

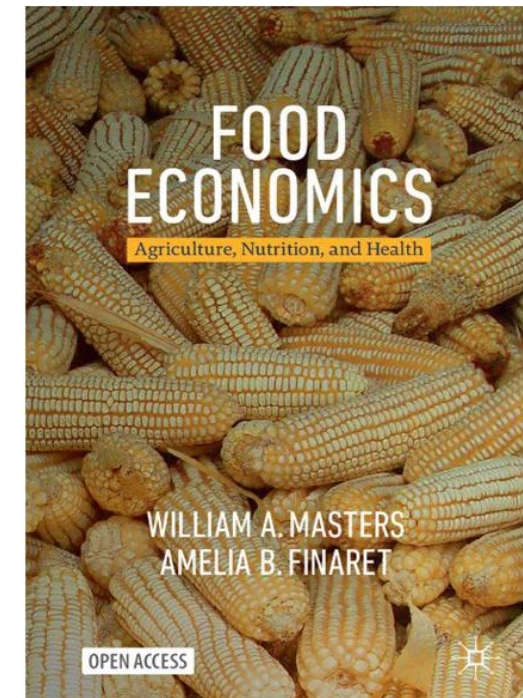
Cost and Affordability of Healthy Diets: Adoption and Use of a New Food Security Metric

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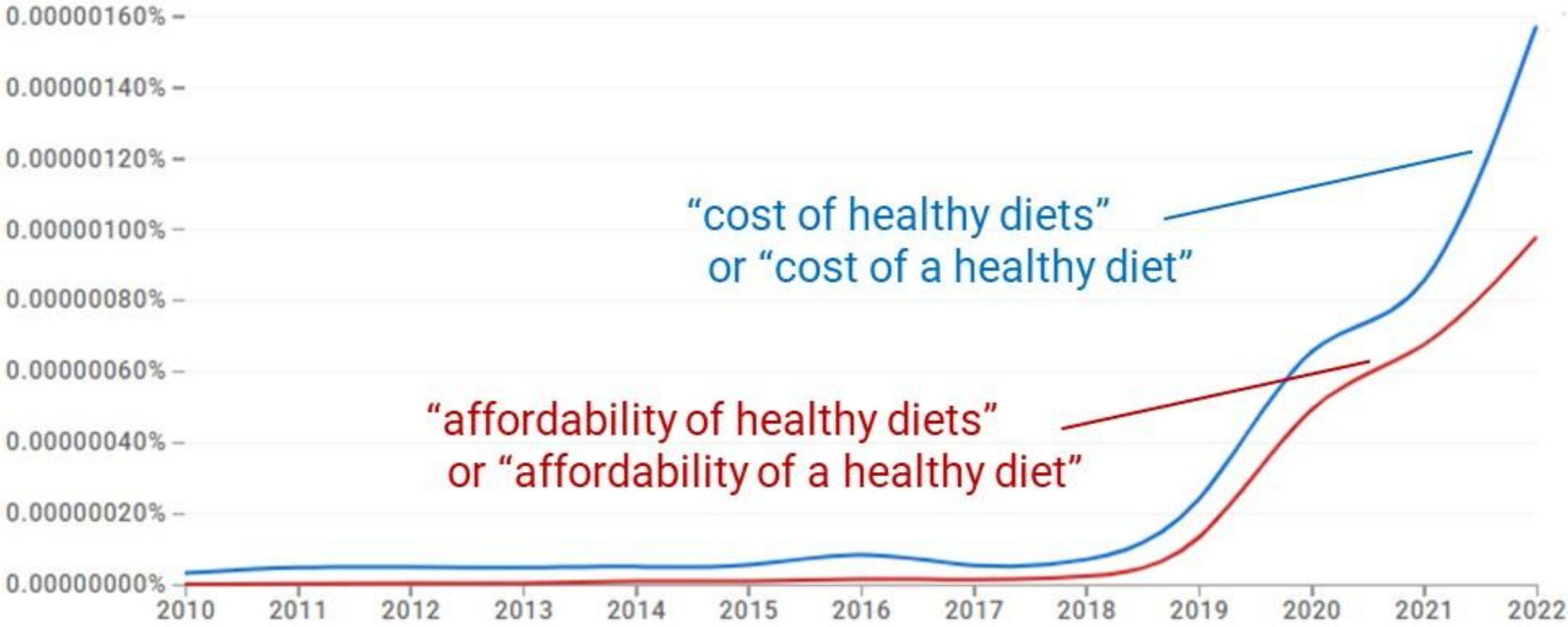
Asian Development Bank AFNR webinar
September 16th, 2025



Open access, at
bit.ly/FoodEconBook

New data can change the conversation

Frequency of selected phrases in English-language books and documents, 2010–2022



Source: Google ngrams data, in W.A. Masters (2025), Tracking the affordability of least-cost healthy diets helps guide intervention for food security and improved nutrition. *Food Policy* 137: 102913.

New data on Cost of Healthy Diets (CoHD) was developed to help guide food and agriculture to meet *health* needs

- **Prior price indexes for consumption, trade and production lack health information**
 - Consumer Price Indexes use all foods weighted by actual expenditure
 - Global food price indexes and producer price indexes use bulk commodities, not retail items
- **Prior food security metrics use the mix of foods actually consumed, not a healthy diet**
 - Since 1974, the FAO has used its “Prevalence of Undernourishment” metric for the prevalence of hunger, based on national food balance sheets if distributed lognormally relative to estimated dietary energy requirements
 - Now c. 9% of the world population (0.7 billion people) are undernourished in this sense
 - Since 1995, the USDA (and then FAO since 2014) have used “Experience of Food Insecurity” for the number of people who went to bed hungry, skipped meals, ate less or other foods etc. due to lack of resources to buy their usual diets
 - Now c. 25% of the world population (2 billion people) are food insecure in this sense
- **Our new price indexes track least-cost items by food group for a healthy diet, in \$/day**
 - Since 2020 the World Bank, FAO and various governments have adopted this as a new food security metric, combining diet costs with income and nonfood spending data to measure Cost and Affordability of Healthy Diets (CoAHD)
 - Now c. 34% of the world population (2.8 billion people) cannot afford a healthy diet in this sense
 - CoAHD is a diagnostic metric to guide intervention, by distinguishing among three causes of unhealthy diets:
 - **High prices:** if healthy foods are unusually expensive, need to invest in production and distribution to lower cost
 - **Low incomes:** if people lack enough money to buy a healthy diet, need higher earnings or assistance
 - **Displacement of a healthy diet by other options,** due to taste, convenience, aspirations and marketing, etc.

Diet costs use local availability and price data, matched to food composition and health needs

We find a ladder of diet costs, from the cheapest energy source to higher-priced foods
Using least-cost options measures *food access*, for comparison to actual consumption

SOFI 2024 updated the price data to items observed in 2021, and updated the income data & method to compute unaffordability

SOFI 2022 introduced the Cost of a Healthy Diet (CoHD) based on the “Healthy Diet Basket” of each country’s 11 least-cost items in 6 food groups

SOFI 2020 used 10 national guidelines for the Cost of Recommended Diets (CoRD)

Food preferences, convenience and other goals

Our 2018 journal article introduced a Cost of Diet Diversity (CoDD) metric and we have since published over 30 studies analyzing other aspects of diet costs



Healthy diets
 Meets national dietary guidelines by food group
Global ave. in 2021 = \$3.60/day

Nutrient adequacy
 Avoids deficiency or excess of essential macro- and micronutrients
Global average in 2021 = \$2.50/day

Daily energy
 Meets only calorie needs, for short-term survival and physical work
Global average in 2021 = \$0.95/day



Food and Agriculture Organization of the United Nations
Cost and affordability of healthy diets across and within countries
 Background paper for *The State of Food Security and Nutrition in the World 2020*

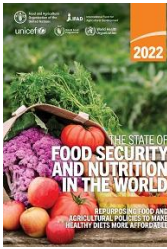
American Journal of Agricultural Economics | AAEA
 Measuring the Affordability of Nutritious Diets in Africa: Price Indexes for Diet Diversity and the Cost of Nutrient Adequacy
 William A. Masters, Yan Bai, Anna Herforth, Daniel B. Sarpong, Fulgence Mishill, Joyce Kinabo, Jennifer C. Coates

SCIENCE ADVANCES | RESEARCH ARTICLE
ECONOMICS
Seasonality of diet costs reveals food system performance in East Africa
 Yan Bai, Elena N. Naumova, William A. Masters*

THE LANCET Planetary Health
Global variation in the cost of a nutrient-adequate diet by population group: an observational study
 Yan Bai, Anna Herforth, William A Masters

Methods and options to monitor the cost and affordability of a healthy diet globally

Background paper for *The State of Food Security and Nutrition in the World 2022*



THE LANCET Global Health
 Volume 8, Issue 1, January 2020, Pages e59-e66

Articles
Affordability of the EAT–Lancet reference diet: a global analysis

Kalle Hirvonen PhD ^a, Yan Bai MIB ^b, Derek Headey PhD ^d, Prof William A Masters PhD ^{b, c, A}

ELSEVIER Food Policy
 Volume 99, February 2021, 101983

Cost and affordability of nutritious diets at retail prices: Evidence from 177 countries

Yan Bai ^a, Robel Alemu ^{b, d}, Steven A. Block ^e, Derek Headey ^c, William A. Masters ^{a, d, A, B}

Our benchmark least cost healthy diets use locally available items that meet national food-based dietary guidelines

Dietary guidelines define healthy diets in terms of food groups

- To allow substitution within food groups, we convert volume and weight to energy shares

Food group targets can differ and change over time

- For SOFI 2020, used median cost of 10 quantified guidelines from all UN regions
- For SOFI 2022, introduced the Healthy Diet Basket from 31 guidelines with food guides
- For SOFI 2024, use updated price and income data but same health criteria
- In Jan. 2024, Nigeria became first country to publish national statistics using global HDB
- Now Malawi also uses HDB, while Ethiopia, Ghana & Pakistan use their own dietary guidelines



Definition of the global Healthy Diet Basket

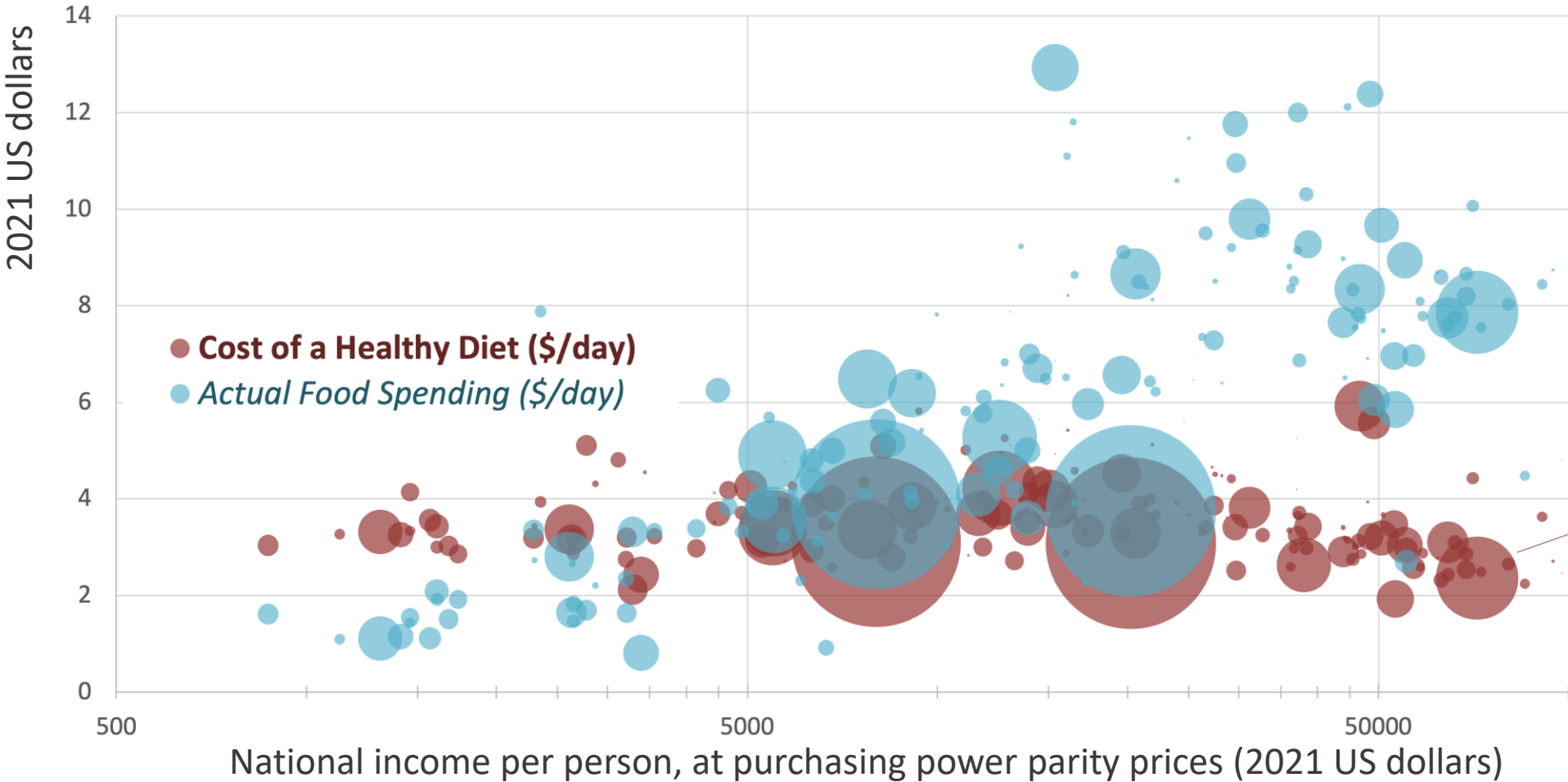
Food group	Number of items	Dietary energy (kcal/day)	Energy shares	Quantities of typical items	Typical weight (grams)	Typical volume (plate share)
1. Starchy staples	2	1,160	50%	322g dry rice	25%	
2. Vegetables	3	110	5%	270-400g veg.	25%	
3. Fruits	2	160	7%	230-300g fruits	25%	
4. Animal-source foods	2	300	13%	210g egg		
5. Legumes, nuts & seeds	1	300	13%	85g dry bean	25%	
6. Oils and fats	1	300	13%	34g oil		
	11	2,330				

Note the global Healthy Diet Basket is just the most basic food groups -- other dietary guidelines include other recommendations!

Source: Herforth et al., (2022), Methods and options to monitor the cost and affordability of a healthy diet globally. Background paper for FAO, IFAD, UNICEF, WFP and WHO.

Our discovery is that the least-cost locally available items in sufficient quantities for a healthy diet cost about **\$3-4/day**

National average cost of a healthy diet and actual food spending by level of national income per capita, baseline estimates for 2021

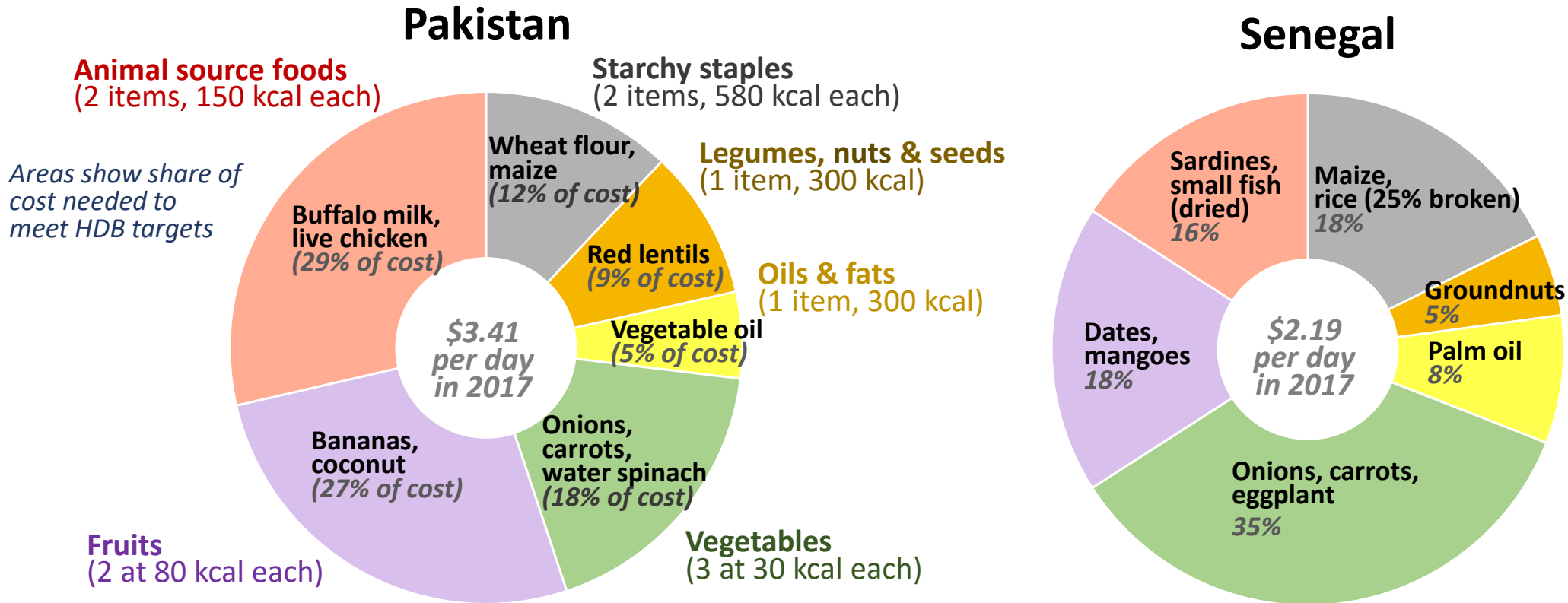


This cost level for 2021 buys only the global Healthy Diet Basket. In 2025 the USDA's Thrifty Food Plan is around \$8.20/day for an adult woman

Source: FAO and World Bank, 2024. The latest Cost of a Healthy Diet data are at <https://www.fao.org/faostat/en/#data/CAHD>, and published simultaneously alongside actual food spending at <https://databank.worldbank.org/source/food-prices-for-nutrition>. Circles are proportional to population size, and countries are arrayed by level of national income using World Development Indicators data.

Identifying least-cost healthy options reveals whether poor diets are due to high cost, low incomes, or food choice

The benchmark Cost of a Healthy Diet is the least expensive Healthy Diet Basket of 11 items in 6 food groups using data reported by each country about the availability and price of locally consumed foods

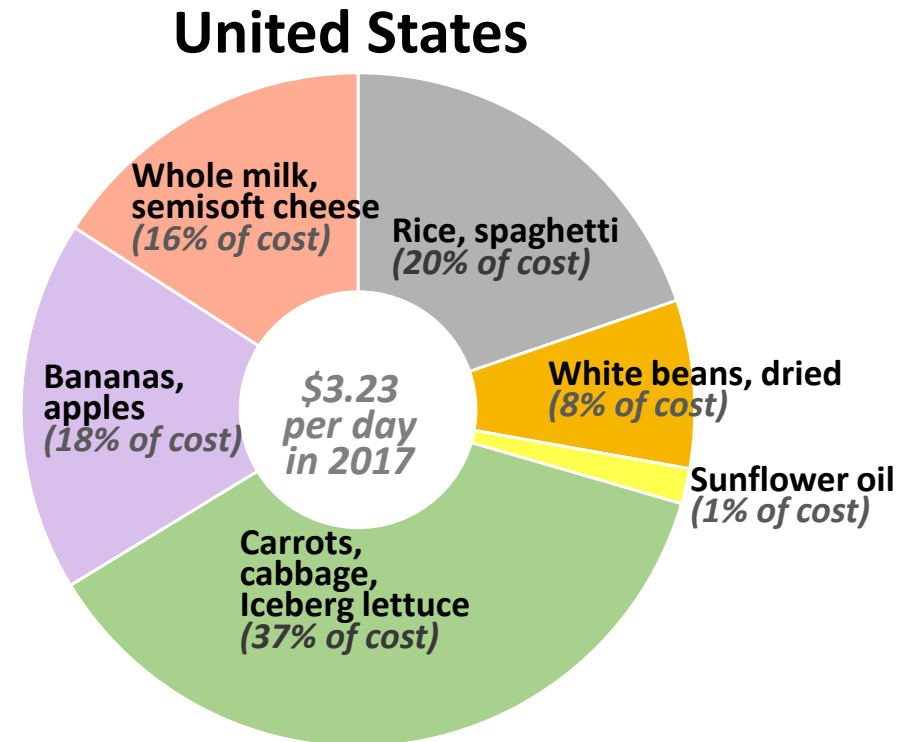
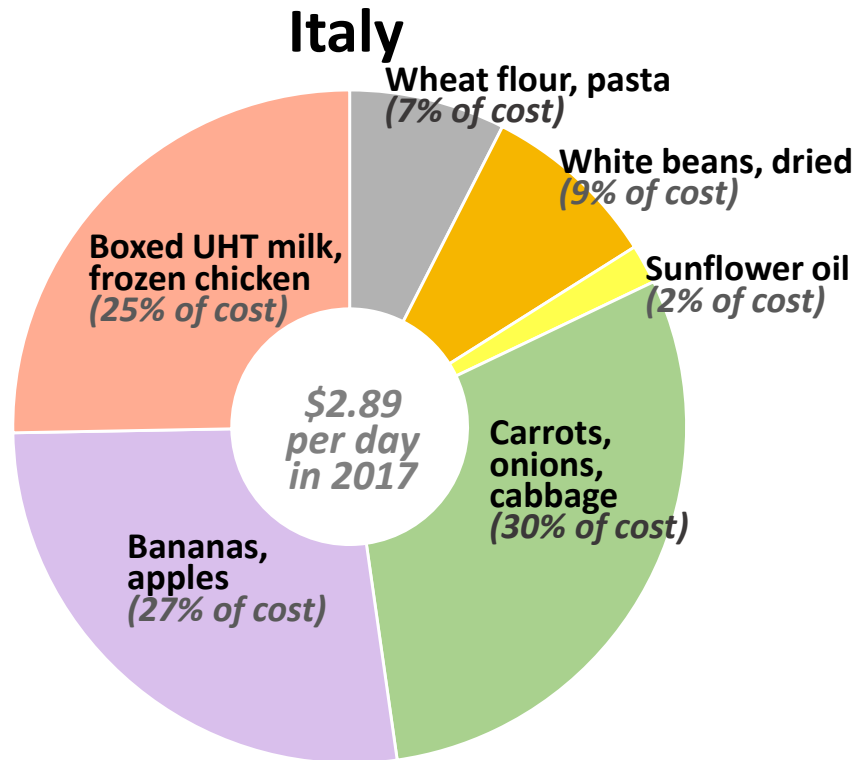


Note: Each item's cost is for a sufficient weight or volume to meet the HDB targets, based on matching item descriptions to food composition data. In food groups requiring multiple items, the lowest-cost foods are listed first. Item descriptions are standardized across countries, with its availability and national average price reported by each country's statistical agency to the International Comparison Program (ICP) for 2017. Cost levels are as published by FAO and the World Bank with methods detailed at Food Prices for Nutrition (2022) <https://sites.tufts.edu/foodpricesfornutrition> or <https://doi.org/10.2478/9783708920209>. This content is available under a Creative Commons Attribution 4.0 International License. Reproduction inside ADB with appropriate permission.

Identifying least-cost healthy options reveals whether poor diets are due to high cost, low incomes, or food choice

The benchmark Cost of a Healthy Diet is the least expensive Healthy Diet Basket of 11 items in 6 food groups using data reported by each country about the availability and price of locally consumed foods

This is a much cheaper diet than would actually be recommended; Remember that as of Jan. 2025, the USDA's Thrifty Food Plan guiding SNAP benefits is \$8.15/day for an adult woman



Note: Each item's cost is for a sufficient weight or volume to meet the HDB targets, based on matching item descriptions to food composition data. In food groups requiring multiple items, the lowest-cost foods are listed first. Item descriptions are standardized across countries, with its availability and national average price reported by each country's statistical agency to the International Comparison Program (ICP) for 2017. Cost levels are as published by FAO and the World Bank with methods detailed at Food Prices for Nutrition (2022) <https://sites.tufts.edu/foodpricesfornutrition> or <https://doi.org/10.2478/9783708923611>. This information is available under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International license. Inside ADB with appropriate permission.

To track affordability, we compare the least-cost healthy diet in each country to household income, minus non-food needs

The new affordability method used by FAO and the World Bank for global monitoring in SOFI 2024 allows for higher non-food needs in higher-income countries

TABLE S2.3 CALCULATION OF THE COMPONENT OF THE COST THRESHOLD THAT CORRESPONDS TO ESSENTIAL NON-FOOD GOODS AND SERVICES

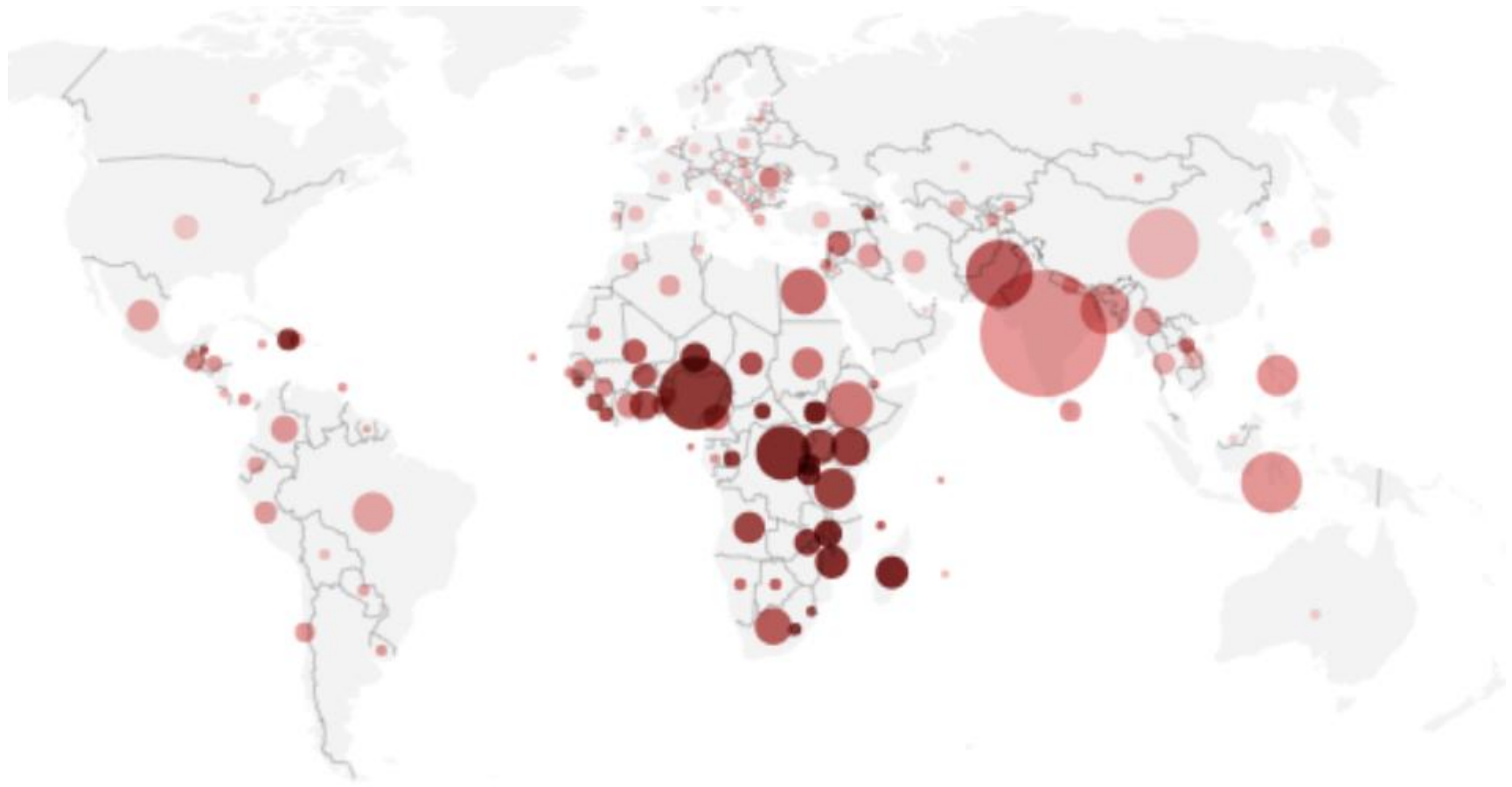
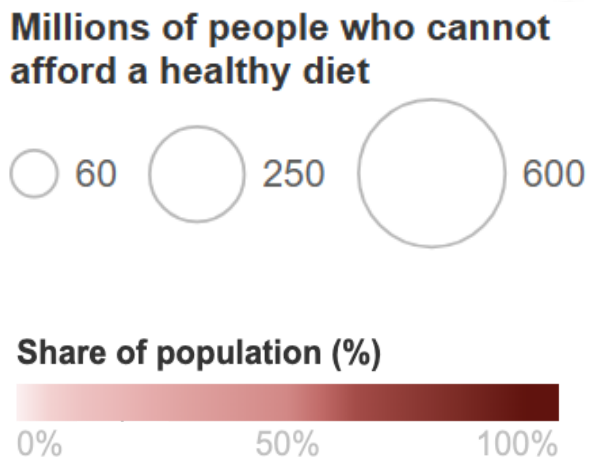
	International poverty line (a)	Non-food expenditure share (b)	Cost of basic non-food (a) × (b)
(2017 PPP dollars per person per day)			
Low-income countries	2.15	0.37	0.80
Lower-middle-income countries	3.65	0.44	1.61
Upper-middle-income countries	6.85	0.54	3.70
High-income countries	24.36	0.54	13.20

NOTE: PPP = purchasing power parity.
 SOURCE: Bai, Y., Herforth, A., Cafiero, C., Conti, V., Rissanen, M.O., Masters, W.A. & Rosero Moncayo, J. (forthcoming). *Methods for monitoring the affordability of a healthy diet*. FAO Statistics Division Working Paper. Rome, FAO.

WB poverty lines, based on average of governments' lines in each income group × *Average of poorer residents' spending on nonfood goods & services in each income group* = *Required nonfood spending used to obtain income available for food*

The latest UN estimate is that 2.6 billion people (32% of the world) could not afford a healthy diet in 2024

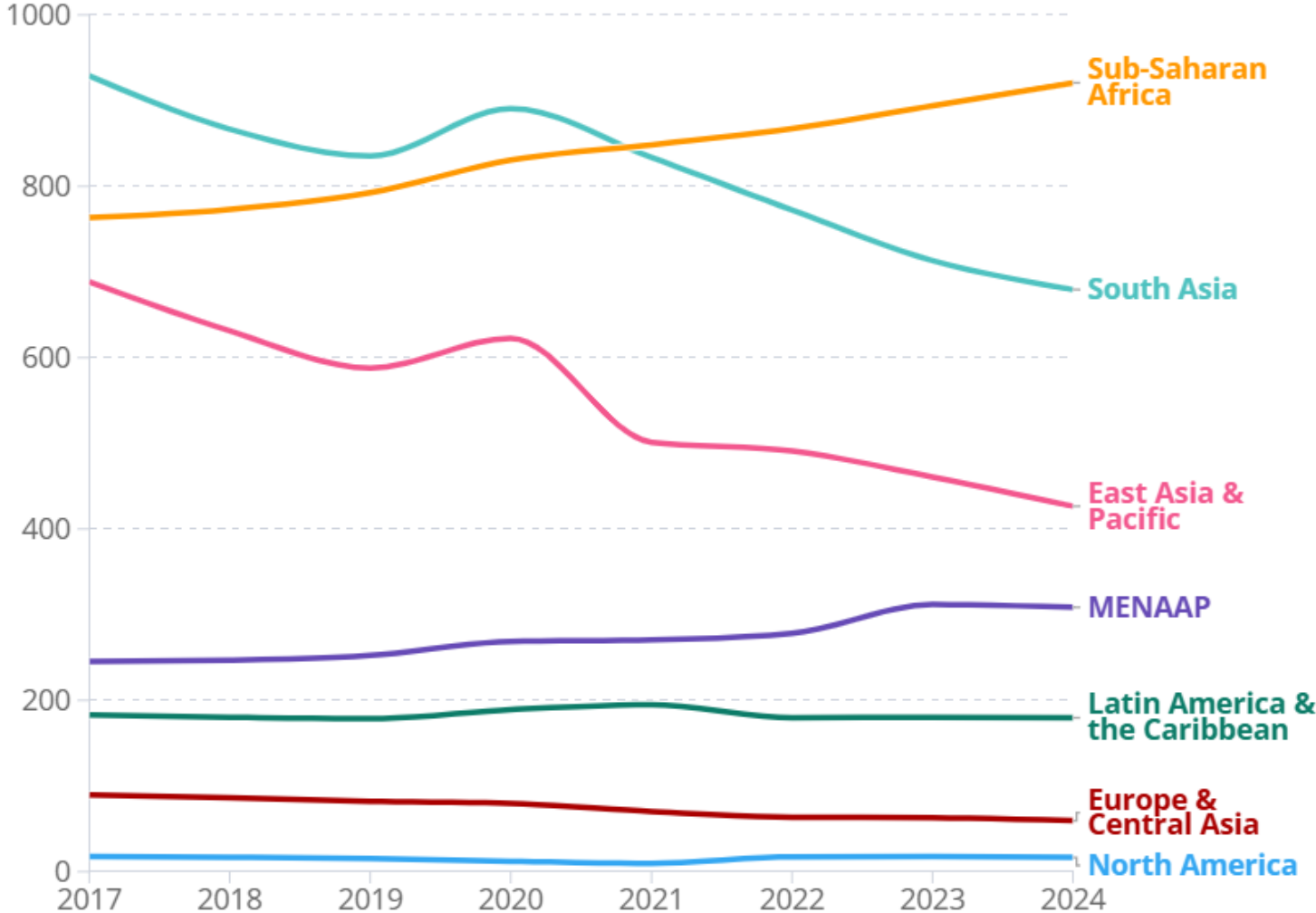
Number and proportion of people who cannot afford a healthy diet



Note: Data shown are based on 2021 item prices projected forward to 2024, relative to income data in 2024.
Source: FAO and World Bank, 2025. The latest data are at <https://www.fao.org/faostat/en/#data/CAHD> and <https://www.worldbank.org/foodpricesfornutrition>.
INTERNAL. This information is accessible to ADB Management and Staff. It may be shared outside ADB with appropriate permission.

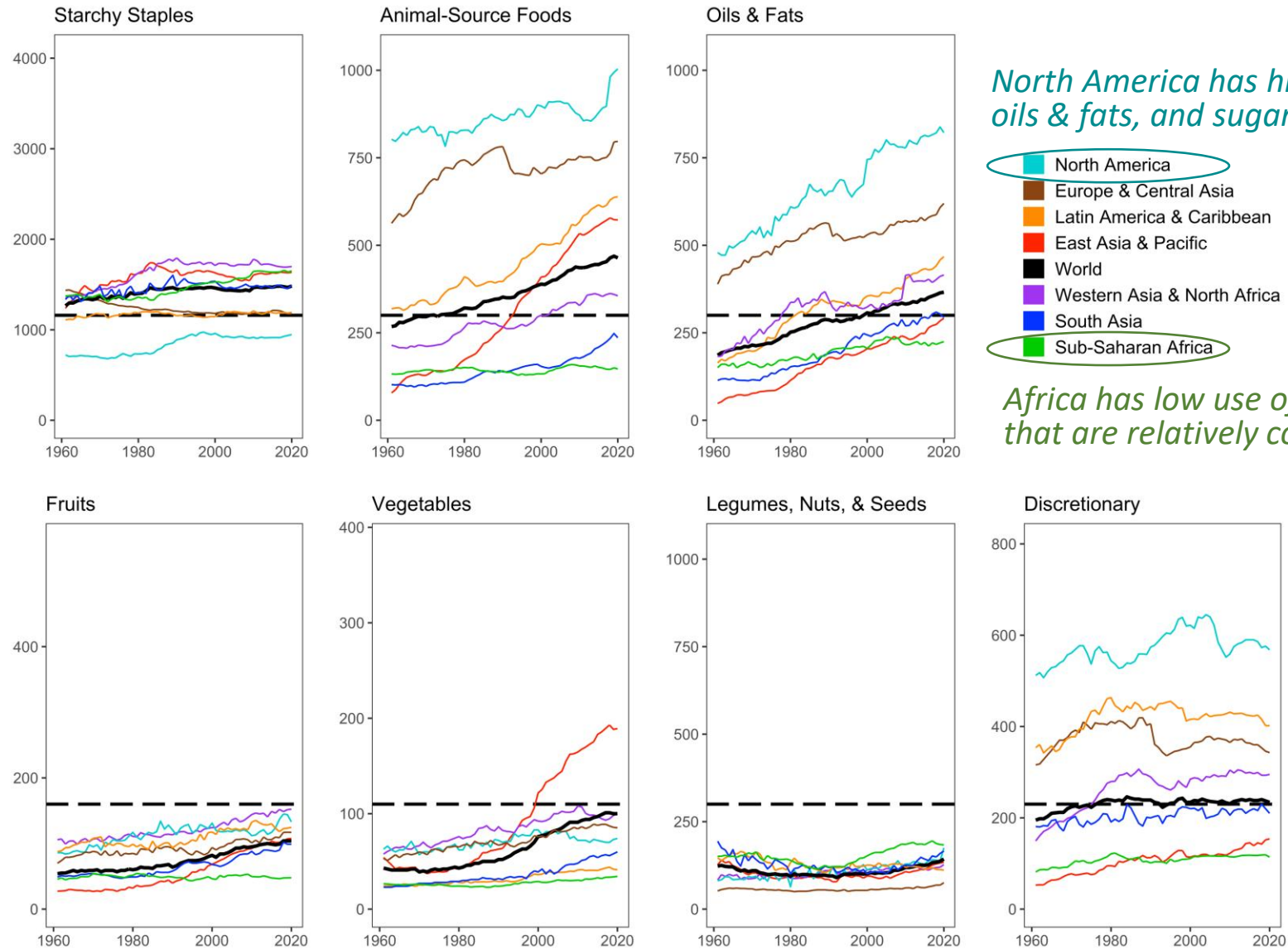
The new metric reveals clear differences by region

Number of people unable to afford a healthy diet by World Bank region



Note: World Bank regional classifications may differ from those used by other organizations; MENAAP is Middle East, North Africa, Afghanistan and Pakistan
Source: Haishan Fu, Jose Rosero Moncayo et al. [Can everyone afford to eat healthy? New data show progress, but not everywhere.](#) World Bank blog, 6 Aug 2025

Globally, actual food use is far from Healthy Diet Basket targets in ways that differ by region and over time



North America has highest use of animal foods, oils & fats, and sugar

- North America
- Europe & Central Asia
- Latin America & Caribbean
- East Asia & Pacific
- World
- Western Asia & North Africa
- South Asia
- Sub-Saharan Africa

Africa has low use of all food groups that are relatively costly per calorie

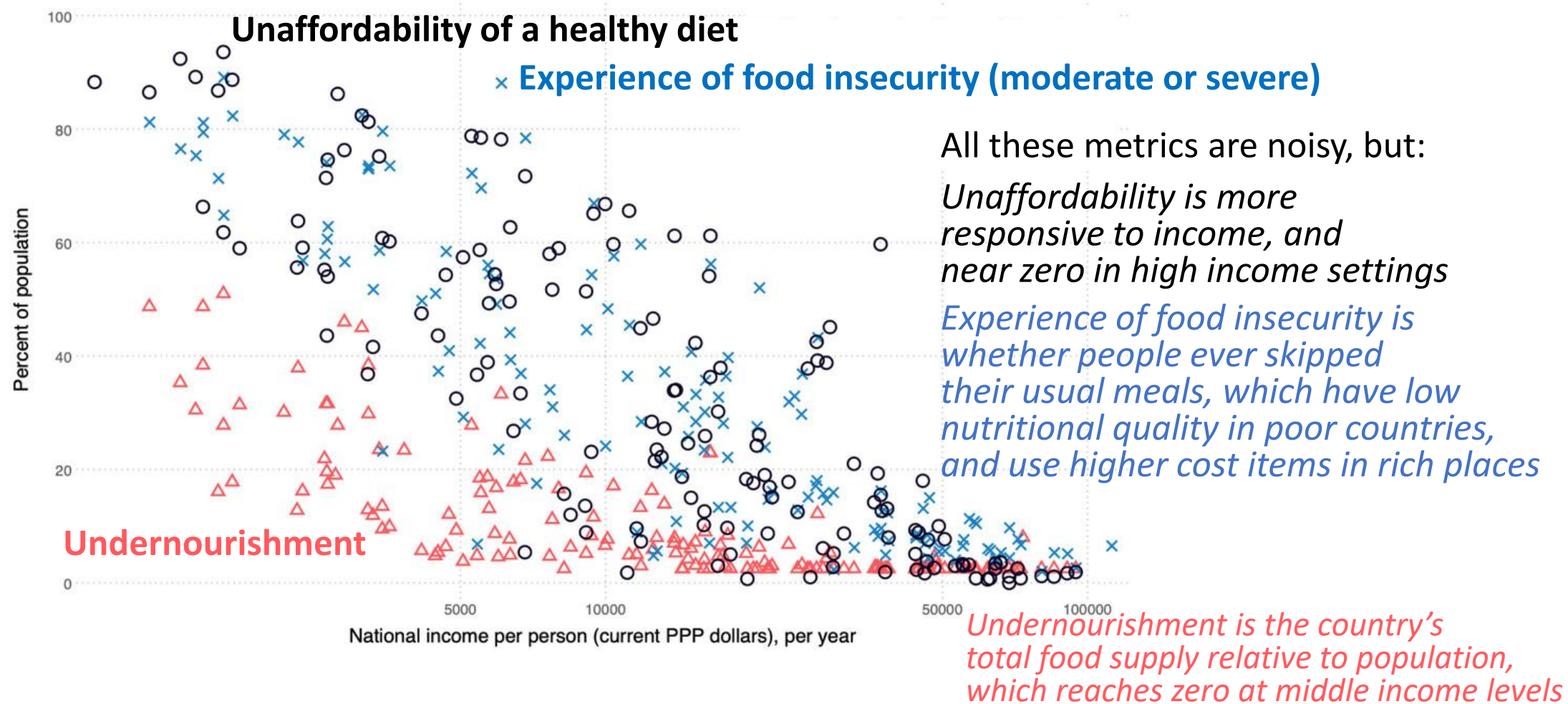
Source: Leah Costlow, doctoral dissertation in progress, Friedman School of Nutrition, Tufts University.

Data shown are from FAO Food Balance Sheet data, for total daily kilocalories available per capita in each region aggregated by HDB food group.

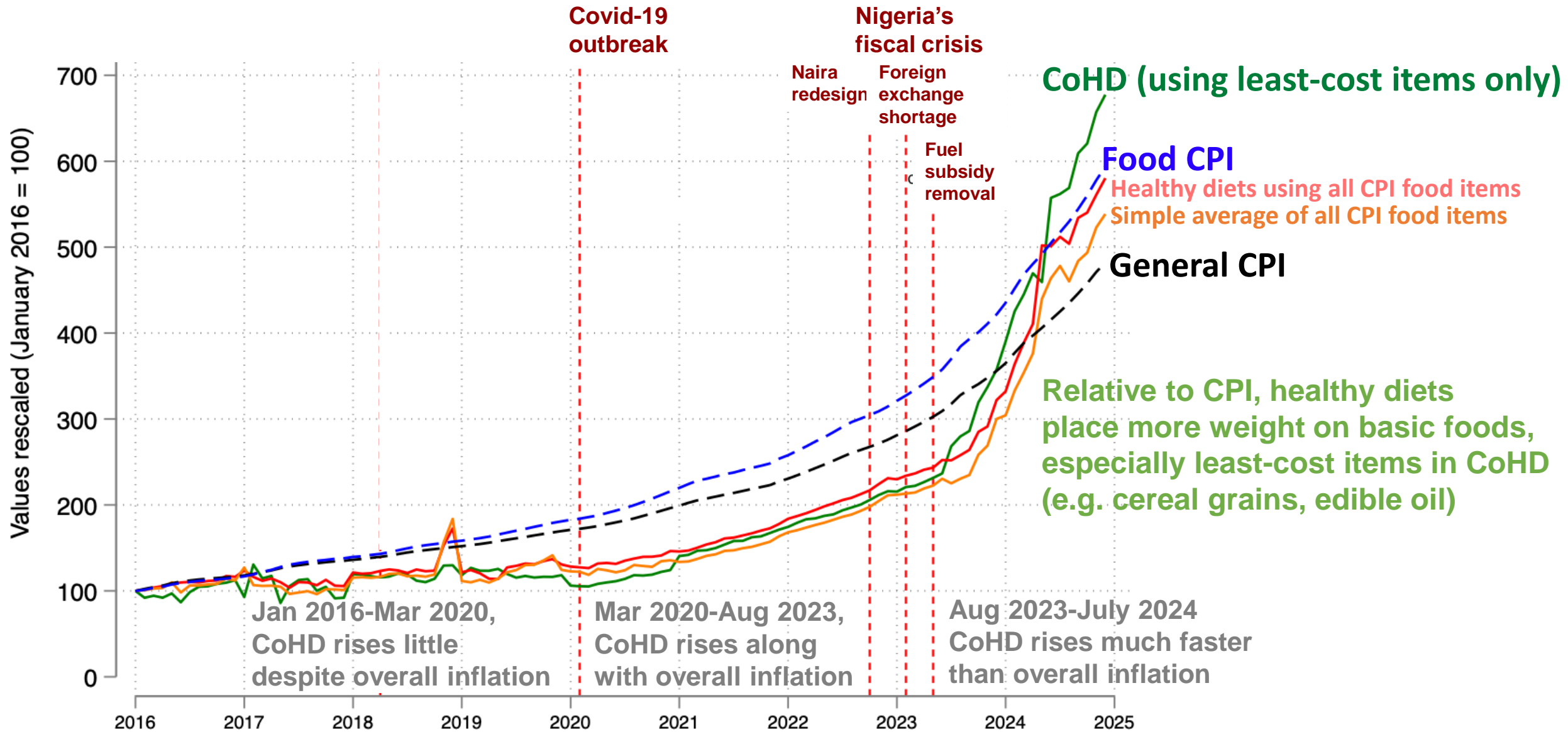
Reproduced in Masters & Finaret (2024), *Food Economics: Agriculture, Nutrition and Health*. Palgrave MacMillan, open access at <https://link.springer.com/book/9783031538391>.

Affordability of healthy diets differs from other food security data

Prevalence of three main food insecurity metrics in 2021



Nigeria data shows how the lowest cost of a healthy diet can have different inflation dynamics than other price indexes



Source: Food Prices for Nutrition analysis of Nigeria NBS data, June 2025. This information is accessible to ADB Management and Staff. It may be shared outside ADB with appropriate permission.

Nigeria's CoHD data is published monthly and widely cited in local policy debates



NATIONAL BUREAU OF STATISTICS

COST OF A HEALTHY DIET

Published since Jan. 2024

Items most often found in Nigeria's CoHD

Food group	Item and frequency
Starchy staples	Millet (whole grain) 32%
	Maize (white grain) 15%
Oils	Palm oil 80%
	Groundnut oil 8%
Fruits	Coconut 42%
	Date palm fruit 30%
Vegetables	Okra (dried) 25%
	Bitter leaf 25%
Legumes, nuts and seeds	Groundnut (shelled) 58%
	Soya beans 20%
Animal source foods	Crayfish (small white) 36%
	Shrimps (red dried) 10%

Note: Data shown are for December 2024



NBS launches new "cost healthy diet" indicator to assess Nigeria's food affordability

By [Iimisyayo Opanuga](#) Date: 31 Jan 2024

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Six Key Insights from the Cost of a Healthy Diet (CoHD) Reports



Living vs minimum wage: Labour's fresh push for salary increase

By [Bunmi Bailey](#) - June 13, 2024

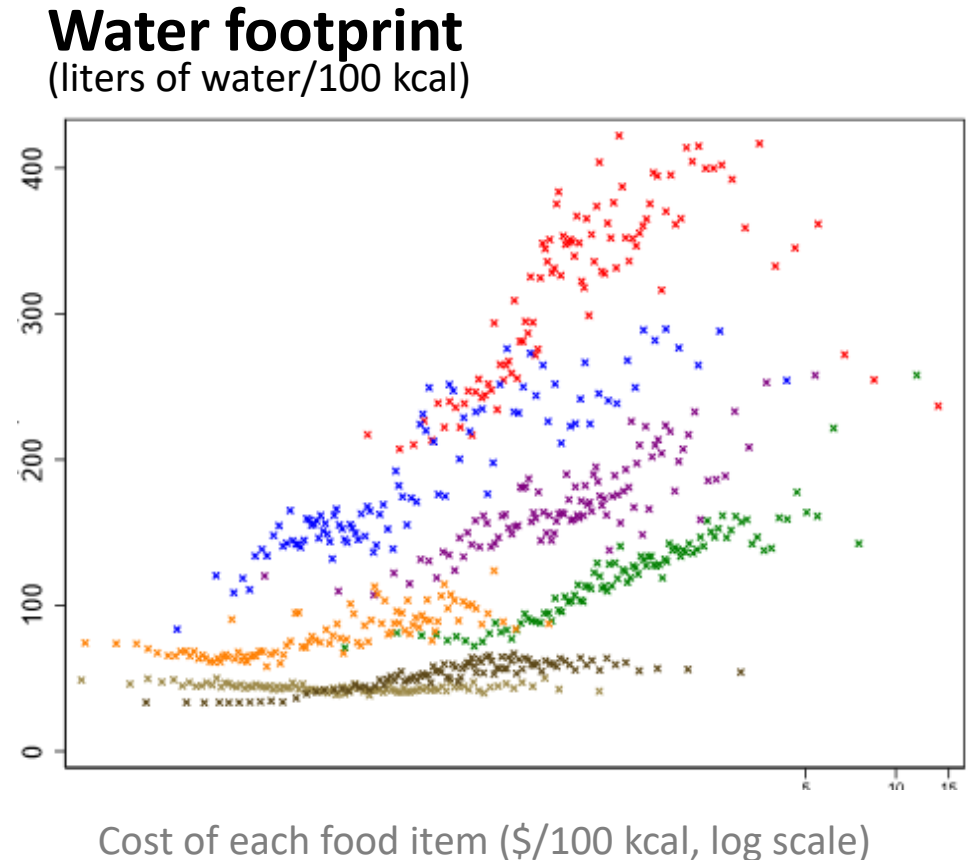
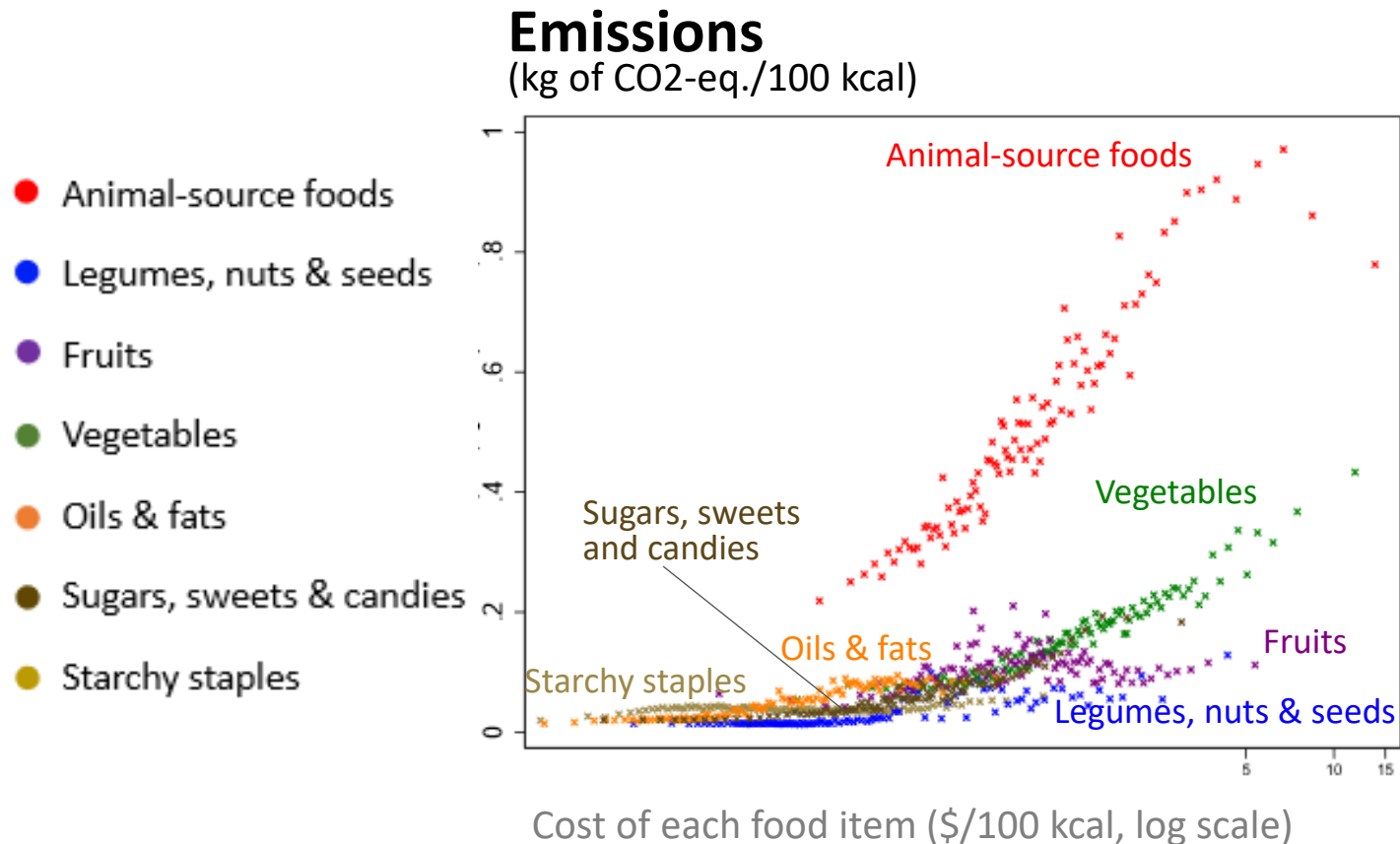
Nigeria more than doubles the minimum wage for government workers after strikes and negotiations



By [DYEPKAZAH SHIBAYAN](#) July 19, 2024

Within each food group, lower cost items are more affordable and also have less emissions (usually - not always!)

...because they use less resources, with closer link to emissions than to water:

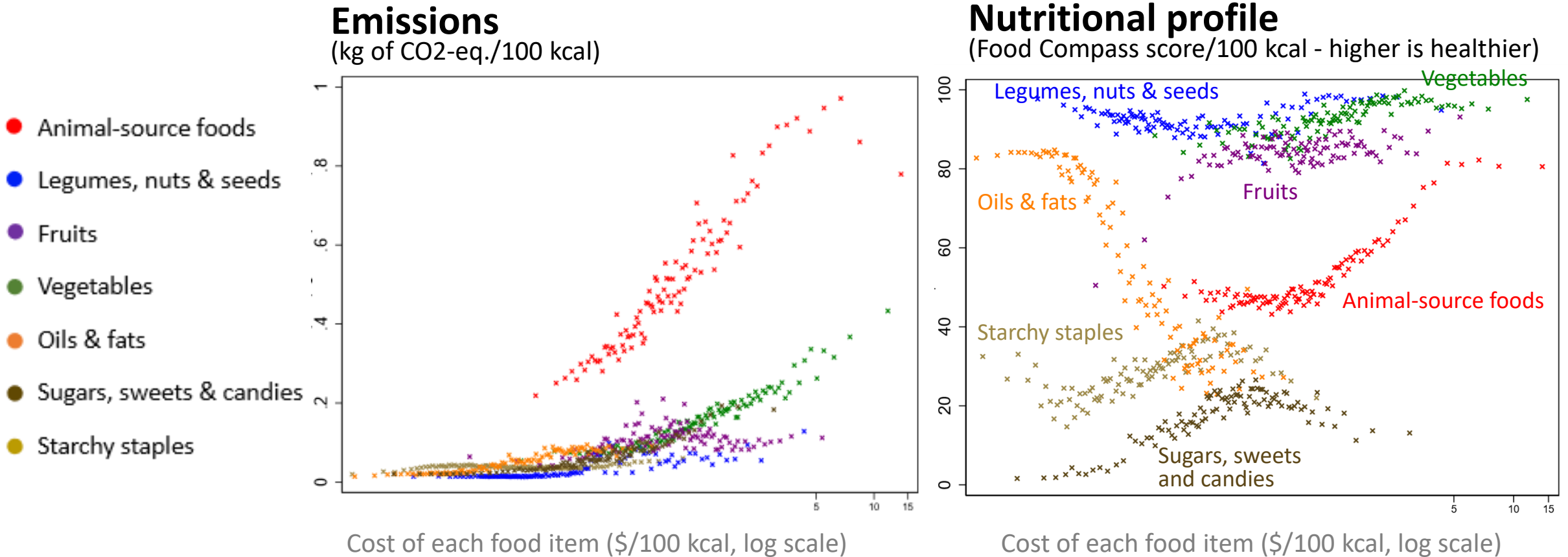


Source: Martinez, E. M., N.T Blackstone, P.E. Wilde, A.W. Herforth and W.A. Masters (2025). [Retail prices, environmental footprints, and nutritional profiles of commonly sold retail food items in 181 countries](#). *American Journal of Clinical Nutrition*, in press (available online 12 August 2025).

Prices shown are for n=811 food items in 181 countries observed in 2011 and 2017, reported by national statistical agencies through the International Comparison Program (ICP), matched to climate and water footprint estimates from Petersson et al. (2021). Figures are binned scatter plots, where each food group is represented by 100 data points, each of which is the mean value of the y-axis variable at the mean level of the x-axis variable across 100 equal-sized bins.

Within each food group, lower cost items are more affordable and also have less emissions (usually - not always!)

...and lower cost items do not generally have a healthier nutritional profile:



Source: Martinez, E. M., N.T Blackstone, P.E. Wilde, A.W. Herforth and W.A. Masters (2025). [Retail prices, environmental footprints, and nutritional profiles of commonly sold retail food items in 181 countries](#). *American Journal of Clinical Nutrition*, in press (available online 12 August 2025).

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Conclusion:

Monitoring the lowest cost healthy diets in each country shows how to bring healthy, sustainable diets within reach

- **For about 2.8 b. people (34% of the world), healthy diets remain unaffordable**
 - Nutrient-rich foods are more costly to grow and ship than starchy staples, vegetable oil & sugar
 - Most unaffordability is due to low incomes, so healthier diets requires higher income or safety nets
- **Even if healthy diets are affordable, they are often displaced by less healthy items**
 - Many factors beyond health drive food choice, as people transition from inadequacy to excess
 - overshooting on animal-source foods, sweeteners and oils, even for home-cooked meals
 - switching to food service and packaged items, leading to excess salt, refined grains etc.
- **Calculating benchmark modeled diets identifies the frontier of potentially affordable foods**
 - Reveals role of income, safety nets and nonfood spending in unaffordability of healthy diets
 - Reveals role of innovation in lowering product cost per unit of each food
 - product cost is closely correlated with emissions (lower cost -> lower emissions, but not always)
 - product cost has varied correlations with nutritional value (depends on product category)
 - In many settings, poor diet quality is caused by factors other than income and price
 - displacement of low-cost healthy options due to attributes such as taste, convenience, and aspirations

=> for poverty measurement in richer countries, may need even more expensive diet quality standards

Thank you!

We are grateful to many price data collectors, analysts and project collaborators, and to the Bill & Melinda Gates Foundation and the UKAid government for funding

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GATES** *foundation*



Foreign, Commonwealth
& Development Office

...and there's more:

Open-access textbook at
<https://bit.ly/FoodEconBook>

Global monitoring is done jointly by the FAO and the World Bank



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Subnational and other analyses done by country governments and other agencies

