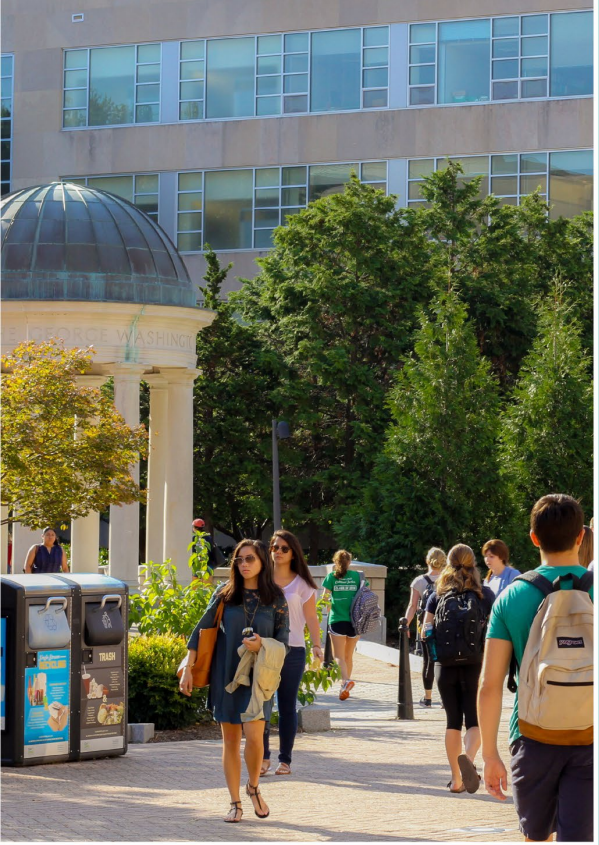

THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, DC

The Global Syndemic of Obesity, Undernutrition and Climate Change

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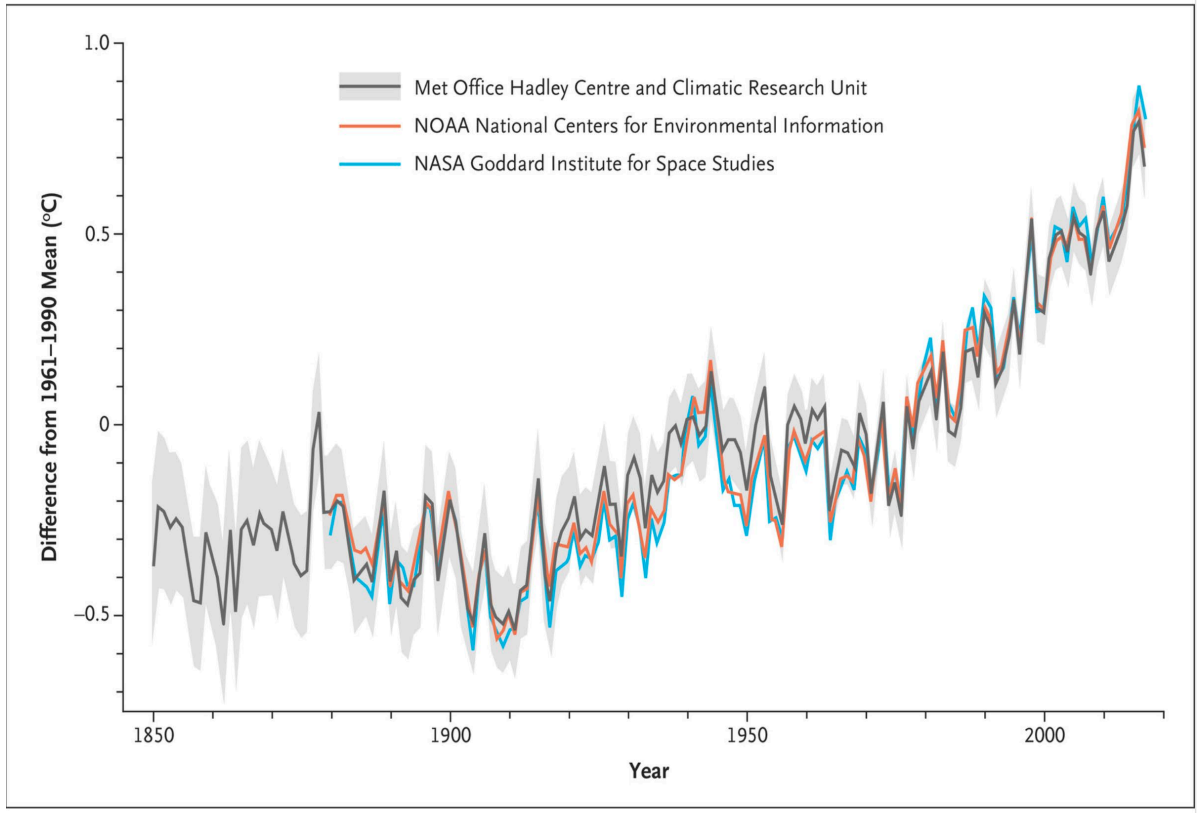
Outline

- The agrifood system contributes to climate change and is directly affected by it
- In the US, beef production and consumption are major and unsustainable drivers of human and planetary health
- The agrifood system interacts with ecological, social, economic and political systems
- The interconnectedness of these systems makes them highly resistant to change

Changes in Surface Temperature 1850-2017



Haines A, Ebi K. NEJM 2019; 380:263

GHG Generation

Source	US	Global
Agriculture.	10%	20-25%
Fossil fuels	30%	10%
Food waste	8%	8%

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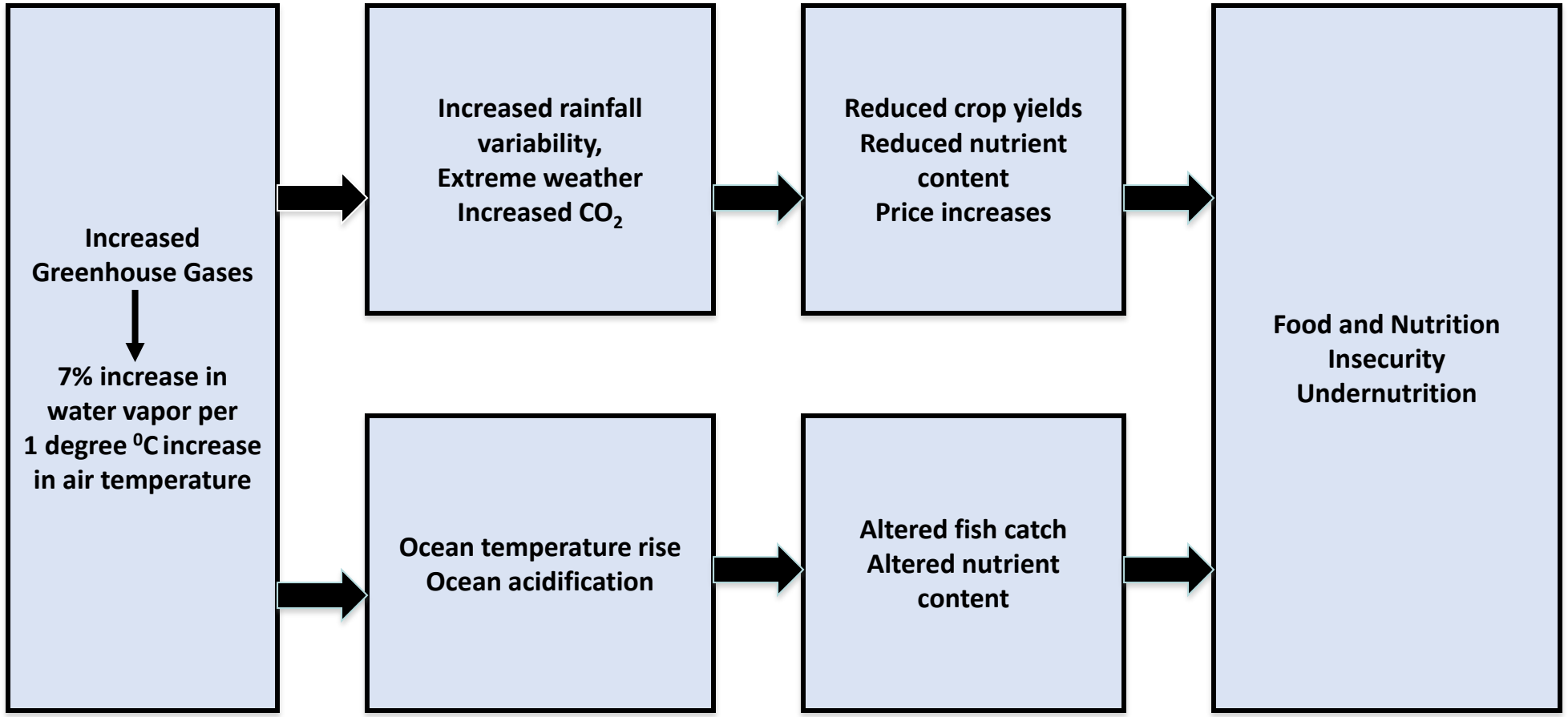
Impact of Climate Change on Food and Nutrition Security and Undernutrition



Myers SS et al. Ann Rev Public Health 2017; 38:259

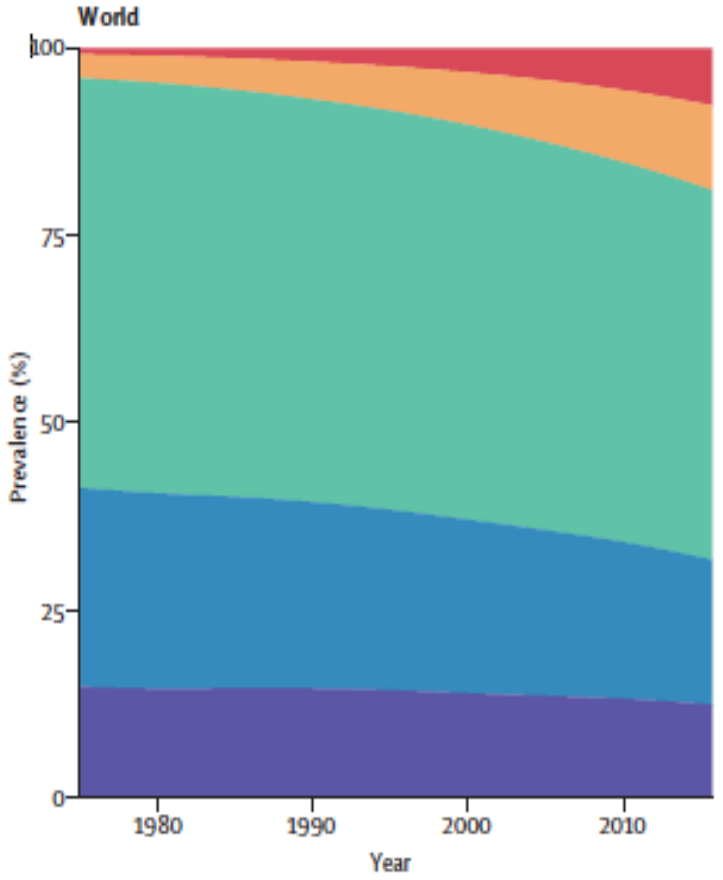
The Global Burden of Obesity, Undernutrition, and Climate Change

Obesity
2 billion people worldwide
$2 trillion/year

Stunting
155 million children with stunting
815 million people with chronic undernutrition

Malnutrition in all its forms
$3.5 trillion/year

Climate change
5-10% world's GDP



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The Global Syndemic of Obesity, Undernutrition, and Climate Change

Swinburn B et al. Lancet 2019; 393:791

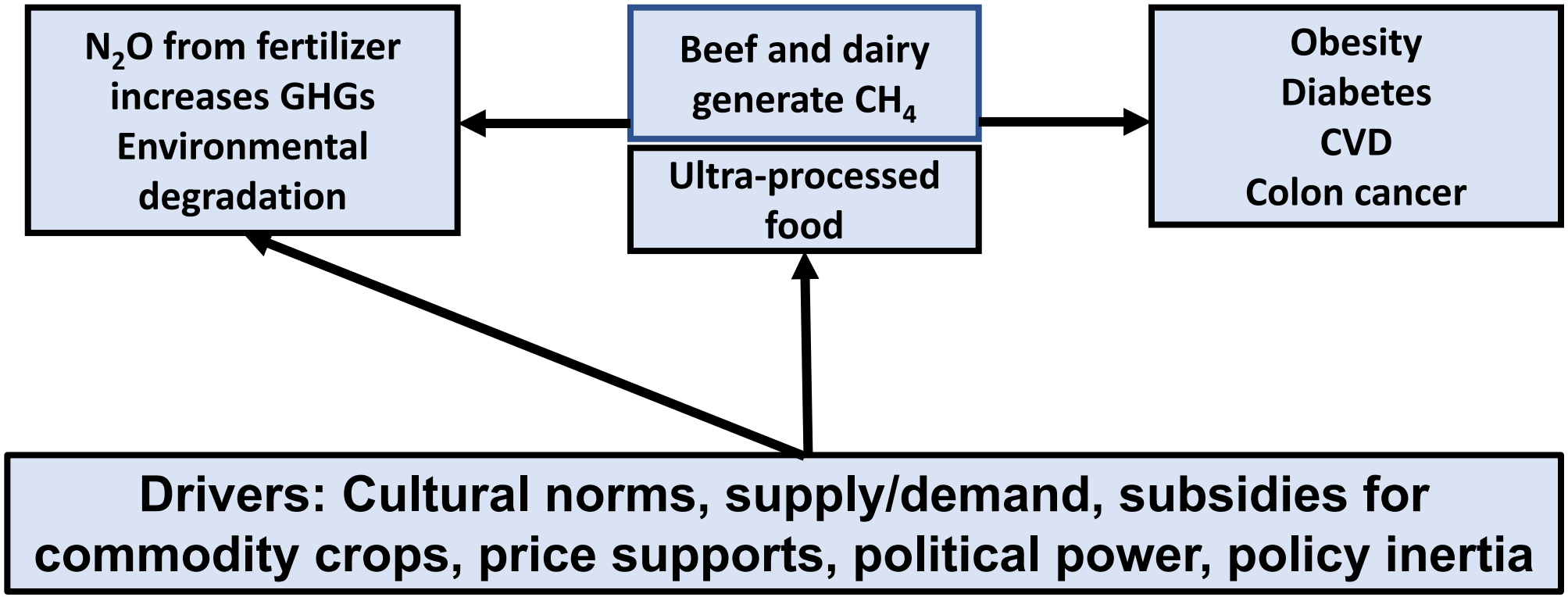
- The pandemics of obesity, undernutrition and effects of climate change cluster within populations
- All three pandemics interact at both biological and biosocial levels and have adverse impacts on each other
- Large scale social forces foster clustering, and have a disparate impact on marginalized populations

Mendenhall E and Singer M,
Curr Opinion HIV and AIDS 2020; 15:213

Examples of Interactions

- Obesity, stunting, and food insecurity in the same children and same population in LMICs
- Beef production, CH_4 and N_2O emissions, red and processed meat consumption and obesity, diabetes, colon cancer and cvd
- Increased GHGs from HICs reduce crop yields and micronutrient content of crops which contribute to food insecurity and undernutrition in LMICs

Contributions of the Agricultural and Food Processing Systems to the Global Syndemic

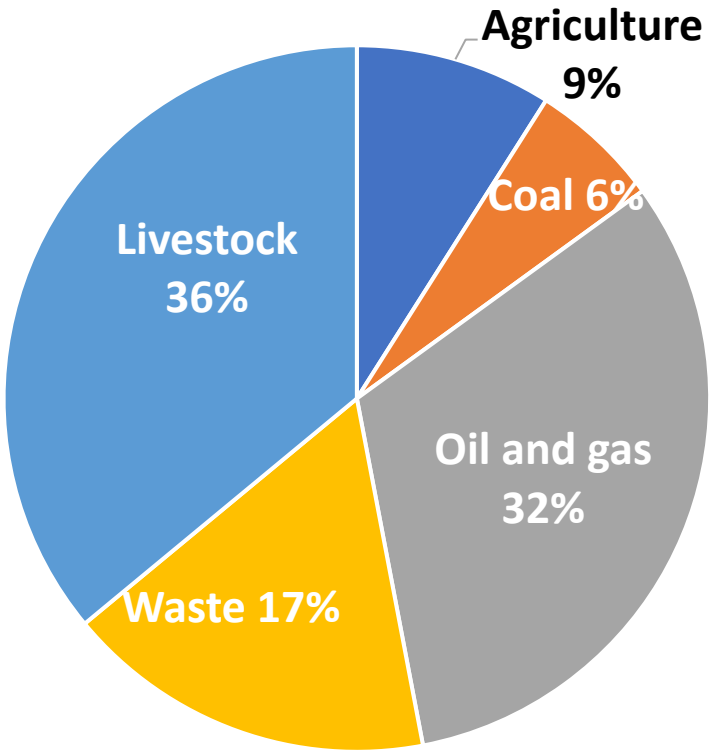


U.S. Emissions from Agriculture - MMT CO_2 Equivalents

	1990	2021
CO_2	**7.1**	**8.3**
Urea fertilizer	2.4	5.2
Liming	4.7	3.0
CH_4	**240**	**278**
Enteric fermentation	183	195
Manure	39	66
N_2O	**290**	**303**
Agriculture soil mgmnt	278	285
Manure	12	17
Totals	**538**	**589**

EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2021

Sources of CH_4 Emissions

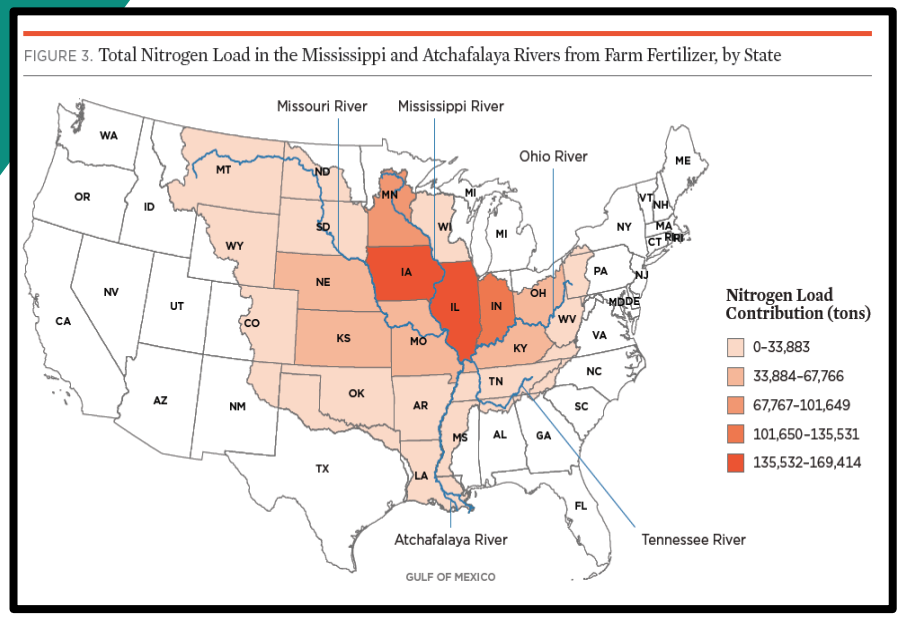


US EPA 2022. Inventory of US Greenhouse Gas Emissions and Sinks 1990-2020.

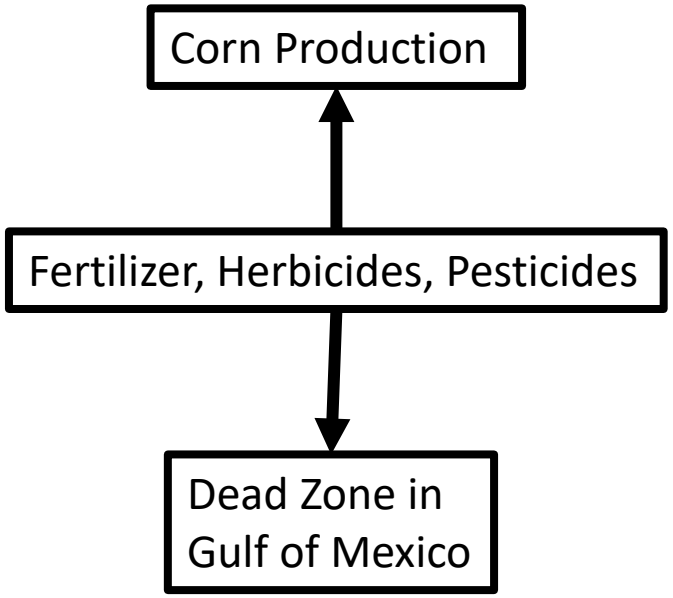
Additional Effects of Beef and Dairy Production

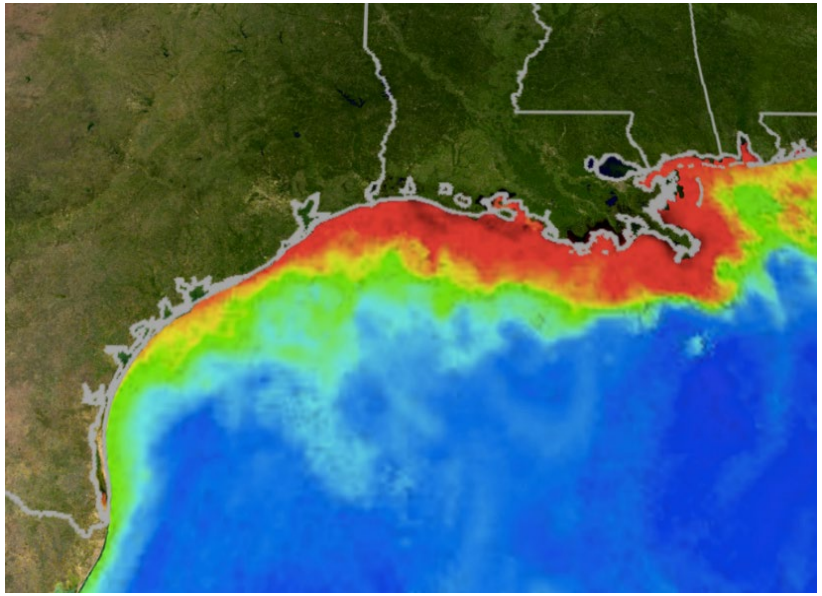
- 25 Kg of animal feed, 15,000L water = 1 kg beef
- 46% of land (24% pasture, 17% crops)
- 75% all freshwater use
- 80% deforestation
- Diversity loss

Impact of Corn Production on the Dead Zone in the Gulf of Mexico



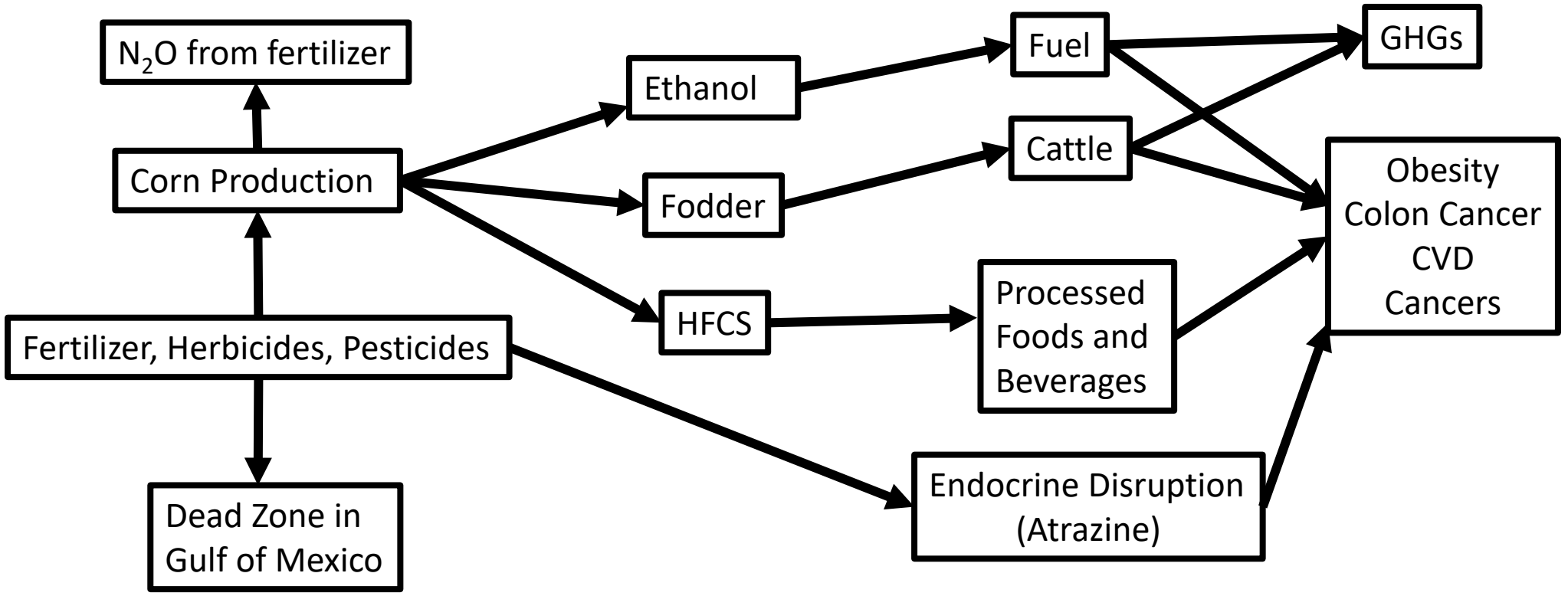
Mississippi River Watershed



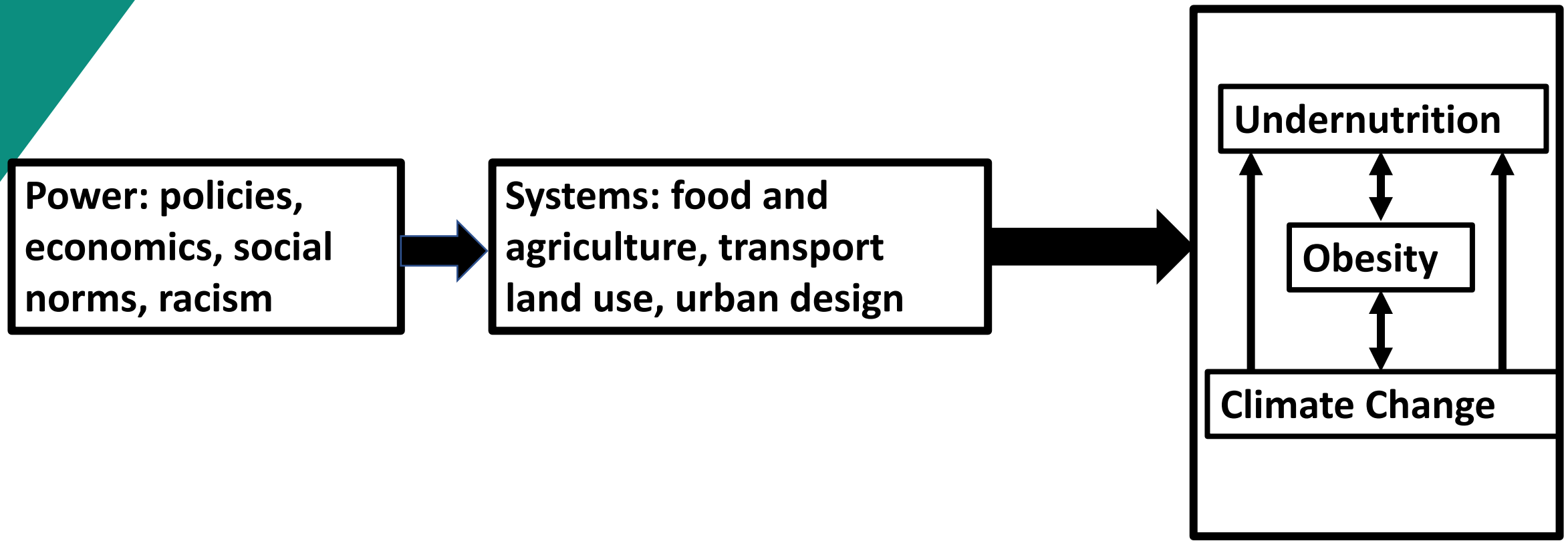


Gulf Of Mexico Dead Zone

Environmental and Health Effects of Corn Production



The Global Syndemic of Obesity, Undernutrition, and Climate Change: Outcomes, Systems and Drivers



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Triple Duty Actions

Climate Change

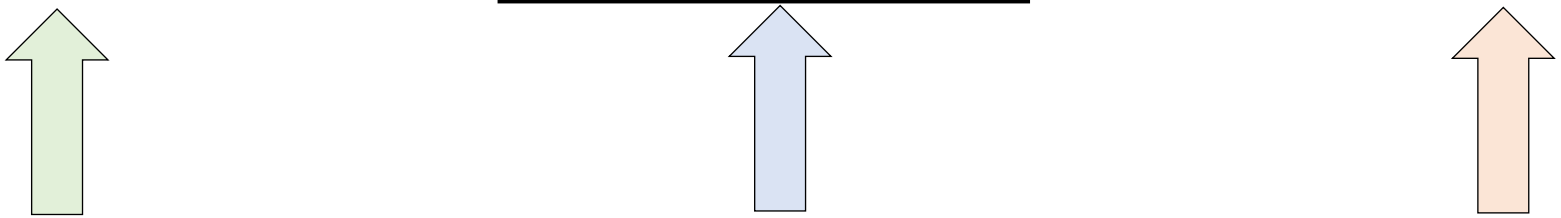
Lower GHGs from agriculture and cattle production

Obesity

Healthier diets for obesity, diabetes and cancer prevention

Undernutrition

Improved nutritional quality and food security



Increase plant-based foods and reduce beef consumption: include externalities in the costs of food; redirect subsidies for commodity crops; communication strategies; include sustainability in the DGAs; implement sustainable food labels; make beef checkoff voluntary; regional food systems to decrease transport costs

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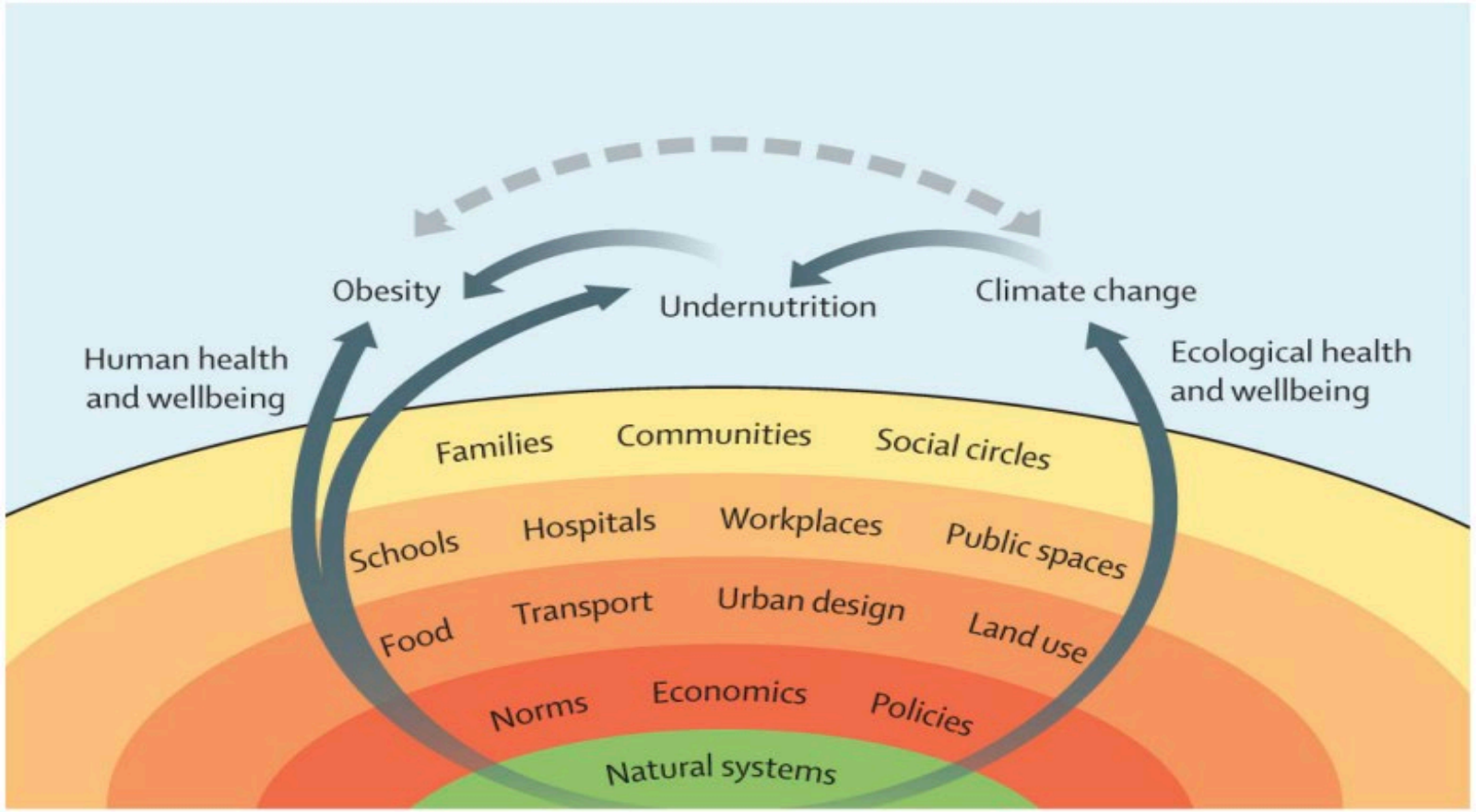
The Complexity of the Global Syndemic and Sustainability



Policy Resistance to Changes in Beef Production and Consumption

- Cargill, JBS, Tyson, and National Beef control 85% of beef production. These companies plus the National Cattlemen's Association constitute a powerful lobby
- USDA checkoff for beef generates almost $100m/year for beef promotion
- 2015 DGAC: Recommends that sustainability be part of dietary guidance. Secretaries Vilsack and Burwell declare that "sustainability is beyond the scope of the DGAs"
- 2020: Despite high rates of COVID-19 infections in meat plants, Trump uses Defense Production Act to classify "meat as critical infrastructure"
- 2020: Sustainability explicitly excluded as a consideration for dietary guidance in 2025 DGAs
- 2022: Ag Secretary Vilsack states that JBS, despite bribery and labor violations, cannot be removed from government procurement due to lack of competition

Messages Regarding Reduced Meat Consumption

Sievert et al. Public Health Nutrition 2021; 25:578

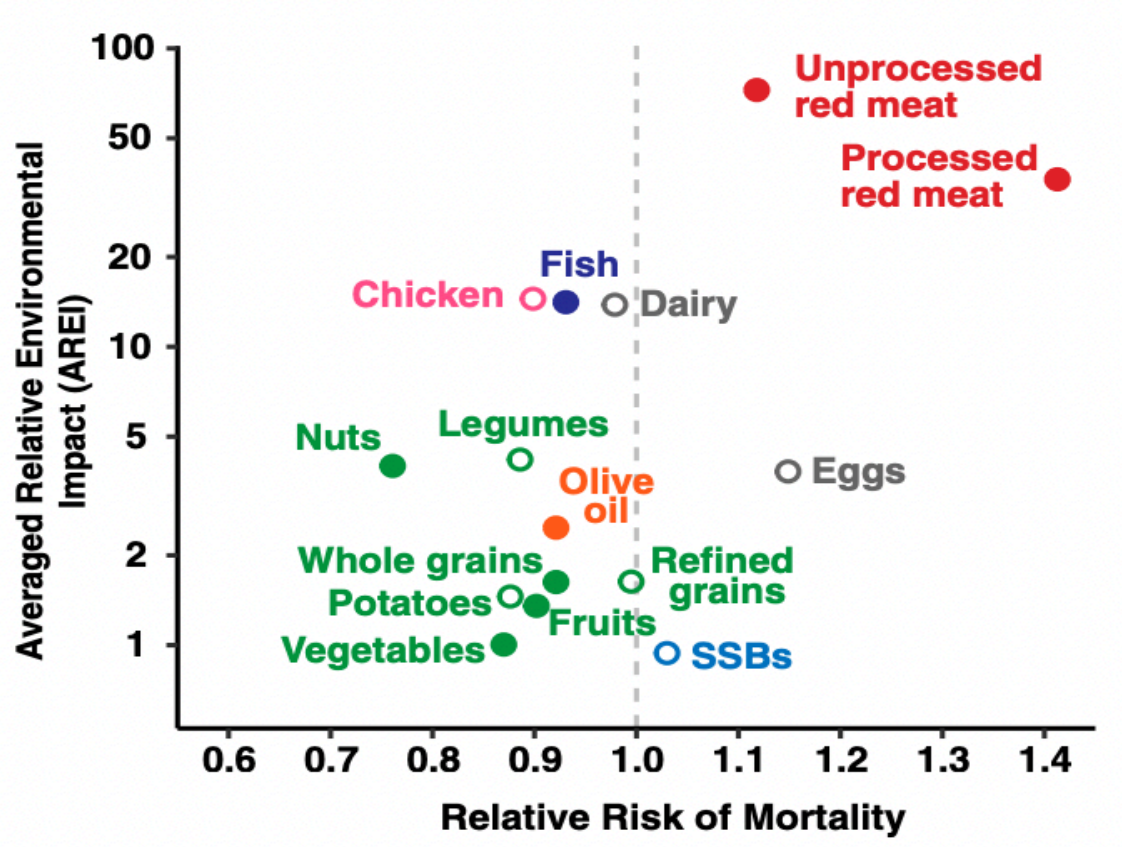
Reports

FAO Livestock's Long Shadow
WHO – International Agency for Research on Cancer – Carcinogenic Risks
EAT- Lancet Commission
IPCC Climate Change and Land

Pro-meat Responses

War on meat and ranchers
Restricts personal liberties – social control by government
Science is lacking
Destroys cultural and traditional values
Hurts poor people
Diversionary tactics (conservation, focus on fossil fuels)
Vegan agenda

Health and Environmental Impacts of Foods



Clark MA et al. PNAS; 2019: pnas.1906908116

Local Strategies to Reduce Red and Processed Meat

- Build political will
- Publicize the effects of RPM on health and climate change
- Develop common targets and local coalitions
- Change our institutions – procurement, composting
- Develop regional food systems
- Develop Central Processing Facilities (DC example)