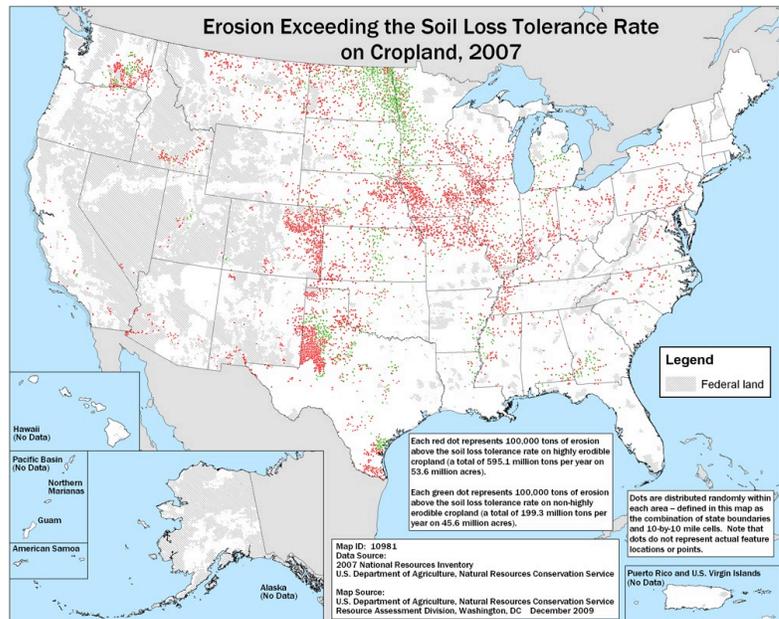


Image sources: Left: Voren1 via Getty Images. Right; Map from USDA NRS, 2007.

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Key definition: Resilience

Isolating the concept of resilience:

Can a system withstand or adapt to disturbances over time?

Thinking about what resilience means in the food system:

A resilient food system can withstand or rebound more quickly to shocks such as climate change, natural disasters, disease epidemics, political or economic crises, or rapid urbanization.

Source: Spiker, Reinhardt, and Bruening, Revised 2020 SOPP, Journal of the Academy of Nutrition and Dietetics.

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Resilience example: COVID-19 and food supply chains

WORLD • COVID-19
How Coronavirus Is Exposing the World's Fragile Food Supply Chain - and Could Leave Millions Hungry
People line up to receive free food distributed by a relief group during a government-imposed nationwide lockdown as a preventive measure against the COVID-19 coronavirus in Kolkata, India on April 23, 2020. (AP Photo/Debajyoti Ghosh)

TRIM
Fresh Taste Local Farms
Premium Quality
100% Natural
100% Fresh
100% Local
100% Organic

The scramble to feed the kids left hungry by the coronavirus crisis
Cafeteria workers and school nutrition directors from five districts across the country explain how meal programs are working now.
By Rachel Singer | Apr 17, 2020, 8:00am EDT

US stores and supermarkets might see shortages for the next year and a half, supply chain experts say
Michelle Mark | Apr 24, 2020, 1:53 PM

Shelves reserved for Pesto chicken lie empty at a ShopRite supermarket on April 24, 2020 in Plainville, New York. (Getty Images/Sruce Bennett)

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Key definition: Equity

What is equity?

The World Health Organization defines equity as “the absence of avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically or geographically.” (1)

How is equity central to sustainability and resilience?

- Some people are less likely to have their needs met, both now and in the future
- Individuals and communities differ in their ability to withstand and recover from disruptive events. Individuals and communities that were more vulnerable before a disruptive event may take longer to recover.

Source: (1) World Health Organization, 2020 (2). Dressel P, 2020.

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Key definition: Equity

How is equity different from equality?

“The route to achieving **equity** will not be accomplished through treating everyone **equally**. It will be achieved by treating everyone justly according to their circumstances.” – Paula Dressel, Race Matters Institute (2)

Example of equality: All public schools in a community have computer labs with the same number of computers and hours of operation during school hours.

Example of equity: Computer labs in lower income neighborhoods have more computers and printers, as well as longer hours of operation, because some students don't have access to computers or the internet at home.

Source: (1) World Health Organization, 2020 (2). Dressel P, 2020.

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Key definition: Equity

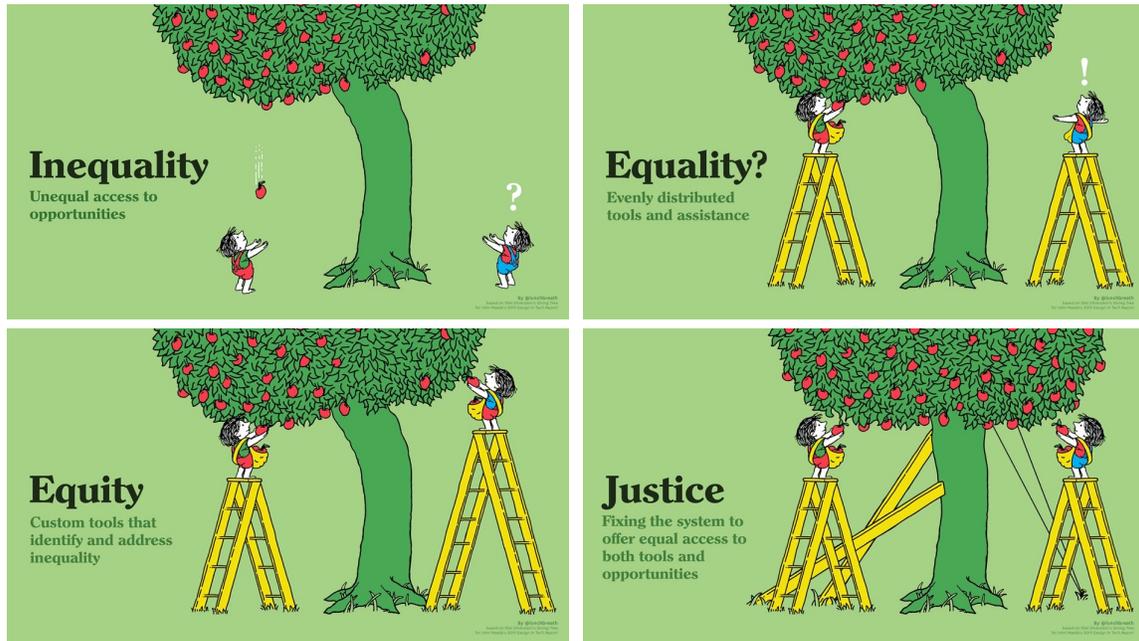


Image source: Images by @lunchbreath, based on Shel Silverstein's Giving Tree, for John Maeda's 2019 Design in Tech Report

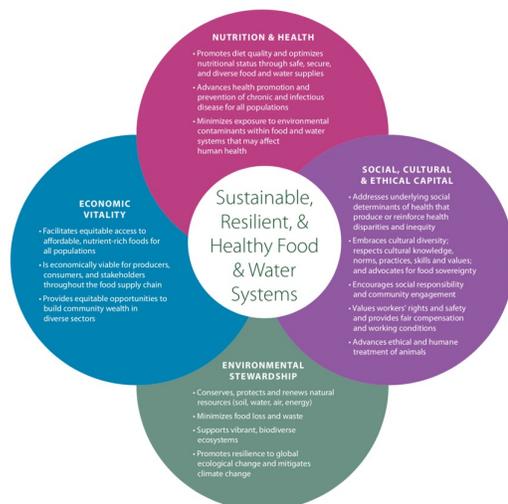
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Key definitions: Putting it all together

“A **sustainable, resilient, and healthy food and water system** is one in which all individuals have equitable access to a safe, adequate, and secure supply of food and water that supports optimal health, both now and in the future.”

Sustainable food systems are at the **intersection of four domains**:

- Nutrition and health
- Economic vitality
- Social, cultural, and ethical capital
- Environmental stewardship



Source: Spiker, Reinhardt, and Bruening, Revised 2020 SOPP, Journal of the Academy of Nutrition and Dietetics.

Getting on the same page about what we mean by sustainability

- > Sustainability **is**:
 - Comprised of multiple domains
 - About now *and* the future
 - About equity: all people, all places
 - Relevant to many parts of the workforce
 - Fundamental to the profession

- > Sustainability **is not**:
 - Exclusively about the environment
 - Only about the future
 - Only for those with financial means
 - Isolated from structural inequities
 - Only relevant to specialized practitioners



Fred Kirschenmann: "Sustainability is a **process, not a prescription**... it is a journey we embark upon together, not a formula upon which we agree."¹

Sources: (1) Kirschenmann FL. Food as relationship. *Journal of Hunger & Environmental Nutrition*. 2008 Aug 25;3(2-3):106-21. (image source) Spiker M, Reinhardt S, Bruening M. Academy of Nutrition and Dietetics: Revised 2020 Standards of Professional Performance for Registered Dietitian Nutritionists (Competent, Proficient, and Expert) in Sustainable, Resilient, and Healthy Food and Water Systems. *Journal of the Academy of Nutrition and Dietetics*. 2020 Sep 1;120(9):1568-85.

Environmental stewardship

The environment affects human diets:

- Growing crops, animals, and marine food sources requires **specific environmental conditions** – e.g., healthy soil, healthy marine ecosystems, biodiversity, adequate rainfall or water for irrigation, land suitable for grazing.
- There is a limit to how much food we can produce using the natural resources we have, and we need to **protect that resource base**.
- Food production relies on ecological systems. Ecological changes such as **climate change** may affect agricultural yields, nutritional content of crops, and more.

Human diets affect the environment:

- We need natural resources to produce, distribute, acquire, and prepare foods.
- Different foods and farming and supply chain practices **vary in their resource intensity** and their effects on the environment.



Source: Spiker, Reinhardt, and Bruening, Revised 2020 SOPP, *Journal of the Academy of Nutrition and Dietetics*.

Environmental stewardship examples: greenhouse gas emissions

Examples of ways human diets affect the environment

Foods may differ in their **greenhouse gas emissions**:

- Rice production tends to have higher CO₂ emissions per kg than potatoes, because flooded rice fields release methane. (1)
- Beef production tends to have higher CO₂ emissions per kg than poultry, because a) ruminant livestock release methane and b) more land is required for grazing and growing feed. (1)
- Beef finished on grass tends to have higher CO₂ emissions per kg than beef finished on feedlots, because cows finished on grass take more time to reach market weight. (2)
- Transporting foods by air may emit 50x more carbon dioxide equivalents than transporting foods by boat. (3)



Sources: (1) Clune et al., 2017 (2) Pelletier et al., 2010 (3) Ritchie 2020. Image source: Astrid860 via Getty Images.

Environmental stewardship examples: water use

Examples of ways human diets affect the environment

Foods may differ in their **water use**:

- Producing rice requires more water than producing potatoes, because rice cannot grow unless paddy fields are flooded. (1)
- Producing meat requires more water than producing vegetables, due to the water required to grow animal feed (whether that water is from irrigation or rainfall). (2)
- Compared to beef finished on feedlots, beef finished on grass requires less blue water (water from irrigation) but more green water (water from rainfall). (3)



Sources: (1) Chapagain and Hoekstra, 2011 (2) Kim et al., 2020 (3) Gerbens-Leenes et al, 2013. Image source: North-Tail via Getty Images.

Environmental stewardship examples: water quality

Examples of ways human diets affect the environment

Foods may differ in their **effect on water quality**:

- Excessive application of fertilizer on crops can cause nutrients (e.g., nitrogen, phosphorous) to run into freshwater and marine waterways. (1)
- Excessive nutrients can lead to algae blooms and anoxic dead zones in the water. (1)
- Bivalves (e.g., oysters, clams, mussels, scallops) are filter feeders: they remove excess nitrogen from the water. (2,3)

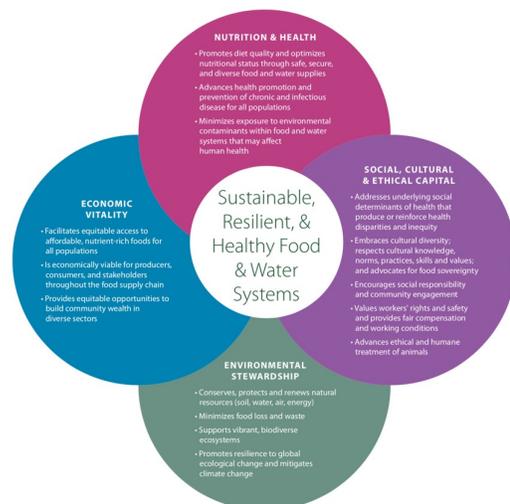


Sources: (1) Robertson and Vitousek, 2009 (2) NOAA, 2020 (3) Nigro, 2011. **image source:** Shutterstock via Getty Images.

How should we use this information?

When we **conceptualize sustainability as including multiple domains**, we can:

- See that achieving optimal nutrition and health are dependent on other factors
- Ensure that interventions to promote sustainability consider multiple factors
- Help colleagues in other sectors, fields, and professions see the value of nutrition
- Identify potential collaborators
- Consider potential co-benefits and trade-offs of nutrition interventions

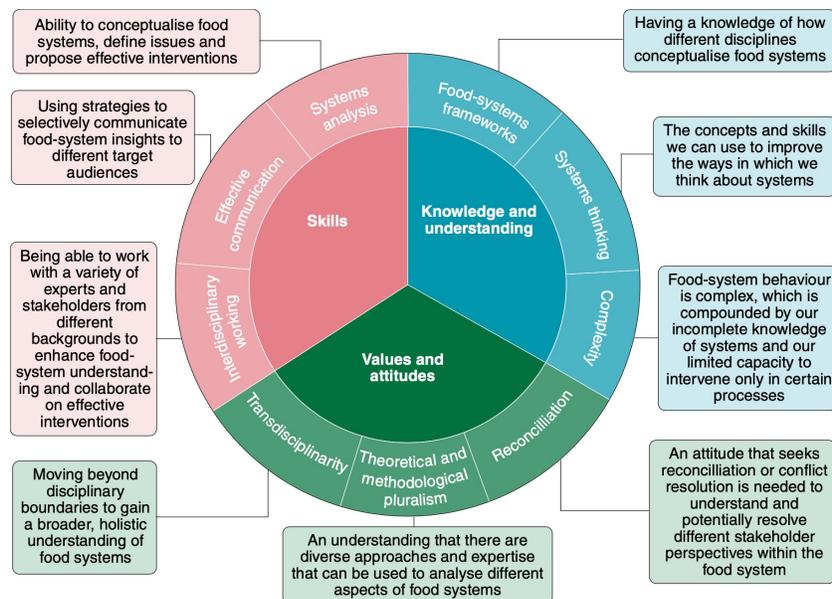


Source: Spiker, Reinhardt, and Bruening, Revised 2020 SOPP, Journal of the Academy of Nutrition and Dietetics.

I'm just one person... how do I change food systems?

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What does a future food systems workforce look like?



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Source: Ingram J, Ajates R, Arnall A, Blake L, Borrelli R, Collier R, de Frece A, Häsler B, Lang T, Pope H, Reed K. A future workforce of food-system analysts. *Nature Food*. 2020 Jan;1(1):9-10.

What is the systems part of food systems?

What is a system? Interconnected parts that operate towards a purpose

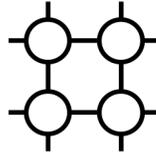
What are different types of systems?



Simple systems:

A well-defined relationship between an event and its outcome.

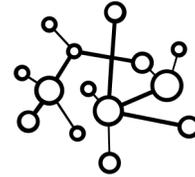
Example: The way a valve lets air into an engine.



Complicated systems:

The co-existence of several well-defined relationships between events and outcomes.

Example: The many mechanical actions and chemical reactions that occur when a vehicle operates.



Complex systems:

The co-existence of several relationships that are not well defined, and that may change over time.

Example: The effect of widespread vehicle use on human physical activity and health.

Sources: Definition of system from Peters 2014, Health Research Policy & Systems; examples of system types drawn from Spiker, Ickes, and Fanzo, 2020 in Public Health Nutrition, edited by Jones-Smith.

Systems thinking

What is systems thinking? A perspective of seeing and understanding a system as a whole, rather than as a collection of unrelated components

How can I practice systems thinking in my day-to-day work?

- Be aware of both:
 - **Root causes** of the problems you see in your patient population
 - **Downstream effects** of your interventions (both intended and unintended)
- Collaborate with people who work in other parts of the system:
 - With food systems, **your interprofessional team** might include professions beyond healthcare
 - Take time to learn each other's **priorities and professional languages**
 - Identify **common ground** and acknowledge where there might be **trade-offs**
 - Identify others who can be champions to help **get nutrition on the agenda**

Individual plus Policy, Systems, and Environment (I+PSE) Conceptual Framework: Creating Systems Change that Support Sustainable Food Systems



Source: Adapted from Tagtow A, Herman D, Cunningham-Sabo L. Next generation solutions to address adaptive challenges in dietetic practice: The I+PSE Conceptual Framework for Action. J Acad Nutr Diet.

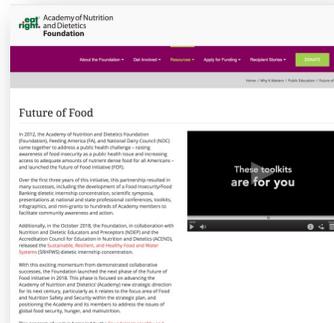
Helpful resources



Standards of Professional Performance (SOPP):
A framework for professional skill development in sustainable food systems. Includes resources, role examples, a glossary, and a framework for skill development.



Cultivating Sustainable Food Systems: a Nutrition-Focused Framework for Action:
Describes how RDNs and NDTRs can promote sustainable food systems through 5 entry points. Includes examples to inspire further action.



The Academy Foundation's Future of Food site:
<https://eatrightfoundation.org/why-it-matters/public-education/future-of-food/>

Academy of Nutrition and Dietetics Foundation resources include:

- Free 3 CPEU Sustainable Food Systems Primer for RDNs and NDTRs
- Additional webinar content on systems thinking in food systems, including instructor guides
- Map & spreadsheet directory of dietetics education programs offering sustainable food systems content
- Sustainable food systems curriculum for dietetics education programs + curriculum implementation guide

Take home messages

- > **Sustainable food systems are relevant to nutrition professionals**
 - The food system affects the options available to patients & clients
 - You can catalyze positive food systems change!
- > **Sustainability has multiple dimensions**, and nutrition is one of them!
 - A food system that doesn't promote human nutrition & health is not a sustainable food system
- > **Systems thinking helps us to move the needle on nutrition goals.**
 - The tools we practiced today – identifying root causes, creating networks maps, and thinking through network change – are just a few of the systems thinking tools available to us.
- > **Interprofessional collaboration is key.**
 - One agency or person can't do it all, but we can coordinate efforts.

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Contact

Marie Spiker, PhD, MSPH, RDN

mspiker@uw.edu

🐦 @MarieSpiker

mariespiker.com

SCHOOL OF PUBLIC HEALTH
NUTRITIONAL SCIENCES PROGRAM
UNIVERSITY of WASHINGTON

