Future of the Future of Food Systems

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Overview

- Food system at critical juncture
- On innovation, *History of the Future of Food*
  - Food production, processing, packaging
  - Alternative forms of food production
  - Food distribution
  - Marketing and value chains
  - Data and analytics, addressing waste
  - Food access and affordability
- Systems approach to thinking about implications for health, environment, social & economic outcomes
- Task for audience

U.S. Food System is Massive

- Resources
  - 52.5% U.S. land use
  - 80% consumptive water use
  - 16% energy use

- Economy
  - 17.5% private sector jobs, 21.6M workers
  - 12.9% household expenditures
  - Projected $137B agricultural exports, $129B agricultural imports

Bigelow & Borchers 2017; Hellerstein et al 2019; Canning et al 2010/2017; USDA ERS 2019; ERS/BLS 2019; ERS 2019; image: Levin+Hargreaves https://vimeo.com/88753915

We are at a Critical Juncture

- Environment
  - Food = key contributor of GHG
  - Global GHG must peak by 2020 to stay below 1.5C (IPCC)
    → Priority on short-lived climate pollutants, incl methane
  - Food production+distribution+nutritional value at risk
  - Biodiversity loss, water availability, other resources, pollinators, population growth, crop yields plateauing, etc.
  - Waste 30% global food supply / 40% U.S.

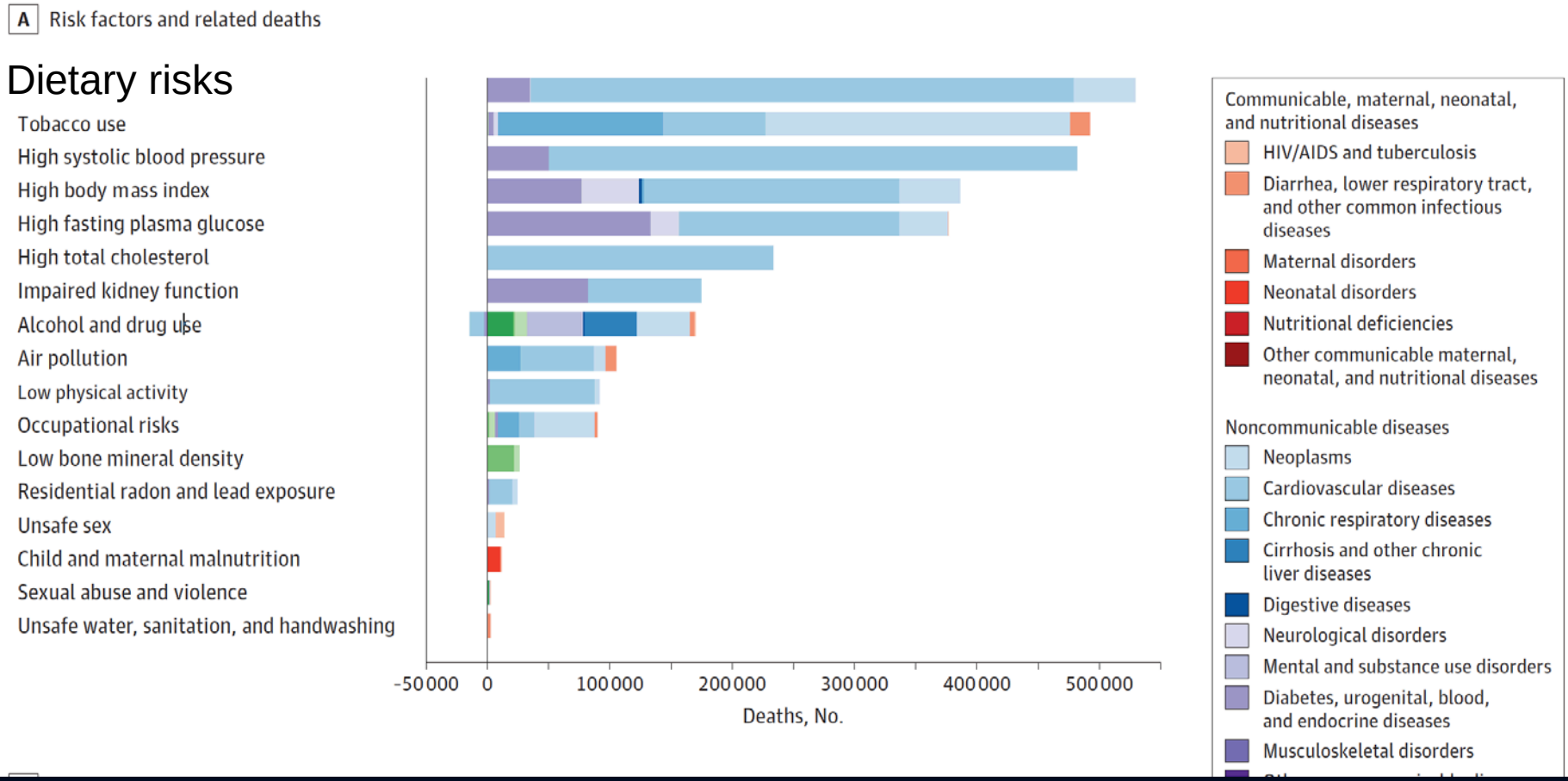
- Food insecurity
  - 821 million chronically hungry globally
  - 11.8% U.S. households food insecure

IPCC 2018; USDA ERS 2019; FAO 2019; FAO 2011

We are at a Critical Juncture

- Health

Figure 2. Number of Deaths and Percentage of Disability-Adjusted Life-Years Related to the 17 Leading Risk Factors in the United States, 2016



A. H. Mokdad et al., *JAMA* (2018)

Food access

Food quality

Food quantity

Food safety

Community safety

worker safety

Nutrition

Safety

Well-being

Health

Workers, farmers

Equity, fairness

Animal welfare

Values

Social

Local agriculture

Taste, happiness

Parenting

Support social roles

Power, Status

Self concept

Cultural/religious

Save or make money/time

Economic

Strengthen power

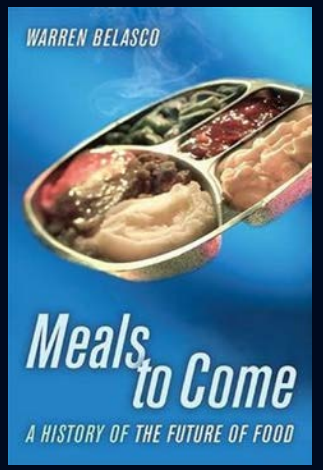
Environment

Sustainability, resilience

Resource use

Prevent/ address waste

History of the Future of Food
(Warren Belasco, 2006)



- Enduring interest in predicting future
  - Dire or gee whiz optimistic get published
  - Same metaphors recur
- Studying past predictions builds healthy skepticism
  - Wide variation in predictions, most wrong
  - Be wary of false choices between technology or failure
- Predictions say a lot about prevailing anxieties, hopes, assumptions
  - Reflect debate about meaning of progress

3 Approaches to Cornucopian Future

- Classical: Future evolves from past, ever bigger, better
  - Aesthetics, opulence, dominion over land/resources
- Modernist: Unprecedented needs, drives, breakthroughs.
  - Function, simplification, streamlining, technology.
- Recombinant: Splice classical and modern.
  - Choice and convenience, but in food system different (but not too different) from bucolic past (microwave stir fries)
- Framing matters

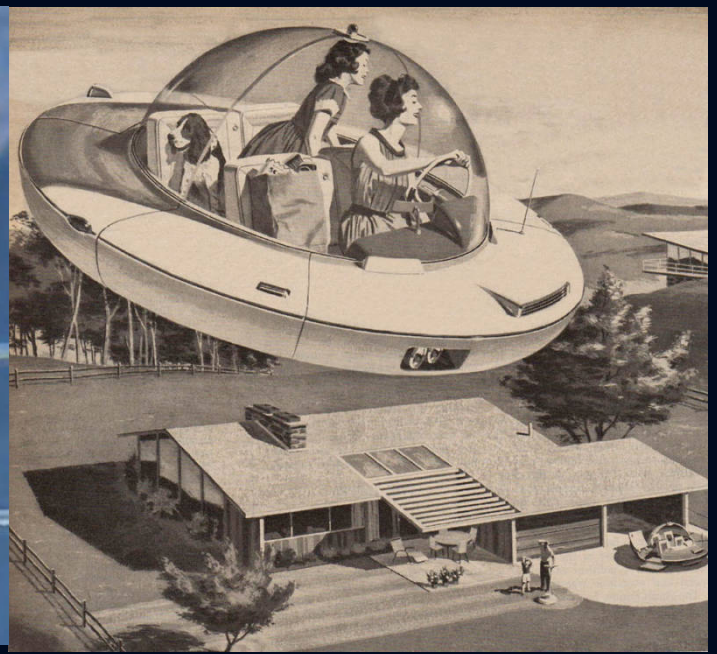
Past Predictions

- 1919 American Geographer: “It is true that the farm tractor is on the way, but it has less prospect of displacing the work animal in food production than the automobile has of driving the work horse off the road.”

- 1930 Lord Birkenhead: the people of 2030 would so prefer tastier, more digestible synthetic foods ‘that agriculture will survive only in historical romances.’

Later 20th Century

- "Future" food looks like astronaut food
- Convenience, efficiency
  - Food pill (could improve women's status)



Robotic “chef”

Pears shaped like babies

http://blogs.discovermagazine.com/d-brief/2014/08/21/pears-shaped-like-babies-are-a-hit-in-china/#.XUeQxFB7nbA

Edible spray paint

https://www.trendhunter.com/trends/edible-spray-paint

3-d printing of food creates novel products

https://www.bestprintersforhomeuse.com/printed-food-yum-i-will-print-more/

Torte with chocolate coating that plays sounds in a record player

Erika Marthins ©Photo by Younes Klouche

Innovation?

in·no·va·tion

/ˌinəˈvāSH(ə)n/

noun

the action or process of innovating.

- a new method, idea, product, etc.

plural noun: innovations

Distinguished from invention

- Game-changer: a newly introduced element or factor that changes an existing situation or activity in a significant way (Merriam-Webster)
- Purposeful; “natural”

Innovation isn't Everything

- Maintainers: "Maintenance, infrastructure, repair, and the myriad forms of labor and expertise that sustain our human-built world"
  - Often lower income, women
  - Tacit knowledge from doing job – what works, what doesn't, how to get it done and keep things moving, and what are important opportunities
  - Maintenance, repair, reuse – preventing waste
- "Americans have an impoverished and immature conception of technology, one that fetishizes innovation as a kind of art and demeans upkeep as mere drudgery." –Russell & Vinsel 2017

http://themaintainers.org/;

Technology isn't Everything

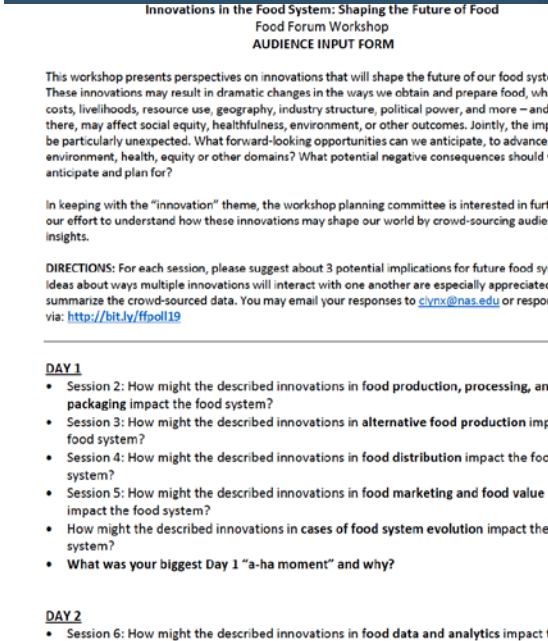
- People, human behavior represent key domains for future progress
- We are complex, diverse, unequal circumstances, irrational, mistrustful, trustful, variety of beliefs/ belief systems
- Need to tailor solutions, communication of solutions to bring about change

Your Insights Wanted

- For each session, please suggest 3 *potential* implications for future food systems.
- Especially: Ideas about ways multiple innovations may interact
- Note: Speculative – can give ideas for modeling, research, practical efforts

ONLINE: **http://bit.ly/ffpoll19**

EMAIL: clynx@nas.edu



Innovations in the Food System: Shaping the Future of Food
Food Forum Workshop
AUDIENCE INPUT FORM

This workshop presents perspectives on innovations that will shape the future of our food syst
These innovations may result in dramatic changes in the ways we obtain and prepare food, wh
costs, livelihoods, resource use, geography, industry structure, political power, and more – and
there, may affect social equity, healthfulness, environment, or other outcomes. Jointly, the imp
be particularly unexpected. What forward-looking opportunities can we anticipate, to advance
environment, health, equity or other domains? What potential negative consequences should
anticipate and plan for?

In keeping with the "innovation" theme, the workshop planning committee is interested in furt
our effort to understand how these innovations may shape our world by crowd-sourcing audie
insights.

DIRECTIONS: For each session, please suggest about 3 potential implications for future food sy
Ideas about ways multiple innovations will interact with one another are especially appreciated
summarize the crowd-sourced data. You may email your responses to clynx@nas.edu or respo
via: http://bit.ly/ffpoll19

DAY 1

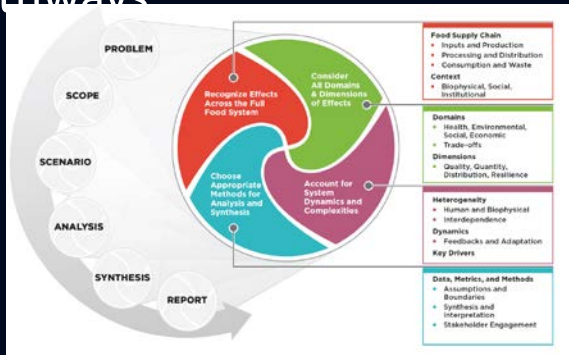
- Session 2: How might the described innovations in **food production, processing, an packaging** impact the food system?
- Session 3: How might the described innovations in **alternative food production** imp food system?
- Session 4: How might the described innovations in **food distribution** impact the foo system?
- Session 5: How might the described innovations in **food marketing and food value** impact the food system?
- How might the described innovations in **cases of food system evolution** impact the system?
- **What was your biggest Day 1 "a-ha moment" and why?**

DAY 2

- Session 6: How might the described innovations in **food data and analytics** impact

Principles for Assessing Food System Impacts

- Recognize effects across full food system
  - Full supply chain + economic, biophysical, social/political context
- Consider all domains and dimensions of effects: Health, environmental, social, economic
  - Tradeoffs within and across domains
  - Within each domain, 4 dimensions of effects: quantity, quality, distribution, resilience
- Account for system dynamics and complexities
  - Including effects across time, space, heterogeneous populations
  - Potential role of underlying drivers, interacting pathways
- (Choose appropriate methods)



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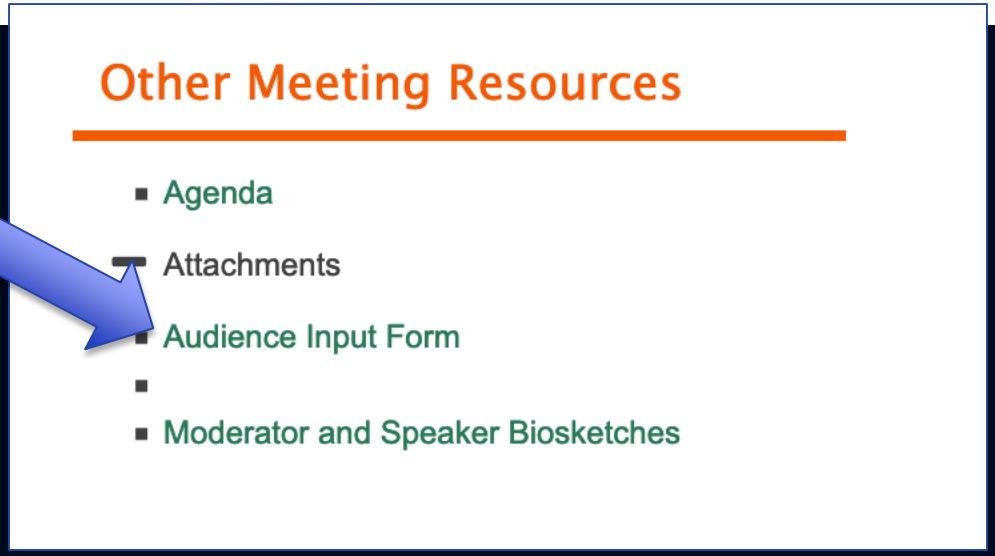

Wasted Seafood

- Dietary guidelines: eat more seafood
- Often less energy, water, feed vs terrestrial food animals
- But where from?
  - Global fish harvests peaked 1996, declining by 1.2m/yr
  - Aquaculture ½ global seafood supply, but high resource use

- Our prior evidence synthesis: 41-47% US seafood supply wasted
- Largest portion @consumers
- Equivalent to 34% consumption gap
- Lost ”nutrient-years”
  - 9.5 million men’s “protein-years”
  - 18.5 million adult “EPA+DHA years”

https://upload.wikimedia.org/wikipedia/commons/2/2a/Salmon_waste_-_panoramio.jpg

Global Environmental Change 35 (2015) 116–124

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Global Environmental Change

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

ELSEVIER

Wasted seafood in the United States: Quantifying loss from produ
to consumption and moving toward solutions

Direct From Frozen Seafood

- Seafood often sold in defrosted state
- Pete Pearson WWF: Could we prevent waste by keeping it frozen?
- Drexel Food Lab direct from frozen recipes, consumer-tested

- Initial reaction “not at all willing” commonly changed if chef-tested; will it cost less?; knowledge that most fresh was frozen

Roasted Tilapia with Creamy Tartar Sauce
Serves: 4

- 2 tablespoons olive oil
- 4 frozen tilapia fillets
- 1-pound red potatoes, halved
- 1 bunch asparagus, ends trimmed
- 1 lemon, juiced
- 2 teaspoons old bay seasoning
- 1 cup plain Greek yogurt
- ½ cup pickle relish
- Salt and pepper to taste

1. Preheat oven to 350 degrees.
2. On a baking sheet tray, drizzle olive oil. Place tilapia on one section of the tray, potatoes on another section and asparagus in remaining section. Season with lemon juice, old bay, salt and pepper.
3. Place sheet tray in oven and roast for about 30 minutes, or until fish is cooked through and potatoes are tender.
4. In a small bowl, mix together yogurt and pickle relish. Season with salt and pepper to taste
5. Serve tilapia, potatoes and asparagus with Greek yogurt tartar sauce.

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Self concept

Cultural/religious

Meet standards/ laws

Save or make money/time

Economic

Strengthen power

Environment

Sustainability, resilience

Resource use

Prevent/ address waste

Example: Direct From Frozen

Effects on:

- Health
- Environment
- Society
- Economy

- Tradeoffs within and across these domains
- Within each: quantity, quality, distribution, resilience
- Effects across time, space, heterogeneous populations
- Potential role of underlying drivers, interacting pathways

Conclusions: Future of the Future of Food

- Innovations will change our future food systems and social systems; vice versa
- Need to assess future innovations with broad food systems and systems lenses
  - Consideration of effects across multiple domains + dimensions of food system
  - Account for systems dynamics and complexities
  - Differential effects
- Hold onto healthy skepticism, sense of urgency, keep close eye on equity effects

- *Looking forward to your input!*

Thank you!

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www.jhsph.edu/clf

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