The EAT-Lancet Commission on Healthy Diets From Sustainable Food Systems
The Problem
A Great Acceleration in the Global Food System
The scale of the challenge

2 billion people lack key micronutrients like iron and vitamin A

155 million children are stunted

52 million children are wasted

2 billion adults are overweight or obese

41 million children are overweight

88% of countries face a serious burden of either two or three forms of malnutrition

And the world is off track to meet all global nutrition targets
We are not yet bending the curves on unhealthy and unsustainable food.
1 Goal – 2 Targets – 5 Strategies

To Achieve Planetary Health Diets for Nearly 10 Billion People By 2050
EAT-\textit{Lancet} Commission Approach

Define a healthy reference diet using the best available evidence (controlled feeding studies, long-term cohort studies, randomized trials).

Define planetary boundaries for 6 key environmental systems and processes (GHG, cropland use, water use, nitrogen and phosphorus application, extinction rate).

Apply a global food systems modeling framework to analyze what combinations of readily implementable measures are needed to stay within food production boundaries while still delivering healthy diets by 2050.

Outline Strategies to achieve the changes needed to meet the goal of healthy diets from sustainable food systems for all by 2050.
Scientific Targets for Healthy Diets from Sustainable Food Production
Evidence Base for the Planetary Health Diet

Randomized controlled feeding studies with CVD risk factor outcomes

Observational cohort studies with long follow-up and disease outcomes

Randomized trials of dietary patterns with CVD risk factors and disease outcomes
## Target 1 – Healthy Diets

2500 kcal/day

<table>
<thead>
<tr>
<th>Food Category</th>
<th>Macronutrient intake grams per day (possible range)</th>
<th>Caloric intake kcal per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole grains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice, wheat, corn and other</td>
<td>232</td>
<td>811</td>
</tr>
<tr>
<td>Tubers or starchy vegetables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potatoes and cassava</td>
<td>50 (0–100)</td>
<td>39</td>
</tr>
<tr>
<td>Vegetables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All vegetables</td>
<td>300 (200–600)</td>
<td>78</td>
</tr>
<tr>
<td>Fruits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All fruits</td>
<td>200 (100–300)</td>
<td>126</td>
</tr>
<tr>
<td>Dairy foods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole milk or equivalents</td>
<td>250 (0–500)</td>
<td>153</td>
</tr>
<tr>
<td>Protein sources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef, lamb and pork</td>
<td>14 (0–28)</td>
<td>30</td>
</tr>
<tr>
<td>Chicken and other poultry</td>
<td>29 (0–58)</td>
<td>62</td>
</tr>
<tr>
<td>Eggs</td>
<td>13 (0–25)</td>
<td>19</td>
</tr>
<tr>
<td>Fish</td>
<td>28 (0–100)</td>
<td>40</td>
</tr>
<tr>
<td>Legumes</td>
<td>75 (0–100)</td>
<td>284</td>
</tr>
<tr>
<td>Nuts</td>
<td>50 (0–75)</td>
<td>291</td>
</tr>
<tr>
<td>Added fats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsaturated oils</td>
<td>40 (20–80)</td>
<td>354</td>
</tr>
<tr>
<td>Saturated oils</td>
<td>11.8 (0–11.8)</td>
<td>96</td>
</tr>
<tr>
<td>Added sugars</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All sugars</td>
<td>31 (0–31)</td>
<td>120</td>
</tr>
</tbody>
</table>
Target 1 – Healthy Diets
2500 kcal/day
Samples of Planetary Health Plates

© Mollie Katzen
Current Intakes vs Planetary Health Diet

Limited intake
- Red meat
- Starchy vegetables

Optional foods
- Eggs
- Poultry
- Dairy foods

Emphasized foods
- Fish
- Vegetables
- Fruit
- Legumes
- Whole grains
- Nuts
Current Intakes vs Planetary Health Diet

North America

Health boundary

100%

Limited intake
- Red meat
- Starchy vegetables

Optional foods
- Eggs
- Poultry
- Dairy foods

Emphasized foods
- Fish
- Vegetables
- Fruit
- Legumes
- Whole grains
- Nuts
Current Intakes vs Planetary Health Diet

Sub-Saharan Africa

Limited intake

Optional foods

Emphasized foods

- Red meat
- Starchy vegetables
- Eggs
- Poultry
- Dairy foods

Fish
Vegetables
Fruit
Legumes
Whole grains
Nuts

Health boundary

729%
Current Intakes vs Planetary Health Diet

<table>
<thead>
<tr>
<th>Limited intake</th>
<th>Optional foods</th>
<th>Emphasized foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red meat</td>
<td>Starchy vegetables</td>
<td>Fish</td>
</tr>
<tr>
<td>Eggs</td>
<td>Poultry</td>
<td>Vegetables</td>
</tr>
<tr>
<td>Dairy foods</td>
<td></td>
<td>Fruit</td>
</tr>
</tbody>
</table>

South Asia

Health boundary

100% 125%
## Substantial Health Benefits

<table>
<thead>
<tr>
<th>Approach 1</th>
<th>Comparative Risk</th>
<th>19%</th>
<th>or</th>
<th>11.1 million adult deaths per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach 2</td>
<td>Global Burden of Disease</td>
<td>22.4%</td>
<td>or</td>
<td>10.8 million adult deaths per year</td>
</tr>
<tr>
<td>Approach 3</td>
<td>Empirical Disease Risk</td>
<td>23.6%</td>
<td>or</td>
<td>11.6 million adult deaths per year</td>
</tr>
</tbody>
</table>
69% packaged foods aren’t aligned with healthy diets

Trends and patterns in per capita packaged food category sales by region, 2005–2017
Planetary Boundaries
A safe operating space for humanity

- Climate change
- Biosphere integrity
- Novel entities
- Land-system change
- Freshwater use
- Biogeochemical flows
- Ocean acidification
- Atmospheric aerosol loading
- Stratospheric ozone depletion

Legend:
- Red: Beyond zone of uncertainty (high risk)
- Orange: In zone of uncertainty (increasing risk)
- Green: Below boundary (safe)
- Black: Boundary not yet quantified

Design: Groenen
Climate (C)  Nitrogen (N)  Water (H₂O)  Biodiversity (DNA)  Land
We are not yet bending the curves on unhealthy and unsustainable food.
## Target 2 – Sustainable Food Production

<table>
<thead>
<tr>
<th>Earth system process</th>
<th>Control variable</th>
<th>Boundary (Uncertainty range)</th>
<th>Global Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate change</td>
<td>GHG emissions</td>
<td>5 Gt CO₂-eq yr⁻¹ (4.7 – 5.4 Gt CO₂-eq yr⁻¹)</td>
<td>No new emissions from Agriculture</td>
</tr>
<tr>
<td>Land-system change</td>
<td>Cropland use</td>
<td>13 M km² (11–15 M km²)</td>
<td>0 land expansion</td>
</tr>
<tr>
<td>Freshwater use</td>
<td>Water use</td>
<td>2,500 km³ yr⁻¹ (1000–4000 km³ yr⁻¹)</td>
<td>&gt;30% flows in basins</td>
</tr>
<tr>
<td>Nitrogen cycling</td>
<td>N application</td>
<td>90 Tg N yr⁻¹ (65–90 Tg N yr⁻¹) * (90–130 Tg N yr⁻¹)**</td>
<td>Pollution &lt;1 – 2.5 mg N L⁻¹</td>
</tr>
<tr>
<td>Phosphorus cycling</td>
<td>P application</td>
<td>8 Tg P yr⁻¹ (6–12 Tg P yr⁻¹) * (8–16 Tg P yr⁻¹)**</td>
<td>Pollution &lt;50–100 mg P m⁻³</td>
</tr>
<tr>
<td>Biodiversity loss</td>
<td>Extinction rate</td>
<td>10 E/MSY (1–80 E/MSY)</td>
<td>50% land intact by ecoregion</td>
</tr>
</tbody>
</table>
Environmental Effects per Serving of Food Produced

Figure 4: Environmental effects per serving of food produced
Bars are mean (SD). CO₂ = carbon dioxide. Eq = equivalent. PO₄ = phosphate. SO₂ = sulphur dioxide.
Global Adoption of the Western diet is not an option
## Achieving Planetary Health Diets

<table>
<thead>
<tr>
<th>Actions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dietary shift</strong></td>
<td>Planetary health diet – as outlined in Table 1.</td>
</tr>
<tr>
<td>Planetary health diet</td>
<td></td>
</tr>
<tr>
<td><strong>Halve waste</strong></td>
<td>Food losses and waste reduced by half, in line with SDG target 12.3.</td>
</tr>
<tr>
<td>Reduced food loss and waste</td>
<td></td>
</tr>
<tr>
<td><strong>PROD</strong></td>
<td>Closing yield gaps to about 75%; rebalancing N and P application; improving water management; implementation of agricultural mitigation options; and land is expanded first into secondary habitat and then to intact forests to minimize impacts on biodiversity.</td>
</tr>
<tr>
<td>Improved production practices</td>
<td></td>
</tr>
<tr>
<td>Standard level of ambition</td>
<td></td>
</tr>
<tr>
<td><strong>PROD+</strong></td>
<td>Closing yield gaps to 90%; a 30% increase in N use efficiency and 50% recycling rates of P; phase-out of first-generation biofuels; implementation of available bottom-up options for mitigating GHG emissions; and optimizing land-use across regions to minimize impacts on biodiversity.</td>
</tr>
<tr>
<td>Improved production practices</td>
<td></td>
</tr>
<tr>
<td>High level of ambition</td>
<td></td>
</tr>
</tbody>
</table>
Five Strategies for a Great Food Transformation
Strategy 1

Seek international and national commitment to shift towards healthy diets
“no single actor or breakthrough is likely to catalyze systems change… require engagement of actors at all scales and in all sectors working towards a shared set of goals

Healthy food needs to be made more available and accessible

The full range from soft (e.g. information) to hard (e.g. regulations) policy options should be considered and for actions at multiple scales, municipal, cities, national, international.

Examples of areas of improvements:
• Information and food marketing
• Investing in public health information and sustainability education
• Implementing dietary guidelines
• Using health care services to deliver dietary advice interventions
Strategy 2

Reorient agricultural priorities from producing high quantities of food to producing healthy food
Change in Food Production

Almost no increase in cereal production

Vegetables +75%  Fruits >50%  Fish >50%  Legumes >75%  Nuts >150%

Red meat production >65%
Strategy 3

Sustainably intensify food production to increase high-quality output
Yield gap – difference between actual and attainable yields

Figure 5
Existing crop yield gaps. Shown is the ratio of current yields to potential yields, as estimated by 92 (see also http://www.yieldgap.org/water-productivity). A ratio of 0.2 indicates that a nation, on average, has crop yields 20% of what that nation is capable of yielding. Low ratios indicate large yield gaps, or the difference between current yields and potential yields. Countries in gray are missing data on either current yields or potential yields.

Clark et al. 2018 Annual Review of Env. Resour.
Strategy 4

Strong and coordinated governance of land and oceans
Areas of improvement include:

**Land:**
Protect natural ecosystems  
Land expansion only into managed lands  
Global coordination to minimize "deforestation leakage"  
Restoration of degraded lands

**Oceans:**
Harmful subsidies to fisheries removed  
Ecosystem based management to protect marine biodiversity  
10% of marine areas closed to fisheries  
Closure of the high seas to enhance fish stocks
Strategy 5

At least halve food losses and waste, in line with UN Sustainable Development Goals
Areas of improvement include:

Infrastructure, storage across value chain
Packaging and processing technology
Food labelling, Food safety policies,
Information and education campaigns

Where food loss and waste occurs along the food supply chain

In low income countries most food loss at production stage
In high income countries food loss at consumption stage

Source: WRI analysis based on FAO (2011b)
Conclusion
Without a transformation of the global food system, the world risks failing to meet the UN Sustainable Development Goals (SDGs) and the Paris Agreement and the data are both sufficient and strong enough to warrant immediate action.

Widespread multi-sector, multi-level action is needed including: a substantial global shift toward healthy dietary patterns; large reductions in food loss and waste; and major improvements in food production practices.
Dietary changes from current diets to healthy diets are likely to substantially benefit human health, averting about 11.0 million premature deaths per year, a reduction of about 20%.

Feeding 10 billion people a healthy diet within safe planetary boundaries is possible and will improve the health and well being of millions of people and allow us to pass onto our children a viable planet.