WELCOME TO THE TRA 6 LECTURE SERIES
INNOVATION PATHWAYS TO SUSTAINABILITY

"SUSTAINABLE FOOD SYSTEMS IN THE ERA OF THE
ANTHROPOCENE AND PANDEMICS: CAN WE HAVE IT ALL?"

SPEAKER:
JESSICA FANZO, BLOOMBERG DISTINGUISHED PROFESSOR OF
GLOBAL FOOD & AGRICULTURAL POLICY AND ETHICS, JOHNS
HOPKINS BERMAN INSTITUTE OF BIOETHICS

MODERATORS:
JOACHIM VON BRAUN, JAN BÖRNER,
TRA 6-SPEAKERS, UNIVERSITY OF BONN
Sustainable Food Systems in the Era of the Anthropocene and Pandemics:
Can we have it all?

Jessica Fanzo, PhD
Bloomberg Distinguished Professor
Johns Hopkins University, USA
For our discussion

• How are food systems coping in the context of the Anthropocene, global malnutrition, and the COVID-19 pandemic?

• How can research and science, technological innovation, government action and consumer behavior ensure food systems are resilient?

• What are the potential trade-offs as we move forward?
Calls for food systems transformation

In the last five years, we have seen many calls for grand-scale food systems transformation to improve diets and nutrition.

And now, planetary health has come to the forefront
Making this transformation is not so easy with the challenges food systems face

With climate disruption, worsening food insecurity and malnutrition, systemic inequities, and now, the COVID-19 pandemic, the question remains:

Can the world expect so much from food systems?
The *Anthropocene* defines Earth's most recent geologic time period as being human-influenced, or anthropogenic, based on overwhelming global evidence that atmospheric, geologic, hydrologic, biospheric and other earth system processes are now altered by humans.
Geology of mankind

Paul J. Crutzen

The Lancet Commissions

Food in the Anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food systems

Research

REVIEW SUMMARY

GLOBAL CONSERVATION

Pervasive human-driven decline of life on Earth points to the need for transformative change


Editorial

A sixth mass extinction? Why planetary health matters

For many decades, scientists have warned that human activity is pushing life on our planet beyond the point of no return. In the Earth’s history there have been five mass extinction events, most recently the Cretaceous-Tertiary mass extinction that occurred almost 65 million years ago and was thought to have been caused by the massive impact of an asteroid on Planet Earth. In the 21st century, we face a sixth mass extinction. According to an article published in July by Gerardo Ceballos and colleagues, the Earth is experiencing a huge decline in their fastest rate in more than a decade, and today the government is proposing the release of 860,000 acres of Amazon forest—an area the size of Portugal—for agricultural production, farming, and mining following pressure from the rural lobbies. They are claiming this will bring economic progress to the whole country. As for the consequences on food production, fewer species to provide natural pest control will mean farmers have to rely more on chemical pesticides. Similarly, crop production on a mass scale will continue to rely on insect pollinators.
Catastrophic climate breakdown…

The challenge of avoiding catastrophic climate breakdown requires “rapid, far-reaching and unprecedented changes in all aspects of society.”

IPCC, 2018
Food systems are both victims and instigators of climate change
EXTERNAL DRIVERS

CLIMATE CHANGE
GLOBALIZATION AND TRADE
INCOME GROWTH AND DISTRIBUTION
URBANIZATION
POPULATION GROWTH AND MIGRATION
POLITICS AND LEADERSHIP
SOCIO-CULTURAL CONTEXT

FOOD SUPPLY CHAINS

- Food production systems and input supply
- Storage and distribution
- Processing and packaging
- Retail and marketing

FOOD ENVIRONMENTS

- Food availability - type and diversity of foods on offer
- Food affordability - food prices, relative to other foods or to an income/expenditure standard
- Product properties - quality and appeal, safety, and convenience
- Vendor properties - type and characteristics of retail outlet
- Food messaging - Promotion, advertising, and information about food

INDIVIDUAL FACTORS

- Economic - income and purchasing power
- Cognitive - information and knowledge
- Aspirational - desires, values, and preferences
- Situational - home and work environment, mobility, location, time resources

CONSUMER BEHAVIOR

- Consumer Behavior - Food acquisition, preparation, meal practices, and storage

DIETS

- Nutrition and health outcomes
- Other impacts

ADAPTED FROM: HLPE (2017). NUTRITION AND FOOD SYSTEMS. A REPORT BY THE HIGH LEVEL PANEL OF EXPERTS ON FOOD SECURITY AND NUTRITION OF THE COMMITTEE ON WORLD FOOD SECURITY, ROME, ITALY.
Climate change is a threat to food security

Climate change is projected to have a net adverse impact on crop yields

3C warmer (scariest) world scenario

With this scenario, loss of biodiversity and water stress will increase as well, which will impact the ability to grow food.

Threatening multiple breadbasket failures

Extreme weather events such as heat waves, droughts and flooding and cold spells can lead to devastating crop failures of major crops such as wheat, maize, soybean and rice. The risk of extreme weather events co-occurring at multiple cropping locations globally is increasing because of climate change.
Nutritional quality of crops are altered by CO2 fertilization effects

Food safety risks will change with a warmer world

Risk maps for aflatoxin contamination in maize at harvest in 3 different climate scenarios, present, +2 °C, +5 °C.

Food systems contribute to GHG emissions

37% of Earth’s landmass (excluding Antarctica) is used for food production

Agriculture accounts for ¼ of global GHG emissions

Note: Numbers may not sum to 100% due to rounding.

Environmental stress of food production will continue in order to meet dietary demands.
The EAT Lancet Commission calls for grand transformations to food production systems

Almost no increase in cereal production

Vegetables +75%  Fruits >50%

Red meat production >65%

Fish >50%  Legumes >75% Nuts >150%

A study of the world’s countries finds that over the last 50 years, diets have become ever more similar.

Each country’s food supply composition in contribution to calories in:

- 1961
- 1985
- 2009

But how?

How we should be eating (Harvard’s healthy eating plate model):
- Sugar: 3%
- Cereals & Starches: 20%
- Fruits & Vegetables: 49%
- Oils & fats: 20%
- Meat, fish, eggs, beans: 11%
- Milk & milk products: 3%

WHO sugar limit <5%

What we are actually producing (According to 2011 FAO):
- Sugar: 16%
- Cereals & Starches: 11%
- Fruits & Vegetables: 47%
- Oils & fats: 11%
- Meat, fish, eggs, beans: 16%
- Milk & milk products: 11%

Source Adapted from bar chart in KC, KB et al, 2018.

Worsening and inequitable food insecurity, malnutrition & diets
Global malnutrition is massive, and complex

690 million
of the world’s population are undernourished

144 million
children under five years of age are stunted

47 million
children under five years of age are wasted

38 million
children under five years of age are overweight

2.1 billion
adults are overweight or obese

The double burden of malnutrition is rising in low- and middle-income countries

Countries with DBM in the 1990s

Countries with DBM in the 2010s

We are experiencing a profound paradox, with diets being a significant contributor to the burden.
Sub-optimal diets are a top risk factor of disease and death

The EAT Lancet Commission shows inequities of diets when compared to a "healthy reference diet"
And the reference Lancet-EAT diet is unaffordable for 1.6 billion people

The least-cost sources of nutrient adequacy are less expensive than the EAT-Lancet reference diet, but still unaffordable

Who suffers the consequences of world diet choices?

- Energy intensive lifestyles and dietary choices of those living in high-income countries are significant anthropogenic contributors to climate change.
- Economically poor households are likely to experience a disproportionate burden of the impacts of climate change.

Unaffordable healthy diets are correlated with food insecurity and malnutrition.
Food prices can lead to social unrest

Countries in which consumers spend more than 30% of income on food expenditures:

- Nigeria
- Kenya
- Cameroon
- Kazakhstan
- Algeria
- Philippines
- Pakistan
- Guatemala
- Azerbaijan
- Turkmenistan

Sedentarizing Pastoralists in Kenya Amidst Climate Change

• Pastoral communities are among the most politically and economically marginalized in society.

• Evaluated the constraints hindering pastoralists’ abilities to secure their livelihoods in Isiolo, Kenya.

• Findings: there is a systemic failure to account for pastoralists’ experiences, endowments (such as assets and income), conversion factors (such as political and environmental conditions), and capabilities to engage makes it difficult to realize policies that meet the needs and goals of already marginalized populations.

Animal source foods are even more expensive

A heat map of *Relative Caloric Prices* of animal-sourced foods in 176 countries, grouped by World Bank income levels and major regions.

And there is a growing demand for meat

China eats half as much meat as the U.S., but because two-thirds of its meat has traditionally been high-fat pork, it consumes more total meat calories. Now demand for leaner meat is rising.

Highly processed foods (which are associated with poor health outcomes) are also rising.

COVID-19 began as a food system risk

- SARS-CoV-2 infected people through a zoonotic spillover event, most likely from a bat, although another animal may have been involved.

- Case trace back from the December outbreak in Wuhan, China implicated a seafood wet food market.

- COVID-19 is a zoonosis, a disease 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 disease - animals are in close proximity to humans, either because their natural habitat has shrunk or been destroyed, or they are moved from their habitats.

- No other species has so profoundly changed the planet and the ecosystems that support species' diversity in such a short span of time.

COVID-19 pandemic and its impacts on food security

**FIGURE 2** Formal jobs at risk in food systems

<table>
<thead>
<tr>
<th>Where in value chain</th>
<th>Jobs (in millions)</th>
<th>Livelihoods (in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary production</td>
<td>716.77</td>
<td>2,023.80</td>
</tr>
<tr>
<td>Food processing</td>
<td>200.73</td>
<td>484.54</td>
</tr>
<tr>
<td>Food services</td>
<td>168.97</td>
<td>339.44</td>
</tr>
<tr>
<td>Distribution services</td>
<td>96.34</td>
<td>241.48</td>
</tr>
<tr>
<td>Transportation services</td>
<td>41.61</td>
<td>101.05</td>
</tr>
<tr>
<td>Machinery</td>
<td>6.51</td>
<td>13.18</td>
</tr>
<tr>
<td>Inputs</td>
<td>4.89</td>
<td>11.06</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>0.13</td>
<td>0.29</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,280.93</strong></td>
<td><strong>3,214.84</strong></td>
</tr>
<tr>
<td><strong>Total at risk due to COVID-19</strong></td>
<td><strong>451.64</strong></td>
<td><strong>1,090.89</strong></td>
</tr>
</tbody>
</table>
Food insecurity hotspots

Estimates suggest that acute food insecurity will rise to 265 million by the end of 2020.


Note: IPC/CH (Integrated Phase Classification/Cadre Harmonisé) provides a scale for classifying the severity and magnitude of food insecurity and malnutrition. Phase 3 (IPC 3) indicates crisis-level food insecurity.
COVID-19 direct effects on malnutrition

1. Stakeholder consultation / buy-in
2. Robust situational analysis
3. Address food insecurity – especially for marginalized populations
4. Invest in education, especially for girls
5. Address gender disparities and empower women
6. Improve living conditions, esp. wash
7. Access to family planning
8. Access to maternal and newborn health care
9. Promotion of early and exclusive breastfeeding
10. Improving complementary feeding and dietary diversification

Focused investments in MNCH services through existing health systems and extension services

Leveraging community-based systems to provide services and manage health and nutrition outreach

Providing targeted programatic support to ensure the most vulnerable are protected

7 recommendations

1. Stabilize food systems and keep trade open and flowing (by supporting and protecting food system workers).
2. Ensure global food supplies are safe, nutritious and equitable.
3. Govern the regulation of illegal sales of wildlife in global food trade and food markets.
4. Link social protection programs to promoting the consumption and production of nutritious food and addressing food insecurity.
5. Consider a one-health approach for research collaborations.
6. Institute a systematic global effort to monitor pathogens emerging from animals that put human populations at risk.
Should we expect so much for food systems?

- Future modeling and some scenarios show that we should call on food systems to do much more – that is, promote optimal human health, ensure future sustainable planetary health, and provide equitable and fair livelihoods of food system actors.

- However, this will depend on science and research, technology, political will and cooperation, and behaviors and decisions of the unpredictable variable in the equation - humans.

1. Building and communicating research and evidence

- At a time when facts and evidence are under ever greater scrutiny, and even openly disregarded as suspect by some political and business leaders, the rigors of science and evidence must be maintained.
- Research has a vital role in charting a positive and sustainable direction for global food security, nutrition, and health.
- Research can and does bring about wholesale changes in attitudes, political thought, and action.

But we need to sort ourselves out along with our messages

<table>
<thead>
<tr>
<th>The state of play</th>
<th>What is the failure about?</th>
<th>What is threatened and needs to be fixed?</th>
<th>Where do the priorities for action stand?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inability of the system to feed the future world population</td>
<td>Food security</td>
<td>Closing the yield gap</td>
<td></td>
</tr>
<tr>
<td>Inability of the system to deliver a healthy diet</td>
<td>Nutrition security and health</td>
<td>Closing the nutrient gap and ensuring the quality of diet</td>
<td></td>
</tr>
<tr>
<td>Inability of the system to produce equal and equitable benefits</td>
<td>Social justice, democratic process, small-scale actors</td>
<td>Decentralization, grassroots autonomy</td>
<td></td>
</tr>
<tr>
<td>Unsustainability of the system and its impact on the environment</td>
<td>Natural resources, agrobiodiversity, energy-water-carbon efficiency</td>
<td>Reducing the food-print of the system on the environment</td>
<td></td>
</tr>
</tbody>
</table>

Does evidence always matter in policy decision-making?

“The good news is that evidence can matter. The bad news is that it often does not.” – Julius Court, ODI

Coming to grips with evidence-based policy realities

“When presenting evidence to policymakers, researchers need to engage with the policy process that exists, not the one we wish existed.”

• Efforts fail when researchers do not understand how the policy process works.

• Need to reject the romantic notion that policymakers will ever think like scientists.

• “Bounded rationality” - policymakers can only gather limited information before they make decisions quickly. They will have made either rational or irrational choices before you have a chance to say, “more research is needed”!

2. Bringing technology to the table

• There has never been a time in history as there is now when progress can be made towards a better world in the context of communication, technologies, innovation, big data and global cooperation.

• What technology options are ethically permissible and acceptable and what is considered fair?
Dietary, technology on farms, minimizing FLW are critical to reduce environmental impacts of food systems.

Technological readiness of future food system technologies

Essential accelerators to help achieve healthy and sustainable diets, productive food systems and improved waste management—three outcomes necessary to transform and attain sustainable food systems.

Innovations to build sustainable, equitable, inclusive food value chains

- Expert panel led by Chris Barrett and the Cornell University Atkinson Center for Sustainability
- The panel is composed of industry, academia and broadly civil society
- Tasks are to:
  - Explore the feasible innovations likely to ameliorate the human and environmental outcomes of the food system.
  - Identify and assess potential actions able to move the food value chain to meet criteria: more inclusive, equitable and sustainable.
3. Policies, politics and political economies

• No technical recommendations to fix food systems will stand on two legs with the current fractured and sclerotic global political enabling environment.

• In order for food systems to function effectively, equitably and sufficiently during the pandemic and long after, the political environment must be one that embraces global cooperation and inclusion and minimizes political polarization and geopolitical competition.
What constrains higher prioritization of food systems in politics?

• **The context** – weak institutional incentives, “institutional orphan”

• **The message** – lack of a simple story, no silver bullets, difficulty of attribution so there is no action

• **Their functionality** – hard to measure and take a temperature check

• **The balance of power and trust** – in who shapes and ”governs” food systems
The context – weak institutional incentives, “institutional orphan”
“The risks of making well intentioned but inappropriate policy choices are much smaller than the risks of using a lack of evidence as an argument for inaction.”

--UN HLPE report on food systems and nutrition (2017)
Their functionality – hard to measure and take a temperature check

The balance of power and trust – in who shapes and ”governs” food systems

“The expansion in the concentration of transnational food corporations and their massively increased, well-coordinated, political and economic power constitutes a major challenge to governance”

~ Lancet Obesity Commission, p27
4. Changing behaviors, of everyone

- Behavior change incentives and nudges of various food system actors and consumers must complement the research, technology and politics.
- Behavior is malleable, but also, ephemeral...
- Nudging is gaining traction because of its less forbidding and paternalistic nature.

Inevitably, there will be trade-offs.

- There is great potential for food systems to promote resiliency, equity and sustainability for better diets, better human and planetary health, and a better world.
- Inevitably though, there will be trade-offs. The question is, how to deal with those trade-offs while doing the least amount of damage.

Inevitably, there will be trade-offs

- There is great potential for food systems to promote resiliency, equity and sustainability for better diets, better human and planetary health, and a better world.
- So can we have it all? It depends.
- There will be trade-offs. The question is, how to deal with those trade-offs while doing the least amount of damage.

Thank you!

@jessfanzo
jfanzo1@jhu.edu