

Food supplies, access to healthy diets, and the economics of food choice

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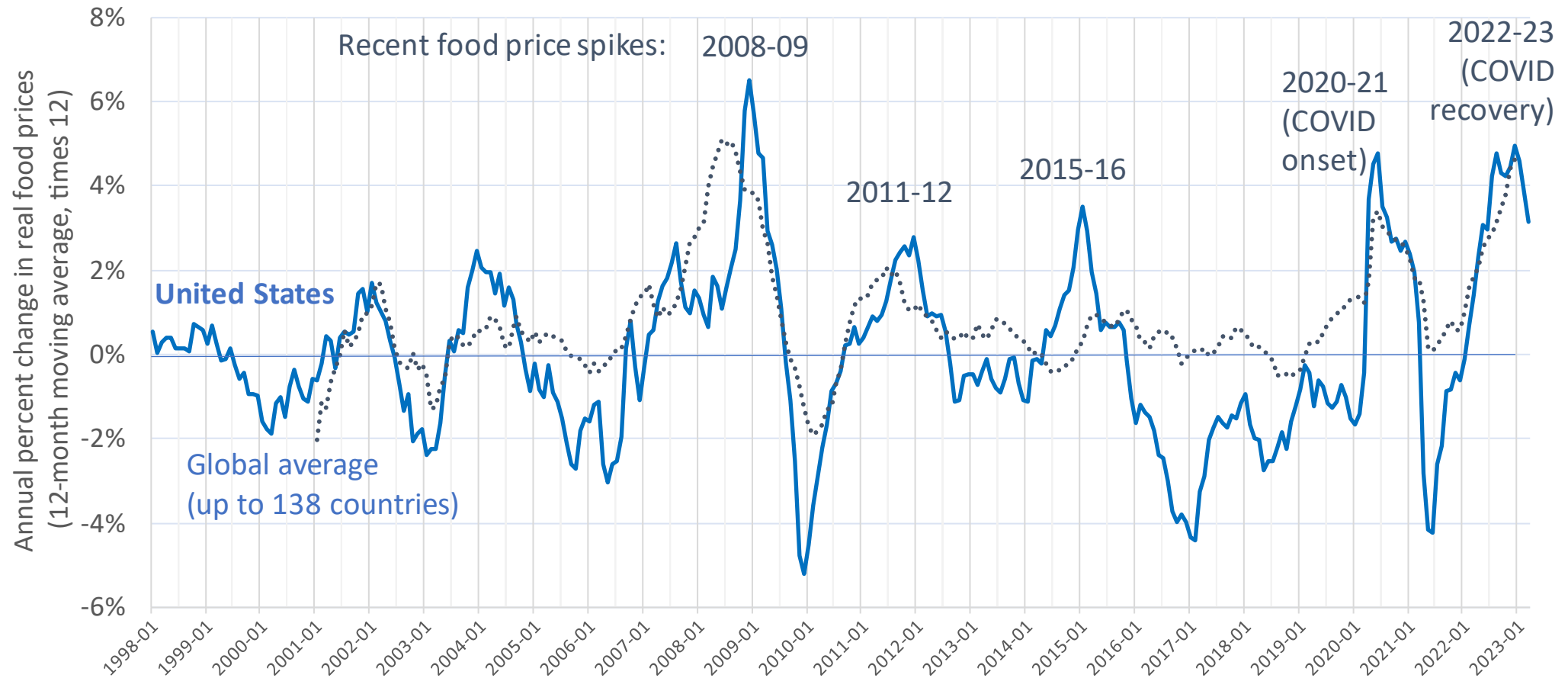
26 April 2023

NASEM Standing Committee on Evidence Synthesis
and Communications in Diet and Chronic Disease Relationships

Open meeting on translating nutrition science from bench to plate: complexity of iterative processes

In periods of scarcity, stocks run low & food prices spike up

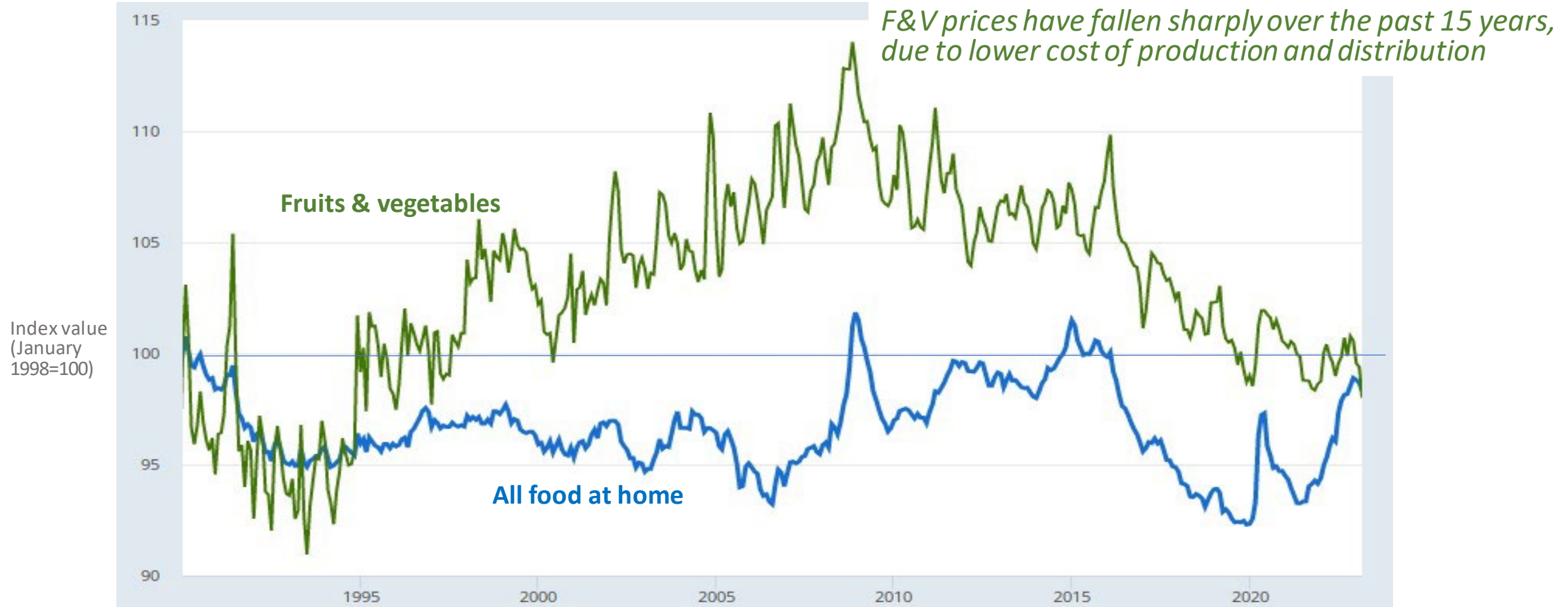
Average rise in retail food prices relative to all other goods and services over previous 12 months in the U.S. and worldwide, Jan. 1998 - Mar 2023



Note: Author's calculations. U.S. data are from the Bureau of Labor Statistics (updates: <https://fred.stlouisfed.org/graph/?g=12Myr>). Global data are from the IMF, averaging up to 138 countries reporting monthly consumer price indexes (CPI) for food and for all goods and services, Jan. 2000 through Dec. 2022. Each observation is the average monthly rise over the previous 12 months, times 12 to obtain an annualized value. Number of countries rises from 51 in Jan 2000 to 95 in 2005 and then 138 from 2015 onwards. Raw data for all countries are at <https://data.imf.org>.

Price variation differs by type of food

Price level for F&V and for all food at home in the United States, Jan 1990 – Mar 2023



Note: Author's calculations. Data shown are from the US Bureau of Labor Statistics, as the average for each category relative to the overall U.S. consumer price index for all goods and services. Fruits and vegetables may be fresh, frozen or canned. Updated values can be obtained at <https://fred.stlouisfed.org/graph/?g=12MMD>.

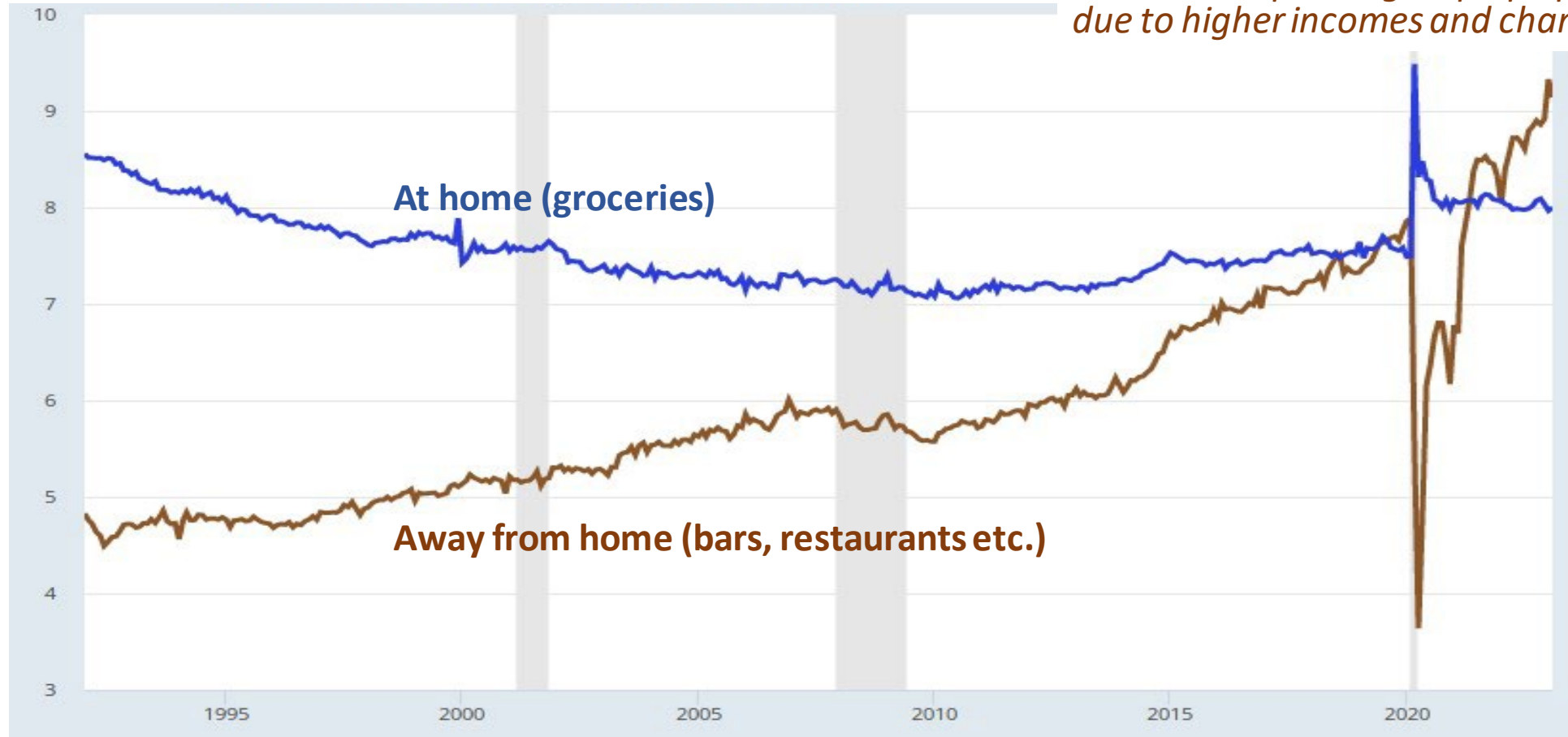
What do food consumers actually buy?

Real average food spending in the United States, Jan 1990 – Mar 2023

Dollars
per day,
per person

(Adjusted for
inflation, to
equal dollars
of Mar. 2023)

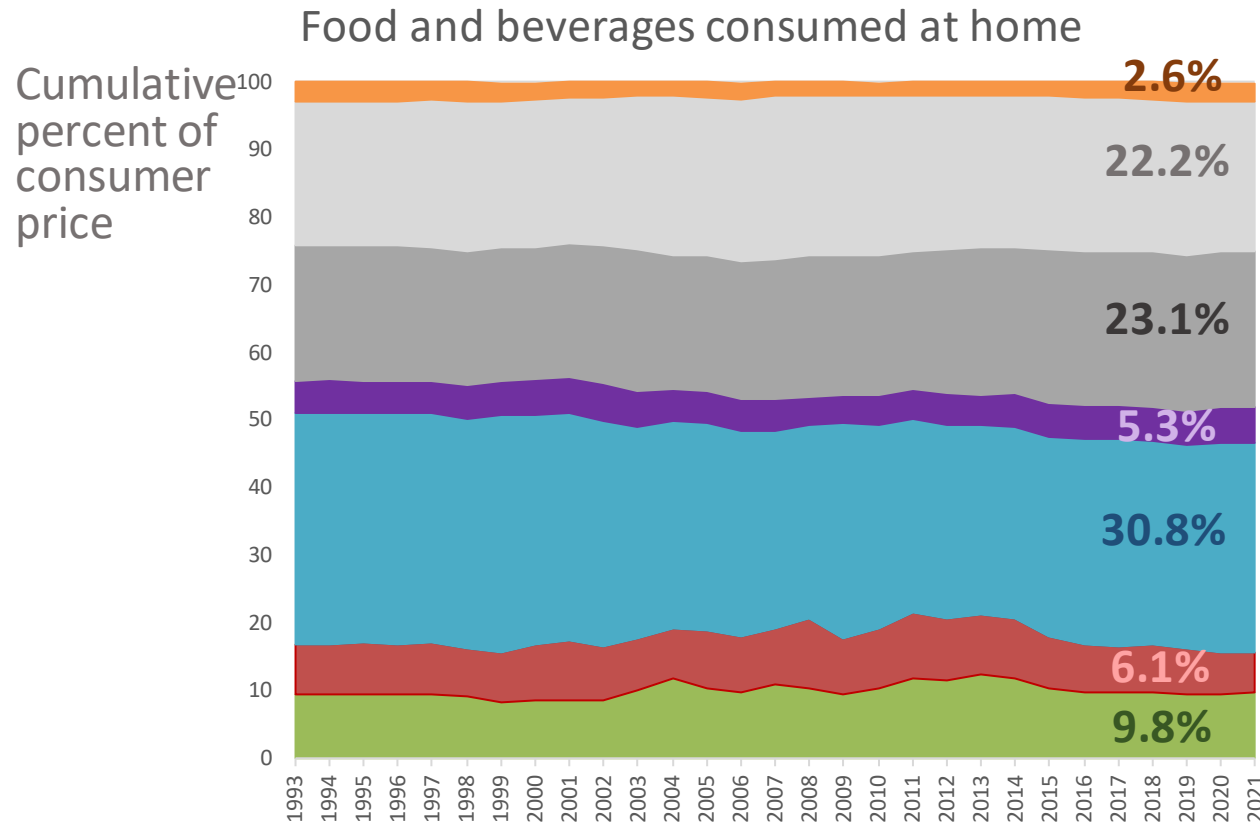
*Restaurant spending is up up up,
due to higher incomes and change in time use*



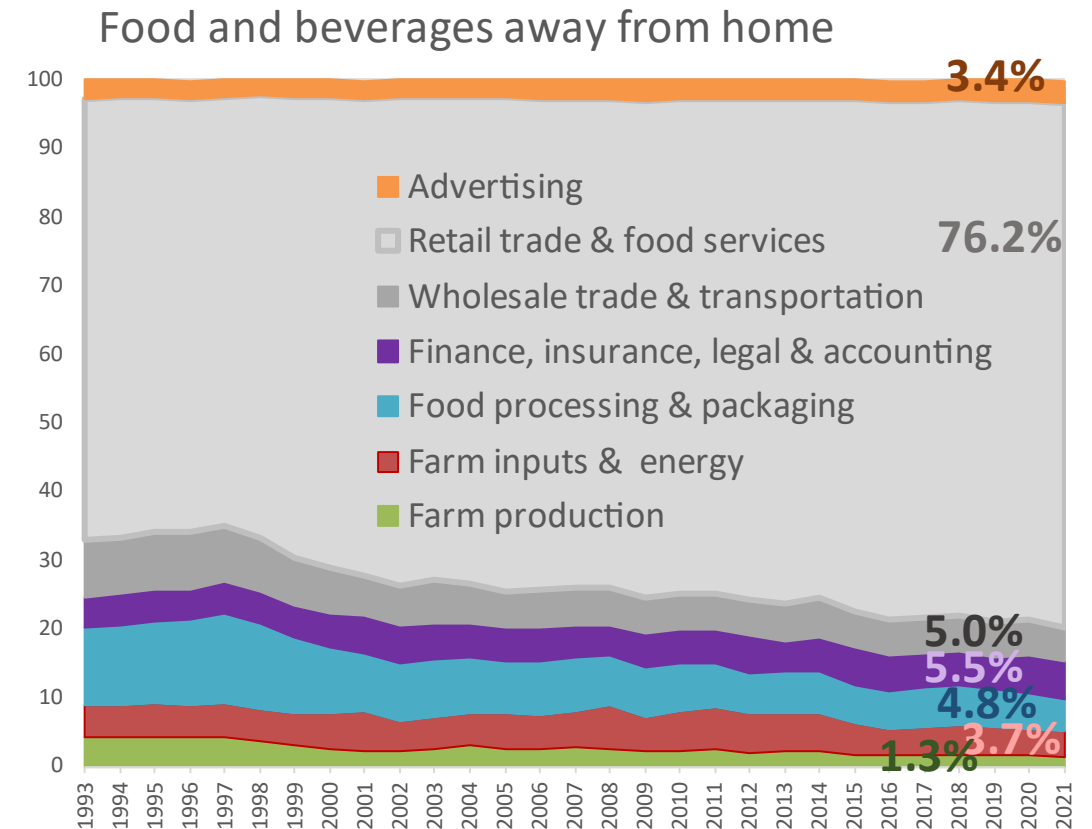
Note: Author's calculations. Data shown are the US Census Bureau's Monthly Retail Trade Survey advance estimates for each month, per day per person in the United States, in today's dollars adjusted for inflation to March 2023. This chart with updated data is at <https://fred.stlouisfed.org/graph/?g=12MMX>.

When we buy food, what are we paying for?

Cost of food by stage of value added in the United States, 1993 – 2021



When we buy food, we pay a lot for brands & services!

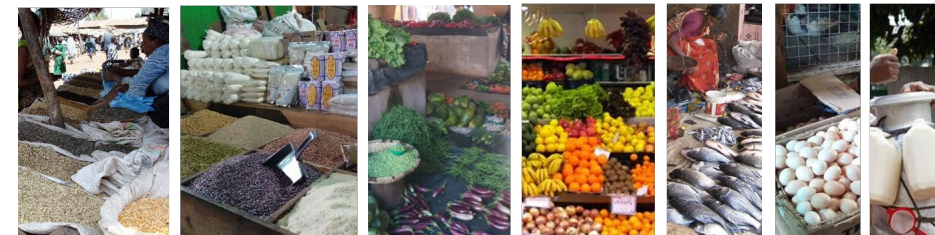


Note: Author's calculations. Data shown are from the USDA Economic Research Service (2023), *Food Dollar Series*. Last updated Feb. 15, 2023, available at <https://www.ers.usda.gov/data-products/food-dollar-series>. Implied total spending on food advertising is roughly \$60 billion per year, more than the NIH and CDC budgets combined. (Overall food spending is about \$6,200 per person, about half our total health-care spending.)

Can we distinguish *access to healthy diets* from what people actually consume?

- **For decades, food security was defined and measured as *calories for survival***
 - Since the 1960s, the FAO has used its “Prevalence of Undernourishment” metric for the number of hungry people in the world, based on total food consumption relative to estimated level of **dietary energy requirements**
- **More recently, food security is defined and measured as *access to desired foods***
 - Since the 1990s, the USDA and then FAO have used “Experience of Food Insecurity” scores 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 foods**
- **Now we can use data on retail prices, to track the *cost and affordability of healthy diets***
 - Since 2016, a series of Tufts projects have developed new metrics of food and nutrition security, designed to measure whether a population has **access to foods that meet international criteria for a healthy diet**
 - Our goal is to guide intervention, matching items to needs and 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
 - **Food choice:** if people could buy a healthy diet but choose unhealthy foods instead, need other changes
 - Pilot study in Ghana and Tanzania ([Masters et al. 2018](#)), then scaled up with over 16 journal articles and adoption for global monitoring by the FAO and other UN agencies on [FAOSTAT](#), and at <https://WorldBank.org/FoodPricesforNutrition>.

The Food Prices for Nutrition project in one slide



We measure *access to healthy diets* using the least expensive locally available foods as a new kind of price index, measuring the cost of food as an input to health

A key step is to quantify needs for both nutrients and food groups

For actual food choice among affordable options, observed consumption often displaces healthy items with other foods

For SOFI 2022, the updated standard for the Cost of a Healthy Diet (CoHD) is a **“Healthy Diet Basket”** of the 11 least-cost items from 6 food groups

Actual global food spending = \$5.46/day

For SOFI 2020, we used 10 countries’ guidelines for the Cost of Recommended Diets (CoRD)

Healthy diets
Meets national dietary guidelines by food group
Global ave. in 2017 = \$3.31/day

Our AJAE 2018 article introduced a Cost of Diet Diversity (CoDD) metric and many other studies analyze the cost of nutrients



Nutrient adequacy
Avoids deficiency or excess of essential macro- and micronutrients
Global average in 2017 = \$2.46/day

Daily energy
Meets only calorie needs, for short-term survival and physical work
Global average in 2017 = \$0.83/day

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*



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

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, d}



Food Policy
Volume 99, February 2021, 101983



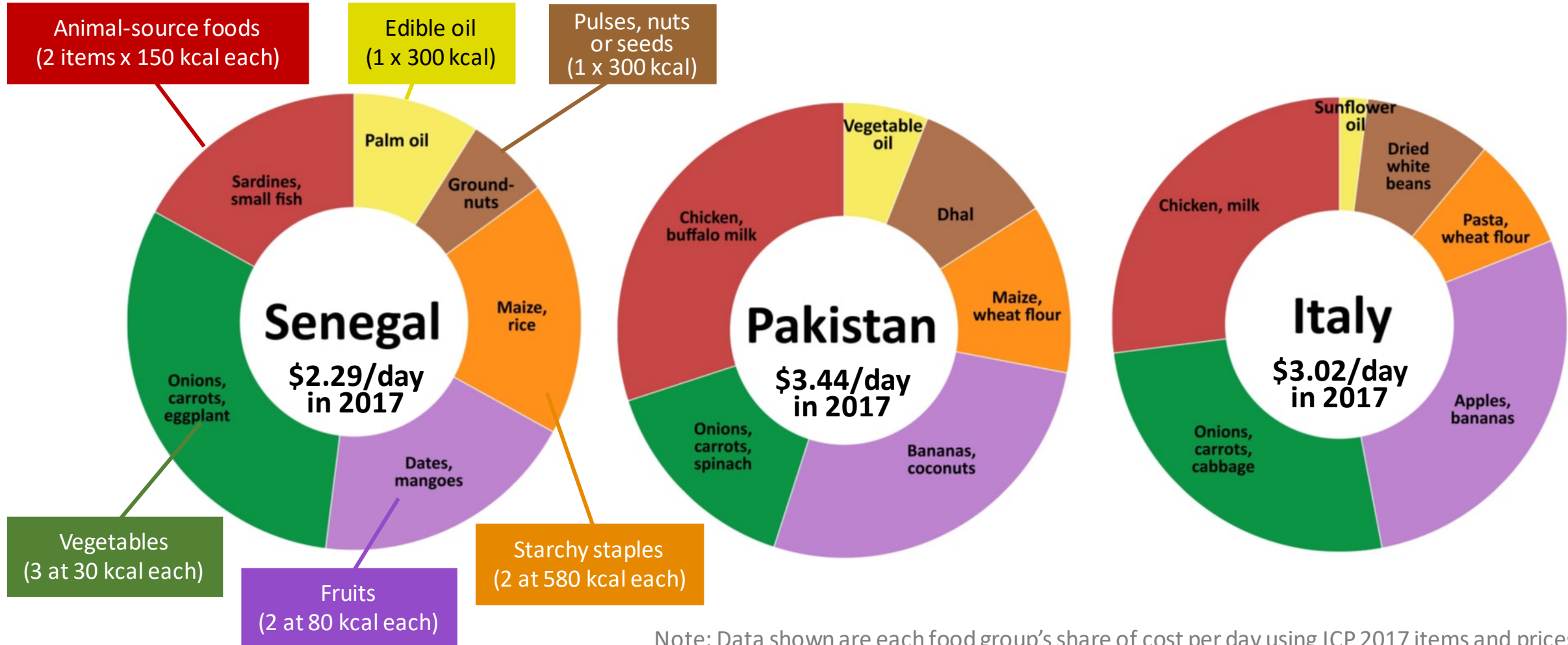
Cost and affordability of nutritious diets at retail prices: Evidence from 177 countries

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

What foods are included in a least-cost healthy diet?



Foods selected are the least expensive items being sold at the time and place of measurement

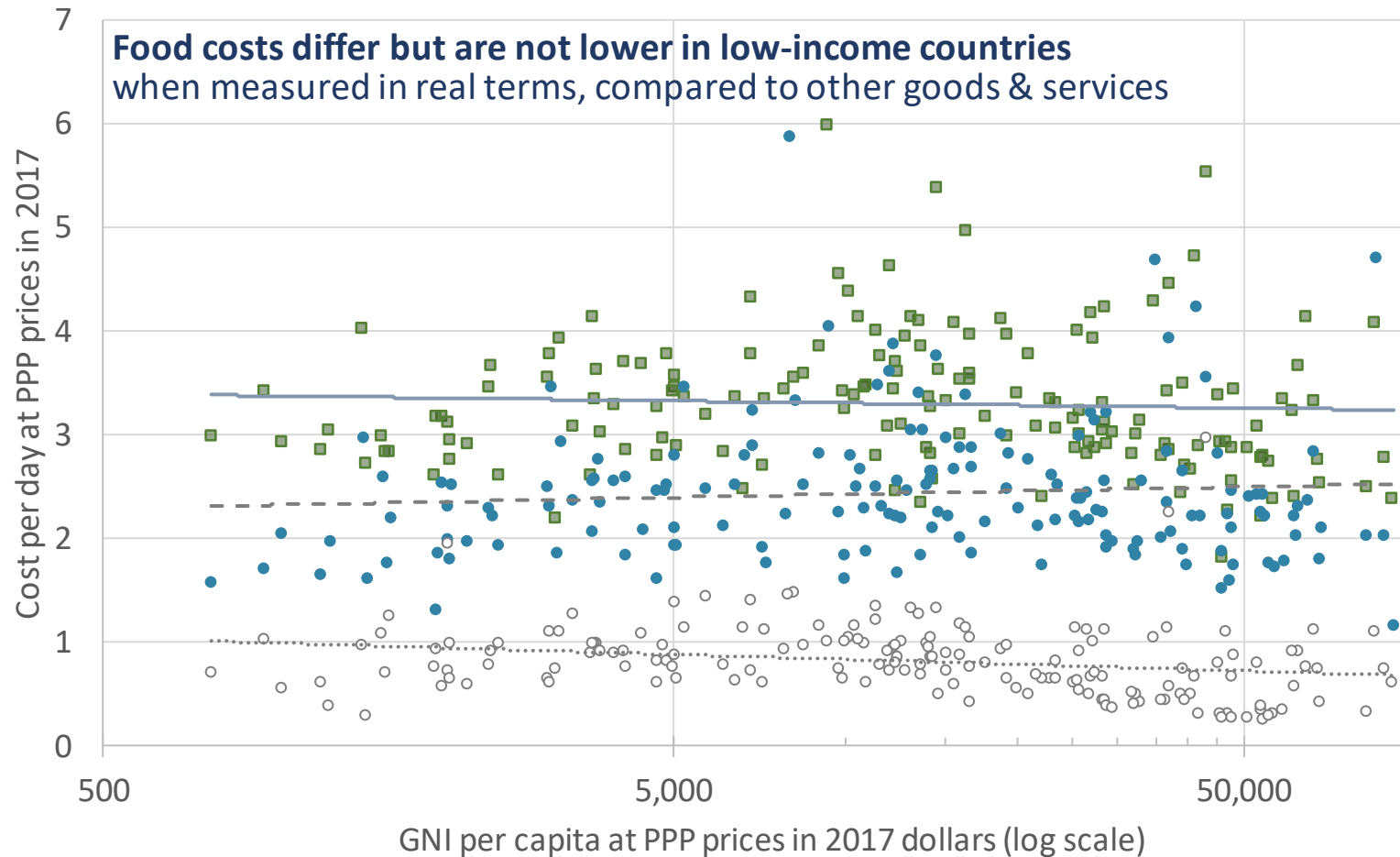


Note: Data shown are each food group's share of cost per day using ICP 2017 items and prices.
Source: Food Prices for Nutrition (2022). <https://sites.tufts.edu/foodpricesfornutrition>

What have we discovered about the cost and affordability of healthy diets?



Cost of the least expensive items for a healthy diet in 2017



Least-cost healthy diets are unaffordable for the very poor, about 3 billion people

Based on overall food price inflation relative to incomes, real costs rose to \$3.54 in 2020, higher in 2021 and 2022

Global average costs in 2017

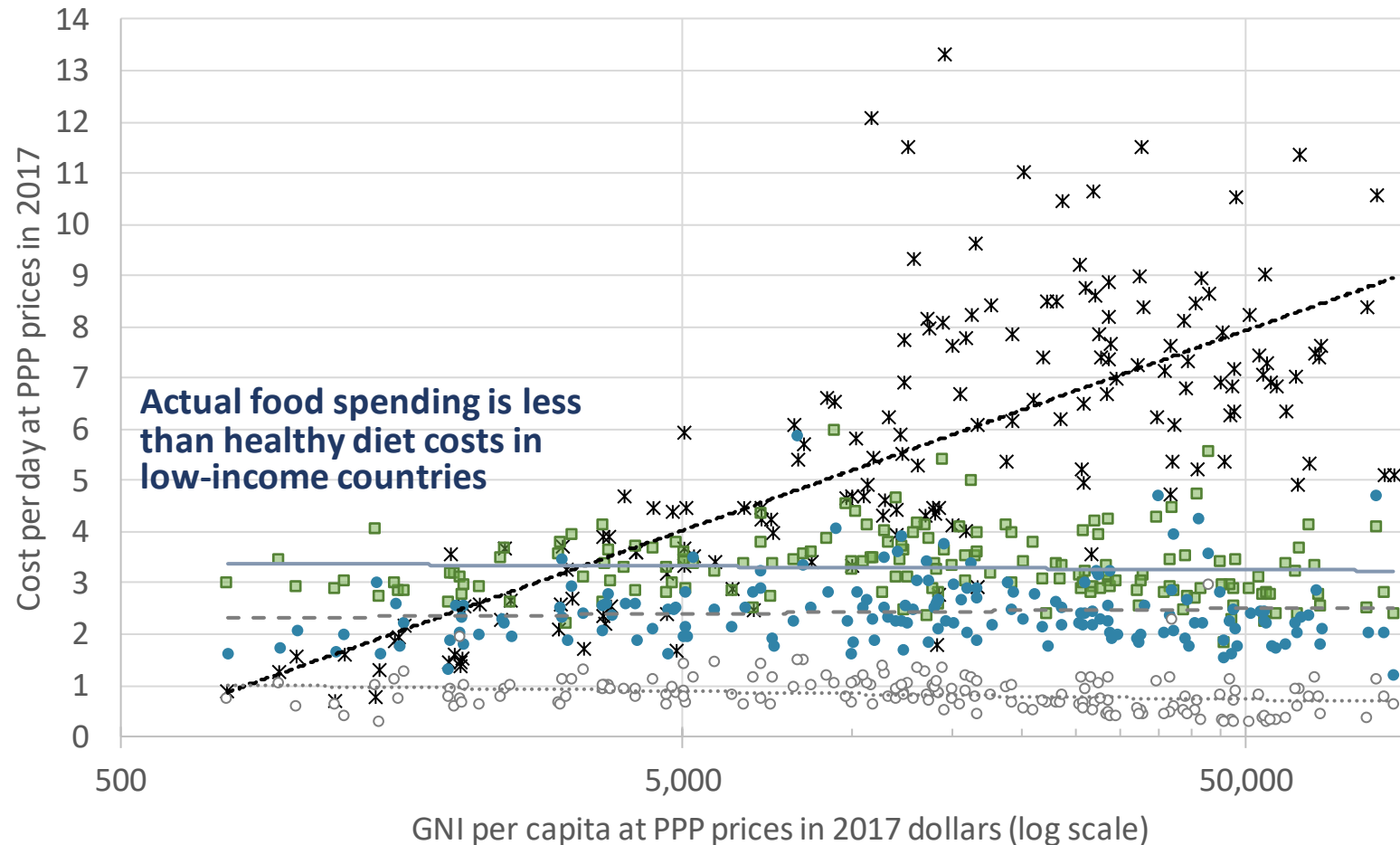
- Cost of a healthy diet [CoHD] **\$3.31**
(meets dietary guidelines for overall health)
- Cost of a nutrient adequate diet [CoNA] **\$2.46**
(within upper & lower bounds for nutrients)
- Cost of an energy sufficient diet [CoCA] **\$0.83**
(sufficient calories for work each day)

Diet cost data are from FAO and the Food Prices for Nutrition project, using item prices reported by national statistical organizations through the International Comparison Program (ICP), downloaded from <https://databank.worldbank.org/source/food-prices-for-nutrition>, and national income (GNI) is from the World Development Indicators <https://databank.worldbank.org/source/world-development-indicators>. Guidelines are linear in the logarithm of income shown on the horizontal axis.

How does actual spending on food compare to the cost of healthy diets?



Cost of the least expensive items for a healthy diet and actual food expenditure in 2017



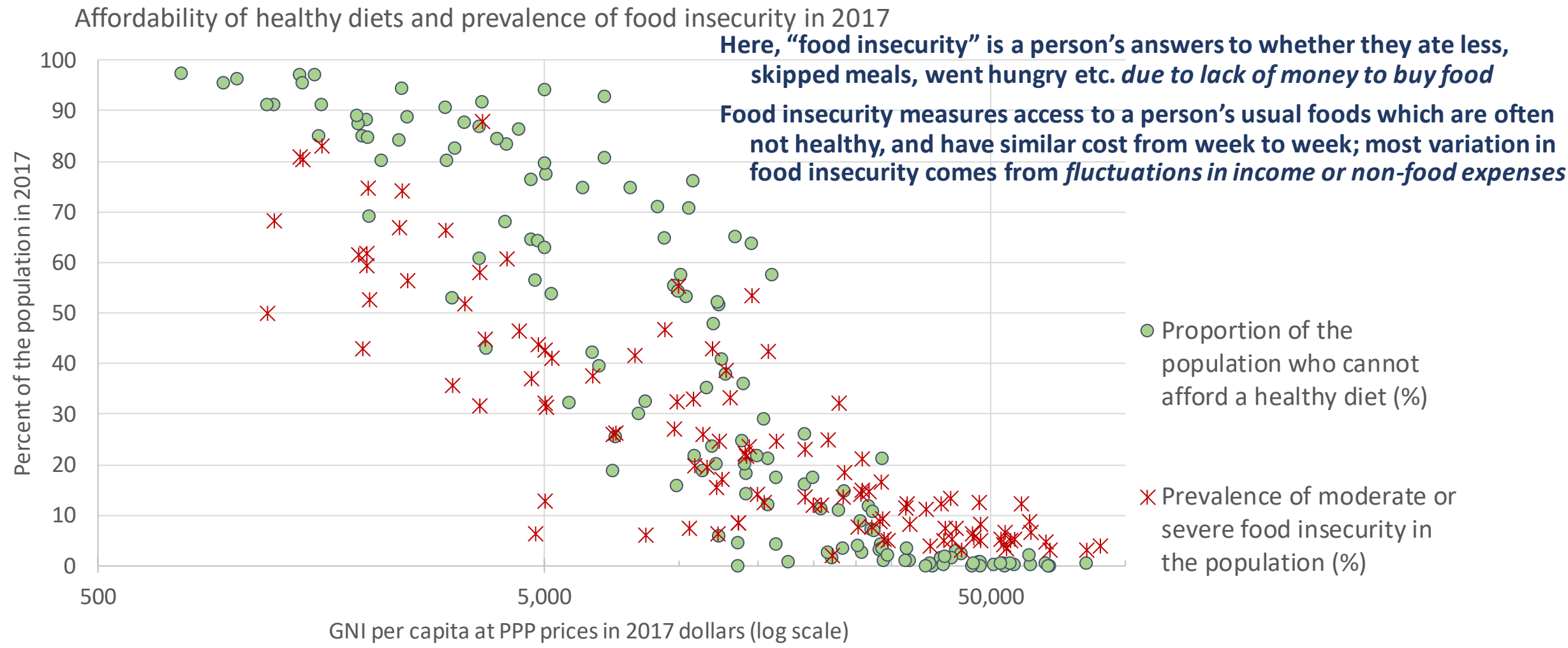
Average food spending is much greater than least-cost healthy diets in middle- and high-income countries ...but that is the national average, many households in these countries cannot afford healthy diets

Global average costs in 2017

- × Food expenditures (FoodExp) **\$5.64**
(pursues many goals other than health)
- Cost of a healthy diet [CoHD] **\$3.31**
(meets dietary guidelines for overall health)
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How does affordability of healthy diets relate to food insecurity?



Data shown are FAO estimates, downloaded from <https://databank.worldbank.org/source/food-prices-for-nutrition> for affordability of healthy diets, and from <https://databank.worldbank.org/source/world-development-indicators> for experience of food insecurity and national income (GNI).

Conclusion: we can distinguish access to a healthy diet from actual intake, and use that to guide intervention



- **For about 3 of the world's 8 billion people, healthy diets remain unaffordable**
 - Nutrient-rich foods are more costly to grow and distribute than starchy staples, vegetable oil & sugar
 - At times and places where prices are unusually high, supply improvements can lower cost
 - Most unaffordability is due to low incomes, so healthier diets will require higher earnings or safety nets
- **For most people (5 of the world's 8 billion), healthy diets could be purchased but are often not chosen**
 - 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 away from home and packaged items, leading to excess salt, refined grains etc.
- **Identifying least-cost items and diet costs helps guide intervention**
 - Which items have the most potential to improve affordability of healthy diets
 - Which people would need higher incomes or safety nets to afford healthy diets
 - Which other foods enter to displace least-cost healthy diets, due to preferences and market failures
 - once affordability is assured, maintaining a balanced diet is very challenging!
 - many different interventions are likely needed, as discussed by others in this session

Thank you!



Photo by Anna Herforth
at Agbogloboshi market, Ghana

We thank the many price collectors and contributors to the diverse databases used in this work and are grateful for funding to the Bill & Melinda Gates Foundation and UKAid, as well as complementary funding from FAO.

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GATES *foundation*

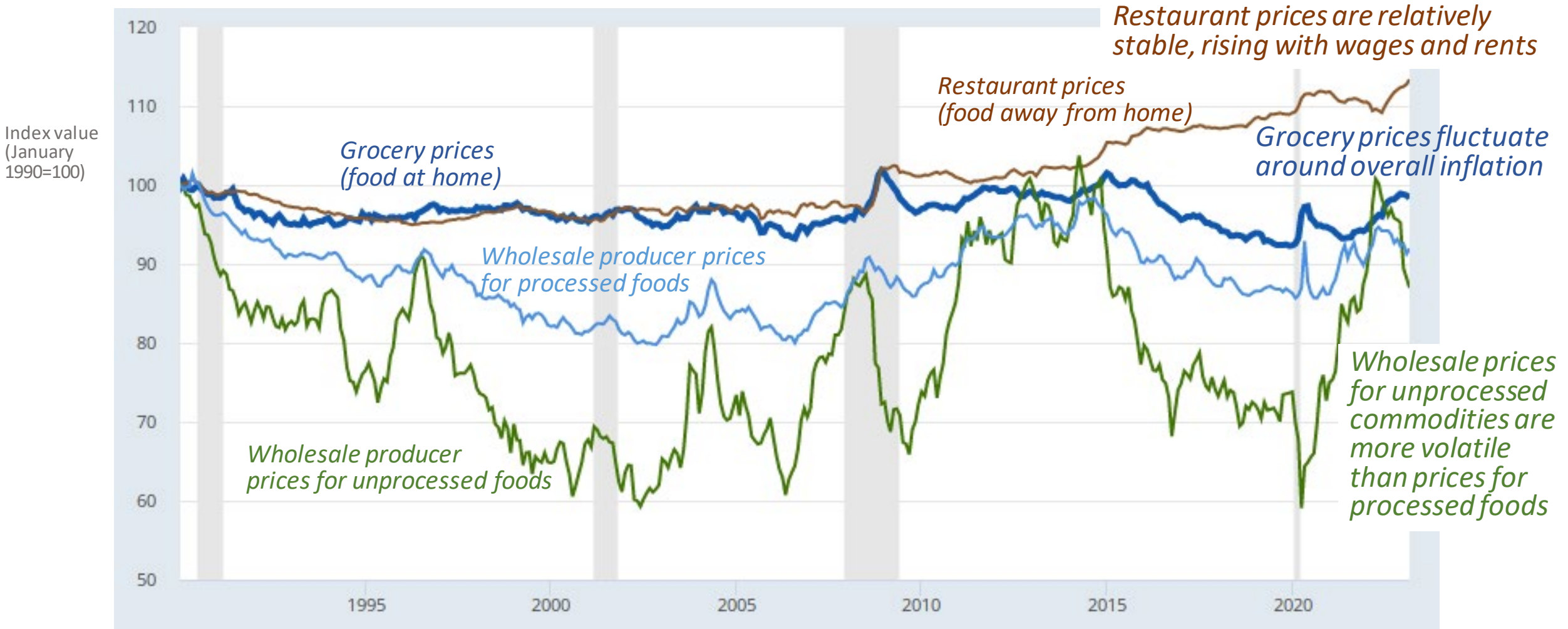


Foreign, Commonwealth
& Development Office



Price variation differs by stage of the value chain

Consumer prices for groceries and restaurants vs. wholesale costs, Jan 1990 – Mar 2023



Note: Author's calculations. Data shown are from the US Bureau of Labor Statistics, as the average for each category relative to the overall U.S. consumer price index for all goods and services. Fruits and vegetables may be fresh, frozen or canned. Updated values can be obtained from <https://fred.stlouisfed.org/graph/?g=12MMI>.