Food security is when all people, at all times, have physical and economic access to sufficient, safe, nutritious food to meet dietary needs and food preferences for an active and healthy life. – World Food Summit, 1996

Vision

How can we be accountable to this vision without understanding availability and affordability of healthy diets?
Aims: what do we want to know?

- If you went to the market in Bangladesh, how much would it cost to obtain a healthy diet?
- How many people in Bangladesh can afford that cost?

Photos: W. A. Masters (Ethiopia, Tanzania, Ghana, Morocco) and S. Kaiyatsa (Malawi)
Even rural farm families rely on market purchases for healthy, diverse diets

Source of calories consumed by month, rural Ethiopia, 2010-11

Shares of food consumed, by food group, rural Ethiopia, 2010-11

Source: Adapted from Sibhatu and Qaim, 2017
Even rural farm families rely on market purchases for healthy, diverse diets

Source: Gupta, Vemireddy, Singh and Pingali, 2021
We estimate three least-cost diets

- “Energy sufficient diet” - Cost of Calorie Adequacy (CoCA)
  - Minimum cost to meet energy requirements using the least expensive, available starchy staple food in each country
- “Nutrient adequate diet” - Cost of Nutrient Adequacy (CoNA)
  - Minimum cost to meet energy and nutrient requirements (23 macro and micro-nutrients, with upper as well as lower bounds)
- “Healthy diet” - Cost of Healthy (Recommended) Diet (CoRD)
  - Minimum cost to meet food-based dietary guidelines, based on food group classifications; a behaviorally realistic way to meet nutrient needs and other needs, including proportionality, norms, culture, and protection of health against NCDs
Least-cost diets

- Most affordable (cheapest, lowest cost) combination of foods that meet the criteria of these diets

- No standard “food basket”
  - Foods chosen depend on time and place
  - Seasonal or locally-available foods selected
Composition of a least-cost nutrient adequate diet in Malawi over time

Source: Bai, Naumova and Masters, 2020
## Most common items in cost of healthy diet by state in India

<table>
<thead>
<tr>
<th>State name</th>
<th>Starchy staples</th>
<th>Proteins</th>
<th>Dairy</th>
<th>Fruit</th>
<th>Vegetables</th>
<th>Leafy vegetables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>Bajra, Ragi, Maize</td>
<td>Peas, Gram, Gram dal</td>
<td>Milk (buffalo), Milk (cow), Curd</td>
<td>Banana, Guava, Papaya (ripe)</td>
<td>Gourd, Onion, Tomato</td>
<td>Gogukura, Amaranth (chaulai), Palak</td>
</tr>
<tr>
<td>Assam</td>
<td>Rice (coarse), Paddy, Bread</td>
<td>Peas, Khesari dal, Gram</td>
<td>Milk (cow), Curd, Milk (buffalo)</td>
<td>Banana, Papaya (ripe), Pineapple</td>
<td>Gourd, Pumpkin, Radish</td>
<td>Bhaji sageaves, Mustard leaves, Gogukura, Bhaji sageaves, Palak, Amaranth (chaulai)</td>
</tr>
<tr>
<td>Bihar</td>
<td>Maize, Paddy, Wheat (coarse)</td>
<td>Peas, Khesari dal, Pea dal</td>
<td>Milk (cow), Milk (buffalo), Ghol (lassi)</td>
<td>Banana, Guava, Papaya (ripe)</td>
<td>Radish, Gourd, Pumpkin</td>
<td>Bhaji sageaves, Palak, Amaranth (chaulai)</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>Bread, Rice (coarse), Wheat (coarse)</td>
<td>Peas, Khesari dal, Gram</td>
<td>Milk (cow), Milk (buffalo), Curd</td>
<td>Banana, Guava, Papaya (ripe)</td>
<td>Radish, Onion, Gourd</td>
<td>Bhaji sageaves, Palak, Amaranth (chaulai)</td>
</tr>
<tr>
<td>Delhi</td>
<td>Bajra, Wheat (coarse), Jowar</td>
<td>Gram, Peas, Pea dal</td>
<td>Ghol (lassi), Milk (buffalo), Milk (cow)</td>
<td>Banana, Guava, Pineapple</td>
<td>Radish, Onion, Carrot</td>
<td>Amaranth (chaulai), Bhaji sageaves, Mustard leaves</td>
</tr>
<tr>
<td>Gujarat</td>
<td>Bajra, Maize, Jowar</td>
<td>Peas, Gram, Urd (whole)</td>
<td>Milk (buffalo), Milk (cow), Curd</td>
<td>Banana, Papaya (ripe), Guava</td>
<td>Onion, Radish, Tomato</td>
<td>Palak, Bhaji sageaves, Amaranth (chaulai)</td>
</tr>
<tr>
<td>Haryana</td>
<td>Bajra, Wheat (coarse), Barley</td>
<td>Gram, Peas, Gram dal</td>
<td>Milk (buffalo), Milk (cow), Curd</td>
<td>Banana, Guava, Papaya (ripe)</td>
<td>Radish, Onion, Carrot</td>
<td>Palak, Mustard leaves, Bhaji sageaves, Palak, Bhaji sageaves, Amaranth (chaulai)</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>Wheat atta, Maize atta, Rice (coarse)</td>
<td>Gram dal, Besan (ground gram dal), Urd (whole)</td>
<td>Milk (cow), Curd, Ghol (lassi)</td>
<td>Banana, Guava, Mango</td>
<td>Onion, Pumpkin, Carrot</td>
<td>Palak, Bhaji sageaves, Amaranth (chaulai)</td>
</tr>
</tbody>
</table>

Source: Raghunathan, Headey and Herforth, 2020
Least-cost diets

- Most affordable (cheapest, lowest cost) combination of foods that meet the criteria of these diets

- No standard “food basket”
  - Foods chosen depend on time and place
  - Seasonal or locally-available foods selected

- Provide a conservative estimate (lower bound) on the cost per day
  - Preferences or convenience would add to the cost
Food prices create a ladder of affordability

When all diets are affordable, food prices are one of many influences on food choice. When healthy diets are unaffordable, food prices are an insurmountable barrier to improved diet quality.

Source: Food Prices for Nutrition, October 2020
Food price data and methods
Price data

- Household expenditure survey data to calculate food unit costs for purchased items
  - Caveat: Surveys done every 5-10 years in many countries

- Market information systems (MIS) typically track farm-gate or wholesale prices of commodities for farmers and traders
  - Caveat: usually does not include processed foods

- Vulnerability assessments track consumer prices to guide emergency interventions
  - Caveat: In most cases, a small number of items are included

- World Bank International Comparison Program (ICP) has unique global dataset of retail prices
  - Caveat: Items limited to comparable products sold in multiple countries; national annual average price per item
Food price data: national government CPI data

• Main data are food prices collected by national governments
  o Used for measuring inflation with the Consumer Price Index (CPI)

• Generally, these prices are collected:
  o On a monthly or quarterly basis
  o At representative market locations

• CPI is generally weighted by share of total expenditure, so culturally acceptable, commonly consumed food items are tracked.
Calculating the Cost of Nutrient Adequacy

Food price data

Combine with food composition data

Linear programming to calculate cheapest diet that meets nutrient and energy requirements
Energy and nutrient requirements

- Energy requirements based on age, sex, and level of physical activity
- Acceptable ranges for macronutrients - protein, fats, carbohydrates
- Lower and upper bounds for 23 micronutrients + upper bound for sodium

Calculating the cost of a healthy diet

- Healthy diet is operationalized as a recommended diet, based on quantitative food-based dietary guidelines (FBDG)
- ~100 countries have FBDG; FAO maintains FBDG repository
  - Only some are quantitative
Bangladesh’s food-based dietary guidelines

- Food groups
  - Sugar not included in the cost of a healthy diet
- Number of servings per day
- Grams per serving (serving size)
Steps to calculate the cost of a healthy diet

1. Categorize each food in food price list according to the food groups in the selected dietary guideline
2. Remove items not required for a healthy diet (e.g., sweets) and duplicate items
3. Calculate price per day for each item
   • price per kilogram x recommended quantity per day (accounting for edible portion)
4. Take the average of the 1-3 lowest cost items (price/day) in each food group
5. Sum the cost for all food groups
Affordability of diets

Affordability is the comparison of cost to a defined income standard

- Poverty lines
  - National
  - International (US $1.90)
- Food expenditures
- Income
- Wages
  - Compared to unskilled wages in India, Ethiopia

Photo (CC): skuarua
How does Food Prices for Nutrition differ from other initiatives?

• Emphasis on monitoring

• Focus on leveraging the abundance of data already collected in existing national and international monitoring systems
  - Support countries to calculate metrics within their own data systems

• Moving beyond nutrients to look at healthy diet patterns

• Cost of a Healthy Diet does not rely on linear programming → relative ease of computation
National applications in South Asia and global results
Variation across space with monthly price data: Pakistan

- National Bureau of Statistics data for 40 cities, 2017
- Cost of healthy diet - Prs 87 / USD 1.43 (2011 PPP)
  - 58% of individuals spend less on food than this cost
- Cost of dairy and vegetables higher than other food groups
- Vegetables, dairy, and fruit are most variable across regions
  - Perishability and transport?
- Availability: prices for dark green leafy vegetables seasonally missing in Pakistan

Source: Dizon and Herforth, 2018

Source: Dizon, Herforth and Wang, 2019
Affordability of a healthy diet relative to wages in India

- Price data: monthly data for 101 food items in 24 states, 2001-2011
- Affordability as the cost of a healthy diet relative to unskilled laborers' wages
  - For men and women separately
- In most states, healthy diets became more affordable for men over time
- 63–76% of the rural poor could not afford a healthy diet in 2011

Source: Raghunathan, Headey and Herforth, 2021
Household survey expenditure data for healthy diets: Bangladesh

- 2016 Household Income and Expenditure Survey: prices derived from food consumption questions for household
  - Total spent/quantity purchased
- Cost of a healthy diet (CoRD) was 58 BDT ($1.70 2011 PPP)
- Can compare least-cost diet with actual food group expenditures
- Food preferences can be incorporated (CoRD-FP); this was demonstrated in Myanmar

Source: Dizon, Herforth and Wang, 2019
Overview of national-level estimates in focus countries: SOFI 2020

<table>
<thead>
<tr>
<th>Country</th>
<th>Energy sufficient diet</th>
<th>Nutrient adequate diet</th>
<th>Healthy diet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost (USD) 2017</td>
<td>% of food exp</td>
<td>% pop. cannot afford</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>0.64</td>
<td>14.5</td>
<td>0.1</td>
</tr>
<tr>
<td>India</td>
<td>0.79</td>
<td>27.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Pakistan</td>
<td>0.77</td>
<td>20.9</td>
<td>&lt;0.1</td>
</tr>
</tbody>
</table>

“Ladder of affordability” – cost of diet rising

Source: FAO et al., 2020
3 billion people globally lack sufficient income to purchase least-cost healthy diets

- Calorie affordability is still a problem in some countries
- Most people in sub-Saharan Africa cannot afford nutrient adequate diets
- Most people in sub-Saharan Africa and South Asia cannot afford healthy diets

Source: FAO, 2020
Healthy diets by any definition are far more expensive than the entire international poverty line.

Median cost of 10 guidelines

$1.90 (Food and non-food IPL)

$1.20 (Approx. food only IPL)

Source: FAO, 2020
Next steps in Food Prices for Nutrition

• Promote use of food prices to measure diet costs and affordability
• Scale up monitoring and analysis

Provide tools, methods, and data to calculate and use the metrics
Support use of the metrics within existing country systems
Model impacts of policies and programs that could affect food prices
Forthcoming tools and events

• Generating tools and guides for data holders to compute Cost of a Healthy Diet themselves
  
  o Agriculture, Nutrition and Health (ANH) Academy Week Learning Lab: [Cost and Affordability of Nutritious Diets – 21 June 2021](#)

• Updated estimates for SOFI 2021, July 2021

• World Bank eLearning course coming next year, August 2022
Food Prices for Nutrition eLearning course

• Will be hosted on the World Bank’s [Open Learning Campus (OLC)] platform

• 3-hour self-paced course for government officials, program planners, researchers, and others

• Two modules
  o Construction of diet cost indices
  o Use and potential applications of diet cost indices in relation to policymaking
Stay in touch with us!

- Give us feedback & stay in touch with this Google Form: https://forms.gle/dhB6zYJwQxhsdHxS7

- Visit our website: https://sites.tufts.edu/foodpricesfornutrition/ or Google “Food Prices for Nutrition”

- Reach out with questions or interest – Rachel.gilbert@tufts.edu
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Questions?

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References


