

Innovative Metrics of Diet Quality in Low- and Middle-Income Settings

June 9, 2021

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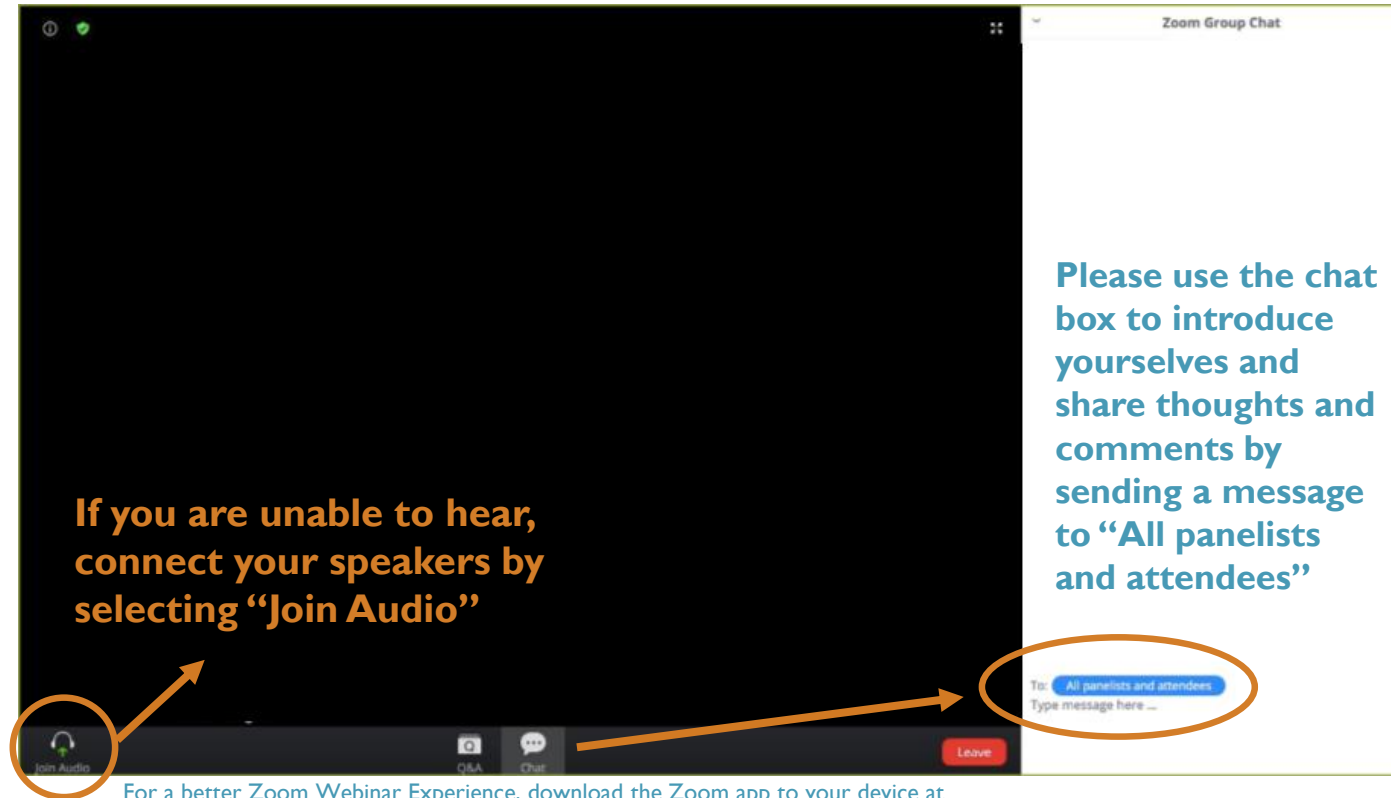
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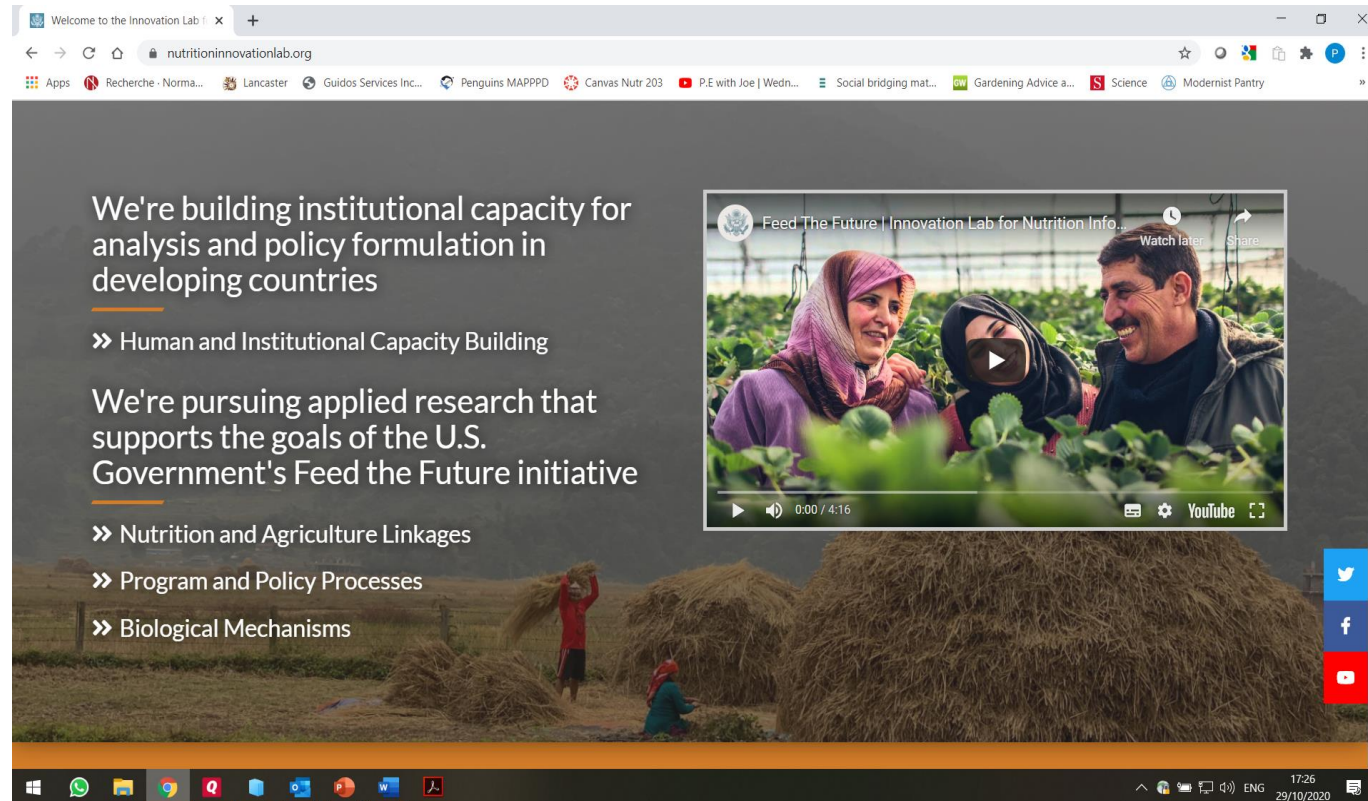
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The screenshot shows a web browser window with the URL nutritioninnovationlab.org. The page features a dark background with white text. On the left, there is a main heading and two bulleted points. On the right, there is a video player showing a group of people in a field. Below the video, there are social media sharing icons for Twitter, Facebook, and YouTube. The bottom of the browser window shows the Windows taskbar with various application icons and the system clock.

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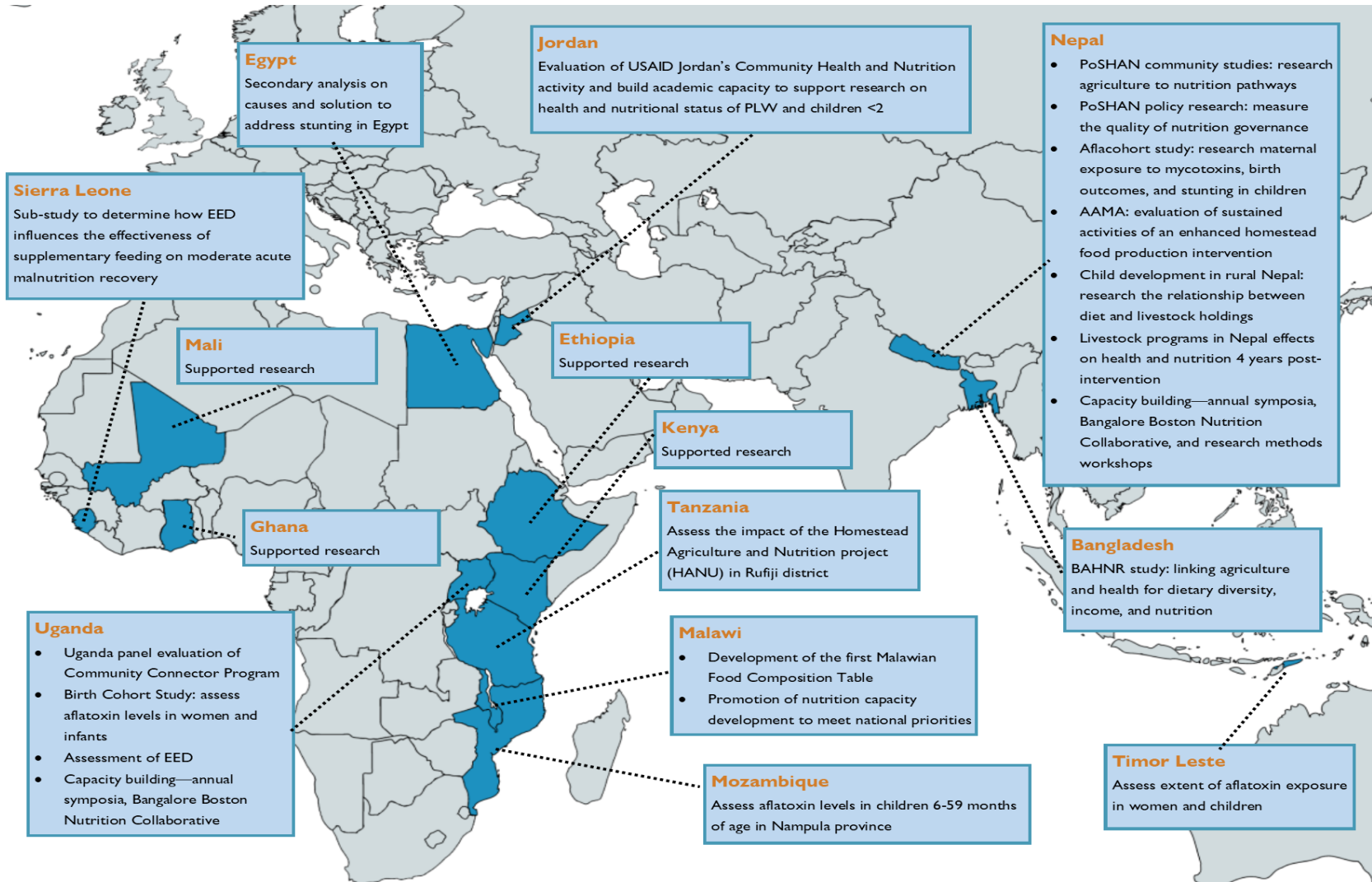
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Innovative Metrics of Diet Quality in Low- and Middle-Income Settings



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Diet-related Measurement Needs



Anne Swindale, PhD, USAID Bureau for Resilience and Food Security

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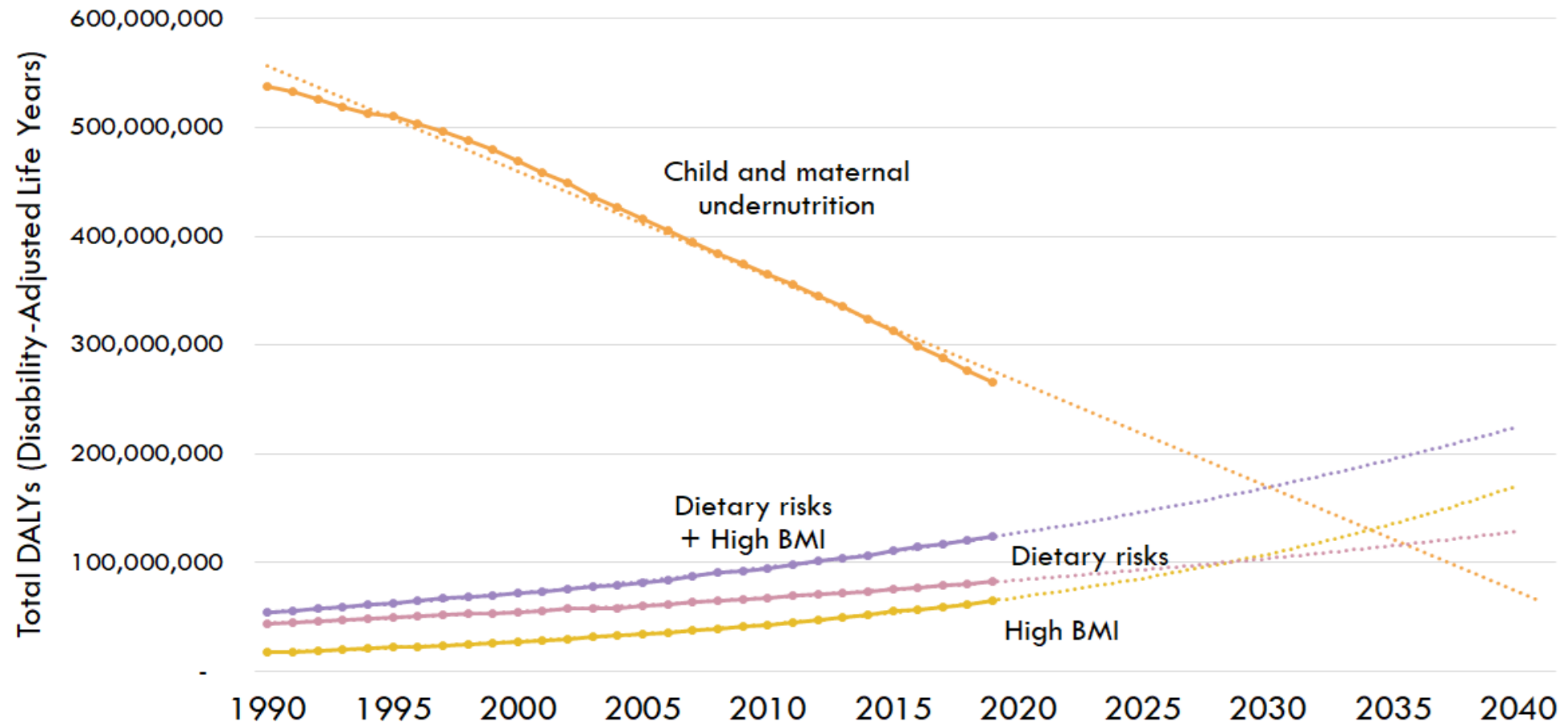
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Implications of Shifts in the Burden of Malnutrition

Projection of low and low-middle income country trends in the burden of undernutrition, overweight/obesity, and poor dietary intake



Year-round availability of affordable, safe,
nutritious and diverse foods on local markets

Consumption of safe, nutritious, healthy and
diverse diets



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Innovative Metrics for Measuring Diet Quality for Women in Low and Middle-income Countries



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GLOBAL DIETARY AND NUTRITION TRANSITIONS

- Globally food systems are failing to deliver nutritious and healthy diets in an equitable manner (EAT Lancet)

1) **Women & children have poor diets** (LMICs):

- Monotonous, plant-based, limited animal foods, seasonal fruits and vegetables, poor bioavailability (Arimond et al, 2010; Torheim et al, 2010; Arimond 2004)

2) **Dietary transition:** Major shifts in diets

- Increased refined carbohydrates (e.g. *refined meal ugali, white rice*), processed and ultra-processed foods, added sugars, and animal-source foods and reduced legumes, vegetables, and fruits (Popkin 2015)

3) **Nutrition transition in LMICs**

- Rapid increases in body mass index (BMI), overweight, non-communicable diseases, low physical activity (Popkin 2015)

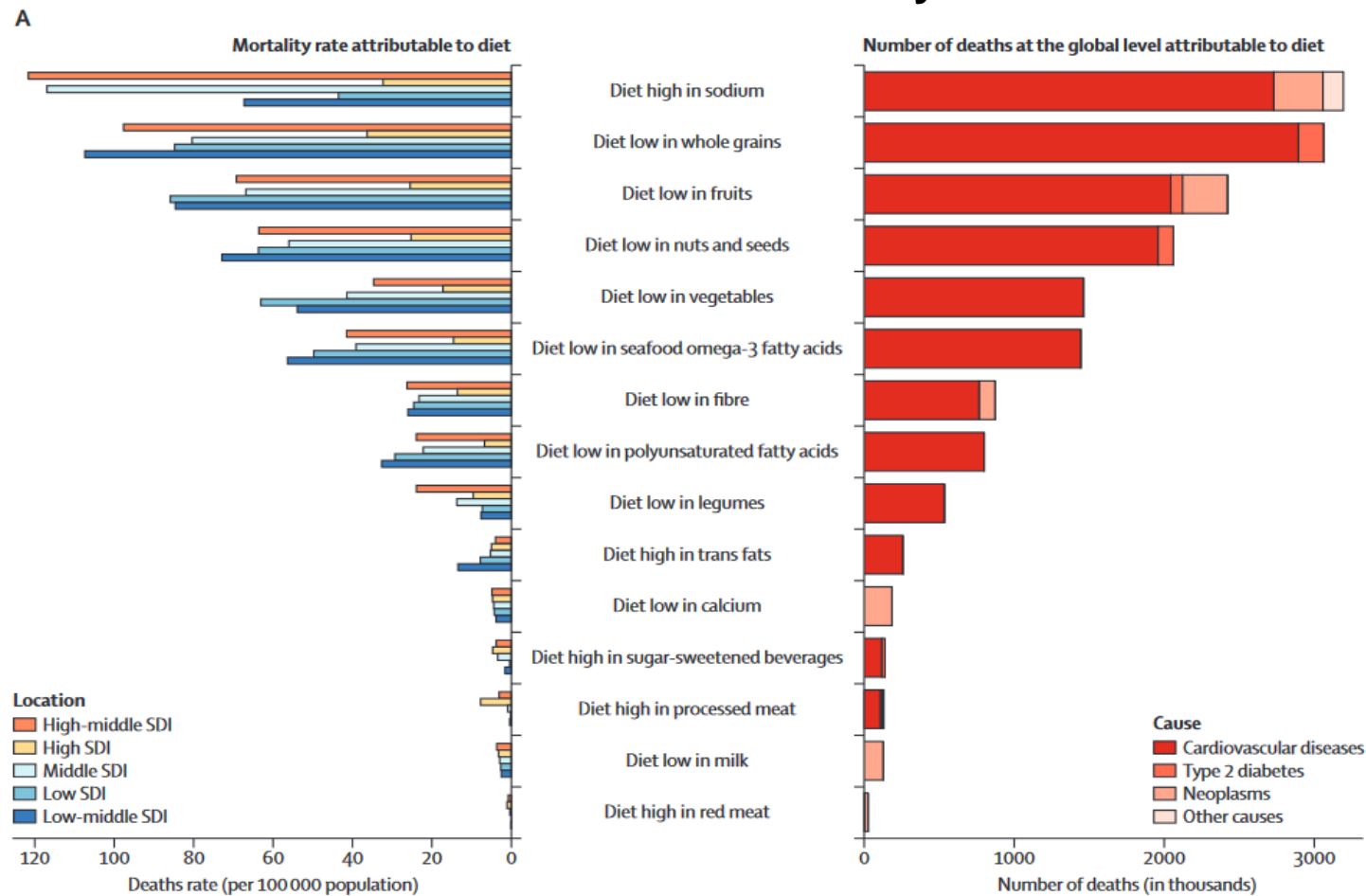
- Anaemia affects **1.6Bil** people, most in LMICs
- **Other micronutrient deficiencies** - Africa, Asia, Latin America: e.g. Vit A , zinc
- **149Mil children** are stunted & **39Mil** overweight (UNICEF, 2020)





Sub-optimal diets are the number one risk factor for mortality (exceeding smoking)

Deaths Attributed to Dietary Factors



11M deaths attributable to dietary risk factors and sub-optimal diets



MEASUREMENT OF DIETS



- Diet quality
 - Complex to define and measure
- **Diet quality dimensions:** Definitions, measurement (Alkerwi et al, 2014; Trijsburg et al, 2019)
 - 1) nutrient adequacy – e.g. micronutrient intake compared to Recommended Dietary Allowance (RDA)
 - 2) food variety/diversity
 - 3) moderation – saturated fat, sodium, sugar, processed foods nutrients associated with excess risk for disease
 - 4) balance - energy-yielding macronutrients
- **Diet quality important in LMICs** – in the context of global dietary transition



MEASUREMENT OF DIETS: Dietary Diversity

Dietary Diversity Scores (DDS)

Most programs focus on dietary diversity for women

Validated for micronutrient adequacy

- Vit A, iron, riboflavin, Vit B6, B12, folate, zinc, calcium
[Martin-Prével et al, 2015; Arimond et al, 2010]

- Dietary intake assessed by 24-hour recall
- DDS: sum of food groups consumed daily

Gap:

- 1) MDD-W measures one aspect of diet quality (micronutrient adequacy)
- 2) Does not capture dietary transition in LMICs
 - Consumption of unhealthy foods e.g. ultra processed and refined foods

FAO Minimum Dietary Diversity for Women (MDD-W)

- 10 Food groups
- Starchy staples
- Beans and peas
- Nuts and seeds
- Dairy
- Flesh foods
- Eggs
- Vit A rich dark green vegetables
- Other vit A rich fruits & vegetables
- Other vegetables
- Other fruits



MEASUREMENT OF DIETS: Diet Quality

Prime Diet Quality Score (PDQS)

Healthy (14)

dark green leafy vegetables (<i>spinach, cassava leaves, amaranthus</i>)	other vitamin A rich vegetables & fruits (<i>carrots, pumpkins, mangoes</i>)
cruciferous vegetables (<i>cabbage etc</i>)	other vegetables (<i>okra, onions</i>)
whole citrus fruits (<i>orange, lemon</i>)	other fruits (<i>banana, wild fruits</i>)
fish	poultry
legumes	nuts (<i>groundnuts, cashew</i>)
low fat dairy	whole grains (<i>whole meal maize, sorghum, millet</i>)
eggs	liquid vegetable oils

Unhealthy (7)

red meat (<i>beef, pork</i>)	processed meats
refined grains and baked goods (<i>ugali, white rice, white bread</i>)	sugar sweetened beverages (<i>SSBs</i>)
desserts and ice cream (<i>mandazi, doughnuts</i>)	potatoes, roots and tubers
fried foods away from home	

Healthy food groups:

- 0–1 serving/week (0 points)
- 2–3 servings/week (1 point)
- ≥4 servings/week (2 points)

Unhealthy food groups:

- 0–1 serving/week (2 points)
- 2–3 servings/week (1 point)
- ≥4 servings/week (0 points)

Scores range: 0-42 points
(higher score is better)

Evidence for associations:

- Cardio-vascular disease [Fung et al, 2018; Alvarez-Alvarez et al, 2020]
- Gestational diabetes, hypertension in pregnancy [Gisevic et al, 2018]



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Maternal dietary diversity and dietary quality scores in relation to adverse birth outcomes in Tanzanian women

Isabel Madzorera ✉, Sheila Isanaka, Molin Wang, Gernard I Msamanga, Willy Urassa, Ellen Hertzmark, Christopher Duggan, Wafaie W Fawzi

The American Journal of Clinical Nutrition, Volume 112, Issue 3, September 2020, Pages 695–706,

<https://doi-org.ezp-prod1.hul.harvard.edu/10.1093/ajcn/nqaa172>

Published: 11 July 2020 **Article history ▼**



STUDY POPULATION

Parent trial:

- Perinatal study, 8,428 pregnant women
- August 2001 to July 2004, Dar es Salaam, Tanzania
- Multivitamin supplementation (Vit B1, B2, B6, niacin, B12, C, E) vs. placebo up to 6 wks

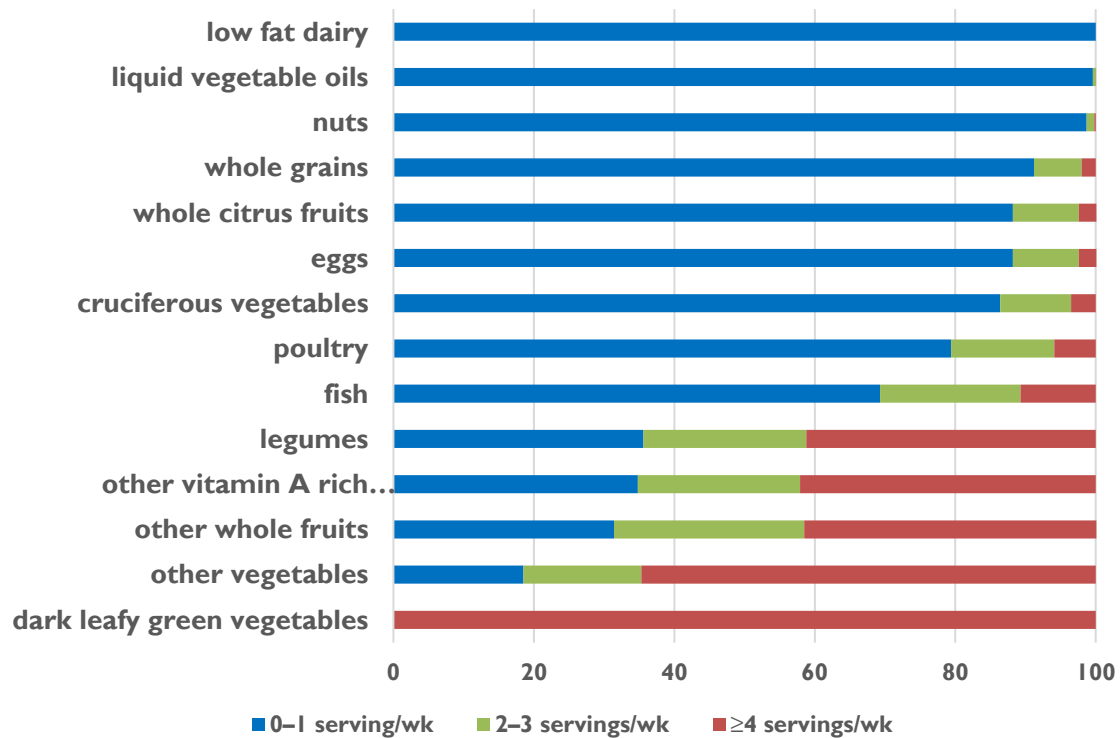
Inclusion: HIV negative, pregnant; 18-45 years of age; 12-27 weeks gestation

Dietary intake: Multiple 24-hour dietary recalls



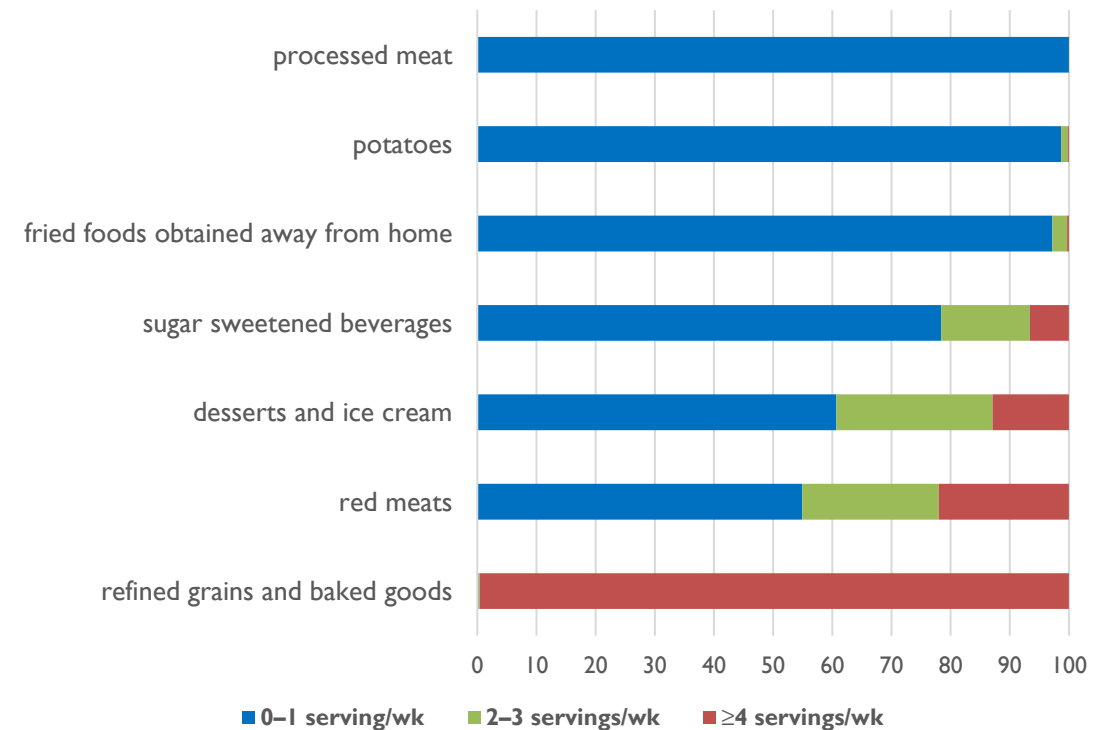
Consumption of PDQS food groups by pregnant women in Dar es Salaam, Tanzania

Healthy PDQS food groups



Low consumption of majority of healthy foods; nuts and seeds, whole grains, eggs, poultry very low

Unhealthy PDQS food groups



High consumption of refined grains, modest consumption of red meats, desserts and ice cream

Median PDQS was 19 (IQR:17-20)

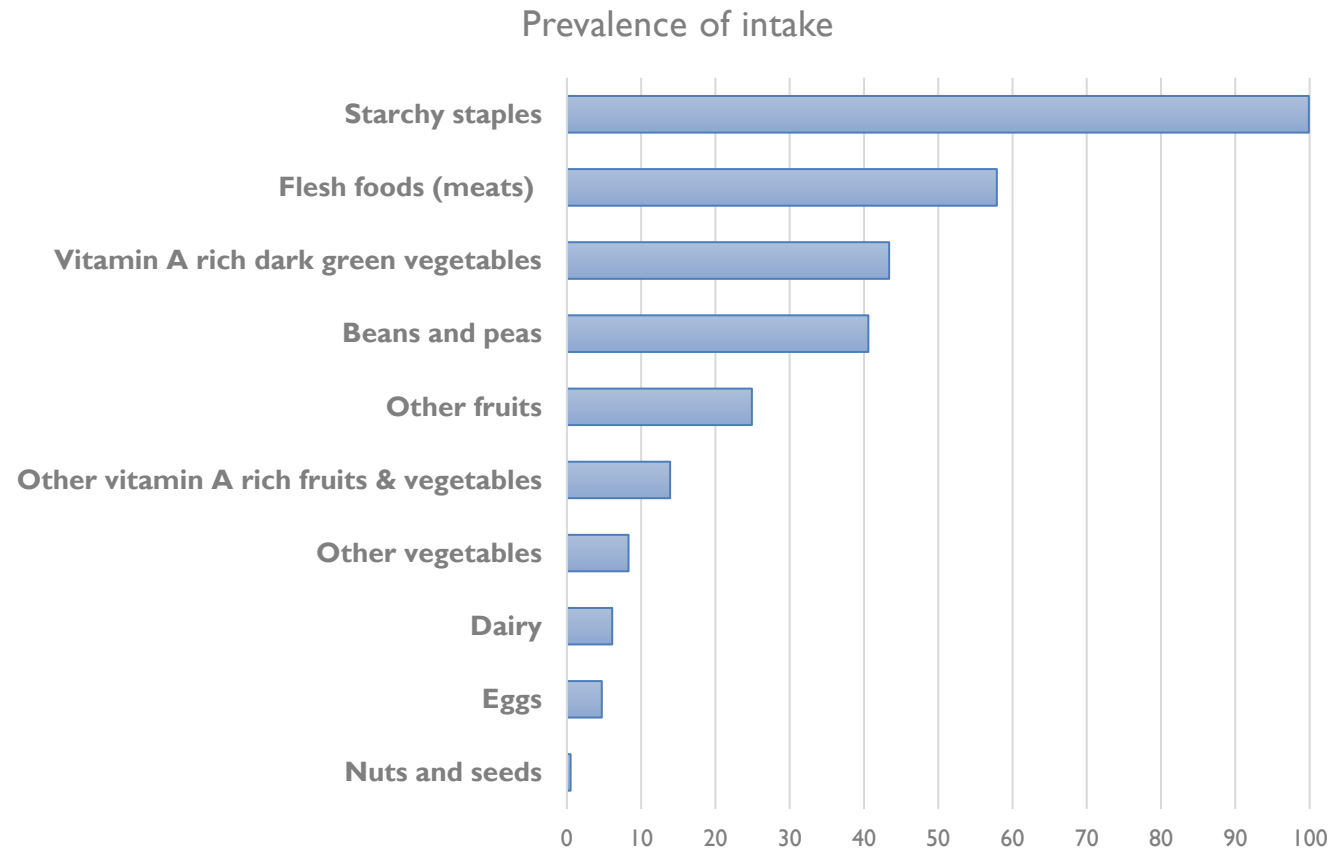


TABLE 5: PREGNANT WOMEN WITH HIGHEST DIET QUALITY (q5 OF PDQS) HAD 45% LOWER RISK OF PRETERM AND 47% LOWER RISK OF LBW AND FETAL LOSS vs. WOMEN WITH LOWEST QUALITY DIETS (q1 OF PDQS)

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P value
Clinical Outcome	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	for trend
PDQS Median	16.0	18.0	19.0	20.0	22.0	
Preterm birth (<37 weeks gestation)						
Univariate	ref	0.81 (0.71,0.93)*	0.67 (0.55,0.80)*	0.81 (0.69,0.95)*	0.52 (0.44,0.63)*	
Multivariate		0.82 (0.71,0.93)*	0.66 (0.55,0.80)*	0.82 (0.70,0.96)*	0.55 (0.46,0.67)*	<0.001**
Small for gestational age (<10th percentile for gest age/sex)						
Univariate		1.04 (0.90,1.21)	1.00 (0.83,1.20)	1.02 (0.86,1.22)	0.90 (0.76,1.07)	
Multivariate		1.04 (0.90,1.21)	0.97 (0.81,1.17)	1.01 (0.85,1.19)	0.91 (0.77,1.08)	0.26
Low birth weight (<2,500 grams)						
Univariate		0.66 (0.53,0.84)*	0.64 (0.48,0.87)*	0.56 (0.42,0.75)*	0.54 (0.41,0.77)*	
Multivariate		0.67 (0.53,0.84)*	0.63 (0.47,0.84)*	0.55 (0.41,0.74)*	0.53 (0.40,0.71)*	<0.001**
Fetal loss (Spontaneous abortion, stillbirth)						
Univariate		0.82 (0.59,1.14)	0.95 (0.59,1.40)	0.63 (0.41,0.96)*	0.57 (0.37,0.86)*	
Multivariate		0.78 (0.56,1.09)	0.86 (0.57,1.30)	0.62 (0.40,0.95)*	0.53 (0.34,0.82)*	<0.01*

15.3% PTB; 16.4% SGA; 6.3% LBW; 3.2% fetal loss

Consumption of DDS food groups by pregnant women in Dar es Salaam, Tanzania



Median diet diversity score (DDS) 3.0
(IQR: 2.5-3.5)



TABLE 4: WOMEN MOST DIVERSE DIETS (q5 OF DDS) HAD 26% LOWER RISK OF SGA VS. WOMEN WITH LEAST DIVERSE DIETS (q1 OF DDS)

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P value for trend
Clinical Outcome	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	
DDS Median (IQR)	2.0 (2.0-2.3)	2.5 (2.5-2.7)	3.0 (3.0-3.0)	3.5 (3.3-3.5)	4.0 (4.0-4.5)	
Preterm birth ² (<37 weeks gestation)						
Univariate	ref	0.87 (0.73,1.03)	1.20 (1.03,1.39)*	0.67 (0.56,0.81)*	0.88 (0.74,1.04)	
Multivariate		0.87 (0.74,1.04)	1.24 (1.06,1.44)*	0.72 (0.60,0.88)*	0.97 (0.82,1.16)	0.24
Small for gestational age ³ (<10th percentile for gest age/sex)						
Univariate		1.03 (0.87,1.21)	0.95 (0.81,1.11)	0.97 (0.82,1.15)	0.74 (0.61,0.89)*	
Multivariate		1.01 (0.86,1.19)	0.95 (0.81,1.11)	0.97 (0.82,1.15)	0.74 (0.62,0.89)*	<0.01*
Low birth weight ⁴ (<2,500 grams)						
Univariate		0.67 (0.50,0.89)*	0.83 (0.65,1.08)	0.71 (0.52,0.94)*	0.79 (0.60,1.04)	
Multivariate		0.66 (0.50,0.88)*	0.84 (0.65,1.08)	0.70 (0.53,0.94)*	0.80 (0.61,1.04)	0.11
Fetal loss ⁵ (Spontaneous abortion, stillbirth)						
Univariate		0.80 (0.51,1.24)	1.37 (0.96,1.98)	1.01 (0.67,1.53)	1.05 (0.70,1.57)	
Multivariate		0.73 (0.46,1.15)	1.37 (0.95,1.98)	0.90 (0.58,1.40)	0.95 (0.62,1.45)	0.96

15.3% PTB; 16.4% SGA; 6.3% LBW; 3.2% fetal loss



SUMMARY OF FINDINGS

- Low maternal dietary diversity and quality may be modifiable risk factors for adverse birth outcomes in urban Tanzanian mothers.
- PDQS, a measure of maternal diet quality, was inversely associated with PTB, LBW and fetal loss.
- DDS, a measure of dietary diversity was inversely associated SGA.
- In addition to dietary diversity, diet quality is important in understanding risk factors for poor birth outcomes.



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The Journal of Nutrition
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Food Crop Diversity, Women's Income-Earning Activities, and Distance to Markets in Relation to Maternal Dietary Quality in Tanzania

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SPECIFIC AIMS

1. Evaluate associations between **food crop diversity, women's access to income, and access to food markets** with women's diet quality (PDQS) in rural Tanzania
2. Evaluate for effect modification of the association by the distance to market



Mrema et al, 2015

HANU Intervention: **homestead production of diverse, nutrient-rich foods** - vegetable seed, garden training, behavior change communication

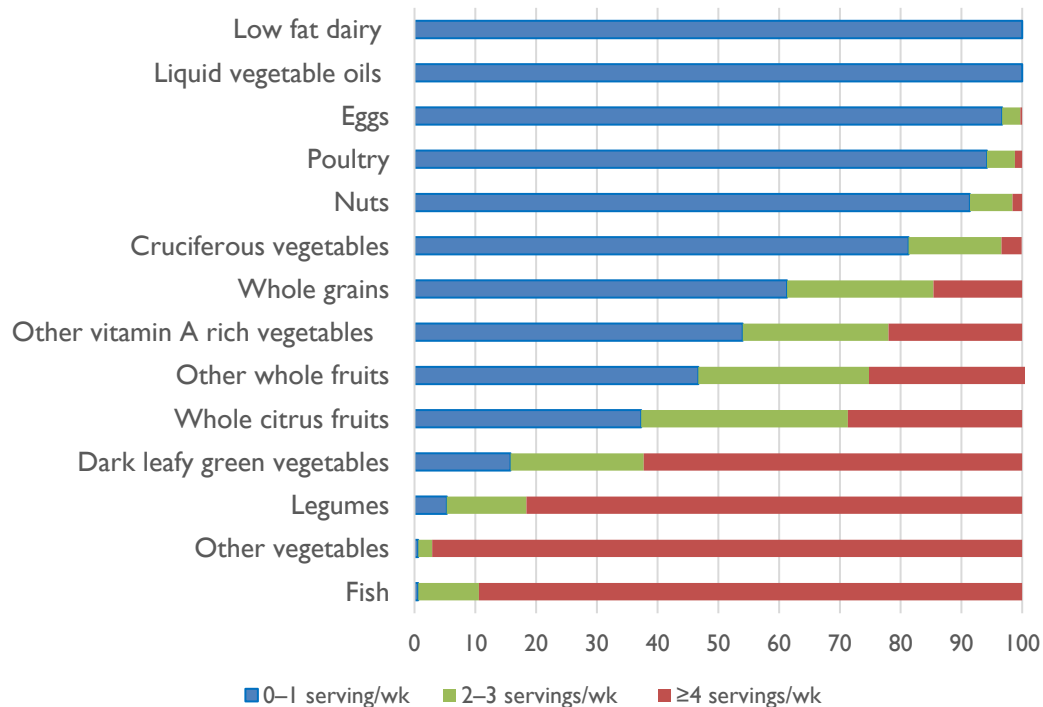
Location: Rufiji rural district, Eastern Tanzania, 10 villages from HDSS

Sample: **Cross sectional study**, 880 women at midline



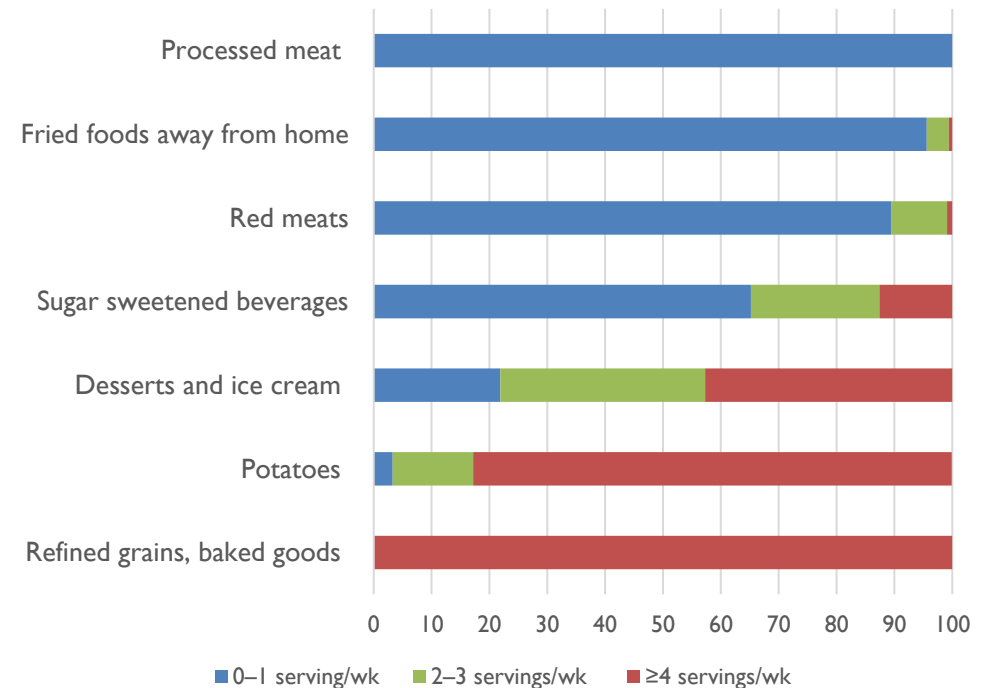
Consumption of PDQS food groups by women in rural Rufiji district, Tanzania

Healthy PDQS food groups



Low consumption of some healthy foods: eggs, nuts and seeds, poultry very low. Whole grains, consumption moderate. High consumption of other vegs, fish, legumes

Unhealthy PDQS food groups



High consumption of refined grains, potatoes, roots and tubers. Modest consumption of desserts and ice cream, SSBs; and low consumption of red meat

Median PDQS was 19 (IQR: 17-21); **Overweight: 24%**, obesity: 13%, **underweight: 7%**



Table 3: Growing an additional food crop was associated with an increase in maternal diet quality (PDQS) by 0.47 points

	Prime Diet Quality Score (PDQS)	
	Univariate ^a	Adjusted model ^b
Food crop diversity score (# of food crops produced, max 7)	0.32 (0.19, 0.44)**	0.47 (0.27, 0.67)***
Livestock diversity score (# of livestock species kept)	0.27 (0.08, 0.47)*	-0.07 (-0.38, 0.24)
Women's participation in off-farm activities		
Woman participate in non-farm economic activities	0.60 (0.22, 0.98)**	0.47 (-0.02, 0.96)
Woman participate in wage/ salary employment	0.87 (0.43, 1.32)***	0.96 (0.26, 1.67)*
Market participation		
Sold crops	0.09 (-0.06, 0.24)	-0.88 (-1.17, -0.58)***
Market food diversity score	0.81 (0.29, 1.32)**	0.50 (0.06, 0.94)*
Distance to market	-0.10 (-0.20, 0.01)	-0.27 (-0.39, -0.14)***

a/ Univariate models are shown.

b/ Controlling for treatment (HANU/control), maternal age (15-24years, 25-34years, ≥35years), maternal education (none, primary, secondary and higher), parity (0-2, ≥3), wealth index (quintiles), land size (acres), weekly income (log), livestock diversity score, woman's participation in non-farm economic activities, receiving wages or salary, household sold at least 1 food crop in last year, maternal BMI categories, and market food diversity score and distance to market.

For every food group produced, women's DDS was higher by 0.14 (95% CI: 0.02, 0.26) points

Fig 3: for women living nearer to markets, food crop diversity had a higher estimated association with PDQS

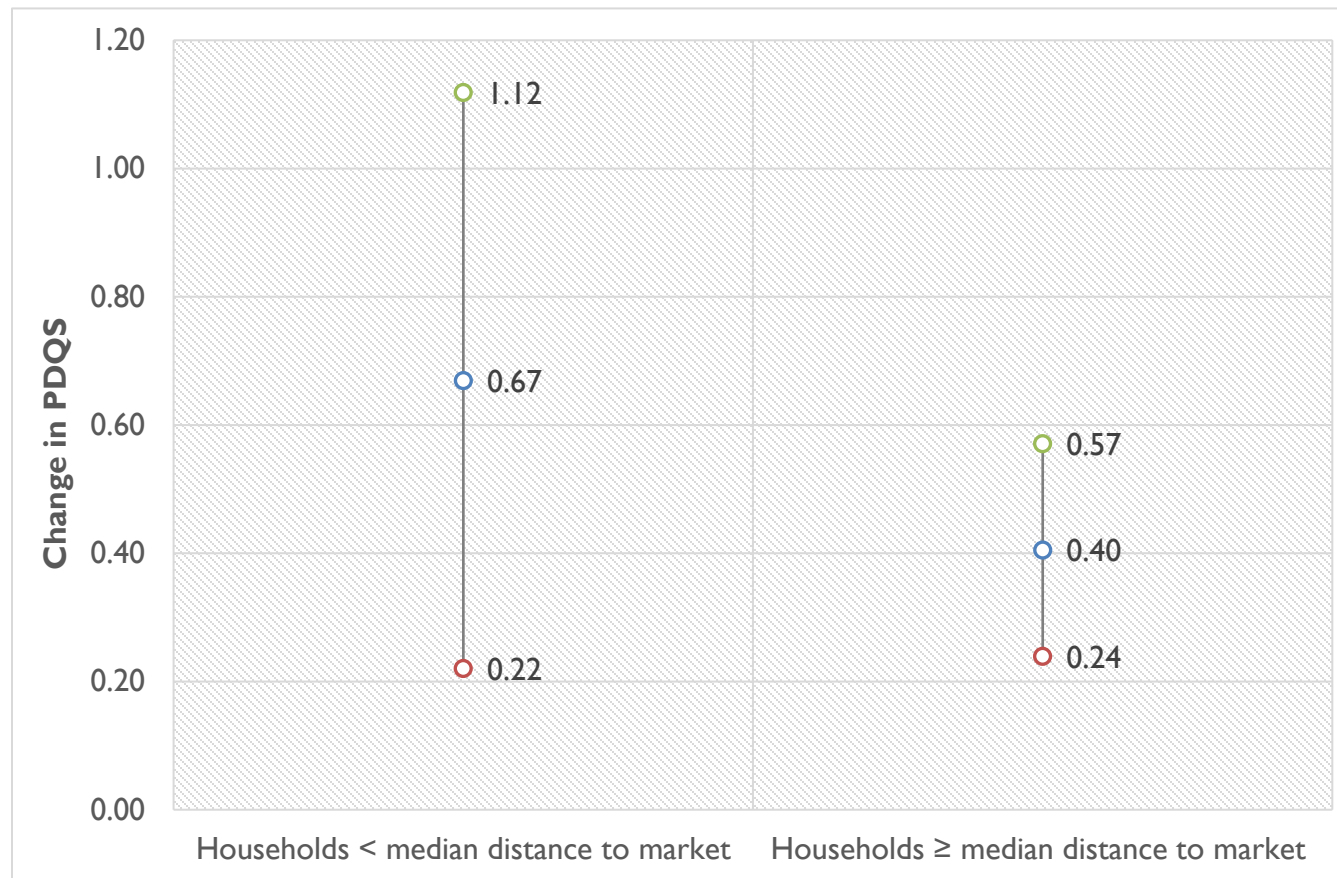


Figure 3: shows effect modification by distance to market (median=1.1km)



SUMMARY OF FINDINGS

- Household food production may act with,
 - (a) access to markets for sale and purchase, and
 - (b) access to non-farm income (source of empowerment for women) to affect women's diet quality in rural Tanzania.
- Policies and programs to improve women's diet quality should consider aspects of market access, and women's access to off-farm income in addition to diversifying household crop production.
- Imperative that nutrition programs consider overall diet quality for women in LMICs, including in rural locations, in addition to measures of dietary diversity.

KEY TAKE-AWAYS AND FUTURE DIRECTIONS

- Our work so far suggests that diets are changing in both urban and rural LMICs, increasing consumption of unhealthy foods
- Imperative that nutrition programs consider tracking overall diet quality for women in LMICs, including in rural locations, in addition to measures of dietary diversity.
- Policies and programs to improve women's diet quality through food systems should consider: market access, and women's access to income/empowerment in addition to diversifying crop production.

Future directions:

- Collection of data on overall diet quality in food systems – in different contexts/regions/populations (women, children, adolescents, men)
- Construct validation (i.e. assess associations with poor nutrition and health outcomes) and refinement of tools e.g. global diet quality score (GDQS)
- Research to practice: Programs, policies to promote consumption of quality diets e.g. SBCC, prenatal counselling

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Assessing diet quality using different metrics



Rumana Akter, MPH, PhD, Save the Children

Photo credit: Save the Children in Bangladesh



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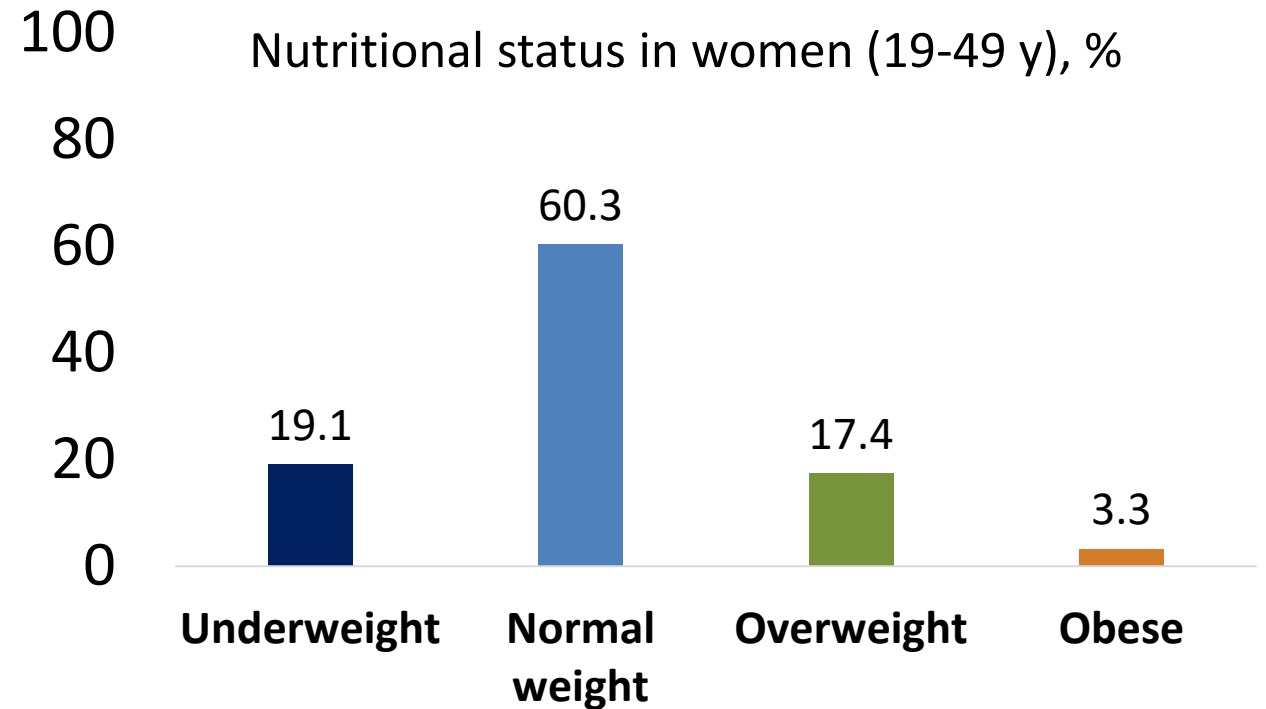
Save the Children

Tufts
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GERALD J. AND DOROTHY R.
Friedman School of
Nutrition Science and Policy

BACKGROUND

- LMICs are burdened by persistent undernutrition and rapidly growing overweight, obesity and diet-related non-communicable diseases.
- Poor diet quality (energy-dense, nutrient-poor foods) is one of the important reasons of this coexistence of malnutrition.



BIHS, 2015 (unpublished data)

DIET QUALITY: Household to Intra-household Level

- Data source: Bangladesh Aquaculture-Horticulture for Nutrition Research (BAHNR), January- April, 2016.
- Preceding seven days household level dietary intake data (frequency and quantity) were collected
- Age- and sex-specific adult male equivalent (AME) fractions were used for intra-household allocation of household level dietary intakes
- Individual's intake of a nutrient was assessed by computing nutrient adequacy ratio in the diet (NAR)
- Mean adequacy ratio (MAR) was computed as an overall measure of diet quality using NAR
- Iron, calcium, zinc, vitamin A, thiamine, riboflavin, niacin, vitamin B6, folate, vitamin B12, and vitamin C

Diet quality by type of HH engagement with aquaculture and/or horticulture

Aquaculture and/or horticulture engagement	Mean (MAR)	SD	df	F	<i>p</i> value	n
Both engagement	0.43	0.23	2, 14330	101.42	<0.001	4,449
Either engagement	0.38	0.20				8,432
No engagement	0.36	0.20				1,452
Total	0.39	0.21				14,333

Diet quality in women reproductive aged

- Data obtained from Bangladesh Integrated Household Survey (BIHS), 2015
- Household and intra-household-level dietary intake data were collected using the 24 h dietary recall method:
- Raw weight of ingredients (individual)

$$\frac{\text{raw weight of ingredients (household)} \times \text{cooked weight of consumed foods/mixed dishes (individual)}}{\text{cooked weight of foods/mixed dishes (household)}}$$

- Dietary micronutrient intake of WRA was compared with the age- and sex-specific estimated average requirement (EAR) in order to get NAR of a given nutrient

% Of women with inadequate dietary nutrient intakes

Nutrients	Inadequate intake (%)
Energy	27.0
Calcium	72.9
Iron	26.3
Zinc	11.5
Vitamin A	77.4
Thiamine	36.5
Riboflavin	66.7
Niacin	11.8
Vitamin B6	18.5
Folic acid	86.4
Vitamin C	40.5
Vitamin B12	73.1



Photo credit: Rumana

KEY TAKEAWAYS

- Double burden of malnutrition is an emerging public health challenge in Bangladesh.
- Appropriate measures with adequate monitoring systems need to be in place to track the progress.
- Acquisition of nutrient intake data through direct dietary assessment using existing metrics is relatively expensive and time consuming.
- Developing innovative dietary assessment metrics that requires limited resources and time is needed particularly for LMICs.

Diet quality measurement to measure food cost & affordability and guide food system actions



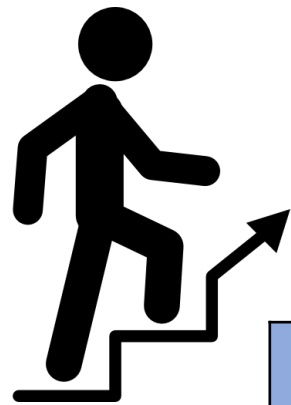
William A. Masters, PhD, Professor of Food Policy and Economics
Tufts University: <https://sites.tufts.edu/willmasters>

Photo credits: W.A. Masters, clockwise from top left in Ethiopia, Tanzania, Malawi, Morocco, Malawi, USA



New methods use retail prices to measure diet costs and affordability of reaching each level of nutritional quality

We compute least-cost diets, selected from all available foods at each market location every month, to meet each standard of diet quality



Daily energy

“Cost of Caloric Adequacy”, sufficient for short-term survival and work

Nutrient adequacy

“Cost of Nutrient Adequacy”, based on requirements & upper bounds for 23 essential micro- and macro-nutrients

Healthy diets

“Cost of Recommended Diets”, based on national dietary guidelines from around the world

EAT-Lancet diets

Designed for health and sustainability

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, e}



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*



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}

SCIENCE ADVANCES | RESEARCH ARTICLE

ECONOMICS

Seasonality of diet costs reveals food system performance in East Africa

Yan Bai, Elena N. Naumova, William A. Masters*

To measure affordability, we focus on the least-cost items needed to meet each dietary standard

Cost of energy and essential nutrients

- **Daily energy** is the most basic human need
- **Nutrient adequacy** to avoid deficiencies was key 20th century discovery, now in the 21st century we include upper bounds for toxicity and chronic disease
- Results are sensitive to food composition data & differences in nutrient needs

Cost of a healthy diet in terms of food groups

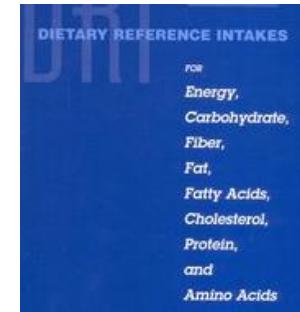
- **Dietary guidelines** are based on epidemiological evidence about food groups including aspects of the diet beyond just essential nutrients
- Guidelines are official national policy; we use ten examples from around the world

Cost of a healthy diet *and sustainable* diet

- **EAT-Lancet commission** reference diets target health and also limit intake of environmentally harmful foods (especially meat)

Affordability depends on income

- We take account of income distribution, and of non-food needs



We use food prices collected for a variety of other purposes

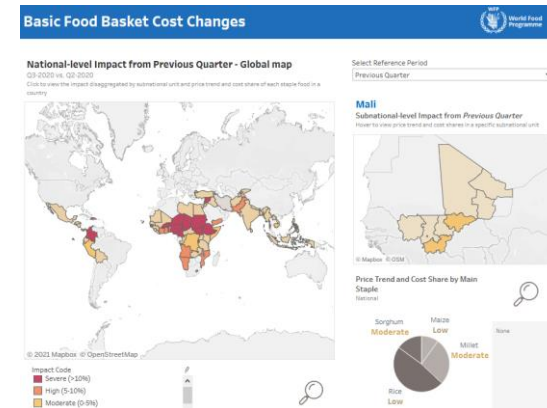
National statistical agencies collect retail food prices for their CPI to track inflation, following the UN system of national accounts

- Typically 50-150 food items, to represent national average consumption
- CPI weights each price by the item's share of total spending
- Underlying data may be confidential, publish only averages



Market information and early warning systems aim to guide agricultural intervention & nutrition assistance

- Prices are reported quickly for places at risk of undernutrition
- Coverage is limited to 80-90 low- and middle-income countries
- Item selection is limited to foods most widely used by the poorest



The International Comparison Program (ICP) uses select items to compare currencies across countries

Choice of items limited to standard products sold in multiple countries

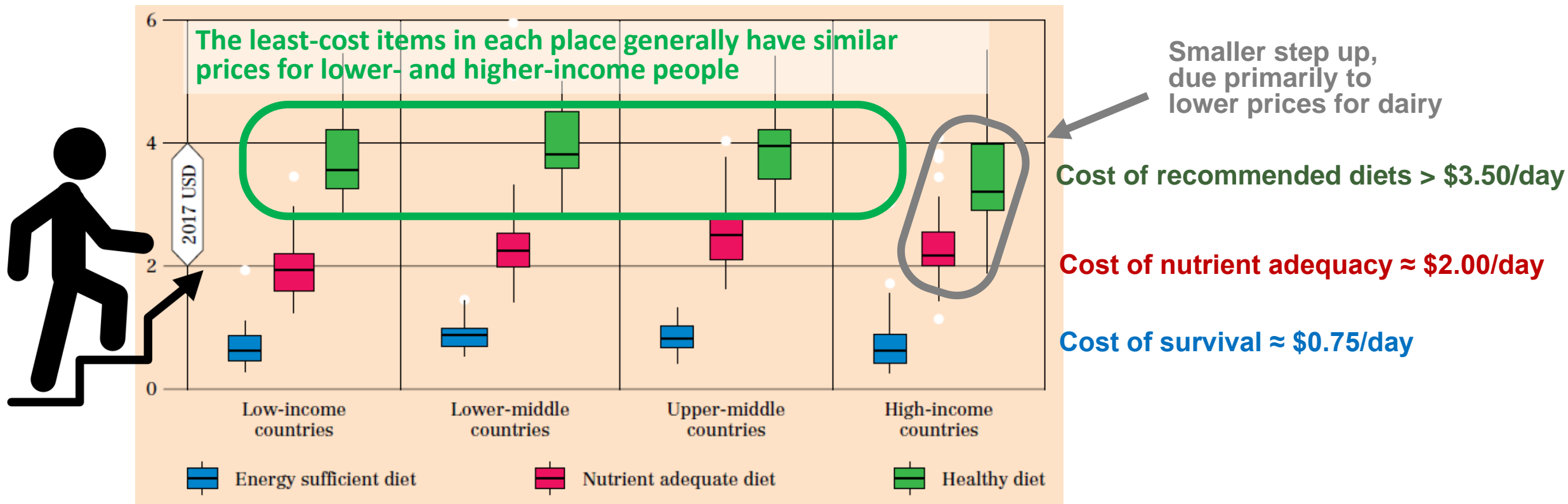
Global and regional lists for 2017 include 787 items

Prices for 2021 being assembled now, will have more green leafy vegetables



What do we discover about food prices and diet costs?

The cost of energy sufficient, nutrient adequate and healthy diets by country income group in 2017



Source: Figure 2 of Herforth et al. (2020). Cost and affordability of healthy diets across and within countries. Background paper for The State of Food Security and Nutrition in the World 2020. FAO Agricultural Development Economics Technical Study No. 9. Rome, FAO.
<https://doi.org/10.4060/cb2431en>



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What did we discover about affordability around the world?

Cannot afford sufficient daily energy

(global total ≈ 185 million, ave. cost = PPP\$0.79)

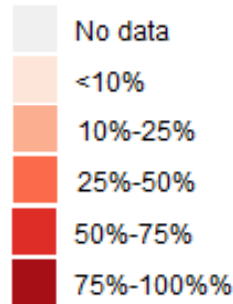
Cannot afford a nutrient-adequate diet

(global total ≈ 1.5 billion, ave. cost=PPP\$2.33)

Cannot afford a healthy diet

(global total ≈ 3.0 billion, ave. cost=PPP\$3.75)

Percent of population, by country in 2017



Africa: 596 million

S. Asia: 1.3 billion

SE Asia: 326 million

Africa: 829 million

About 3 billion people (38% of the world population) cannot afford a healthy diet

Monitoring diet cost and affordability complements other ways of measuring poverty and food insecurity:

≈ 690 m. below \$1.90/day (World Bank)

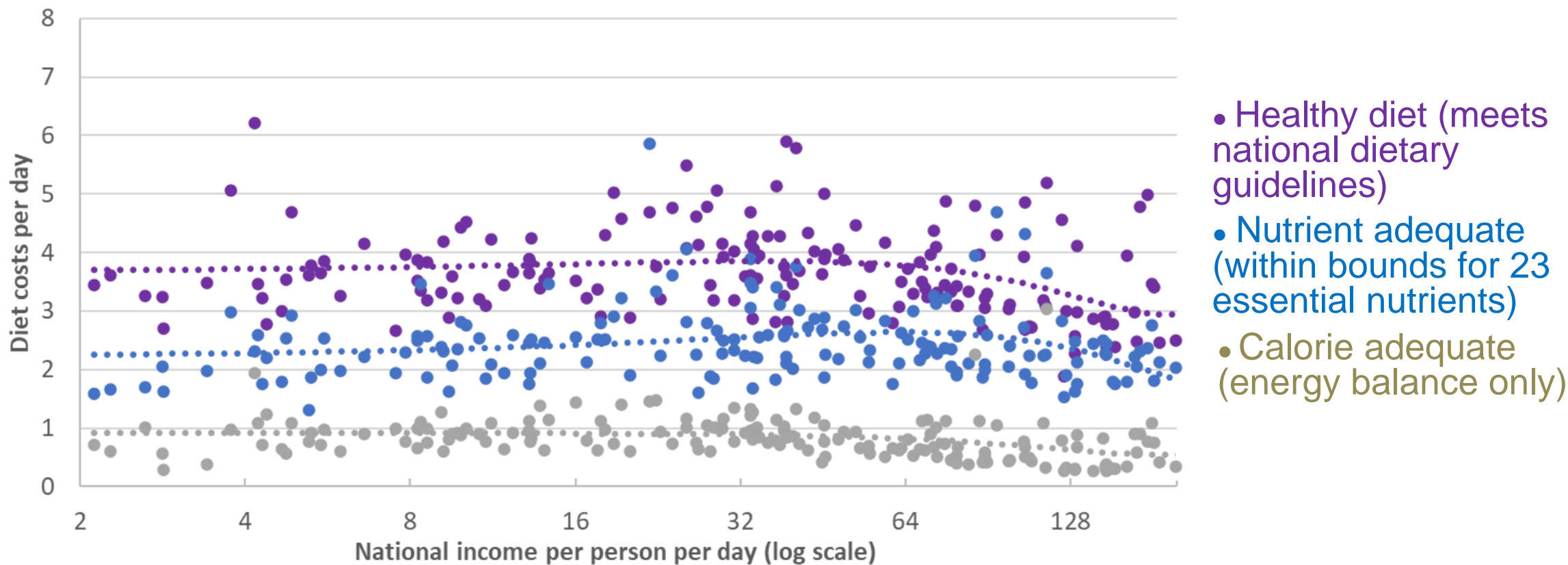
≈ 653 m. undernourished (PoU, from 1960s)

≈ 1.9 b. experience food insecurity (FIES)



Does adding sustainability criteria raise diet costs?

Diet costs at each level of national income (2017, in US dollars at PPP prices)



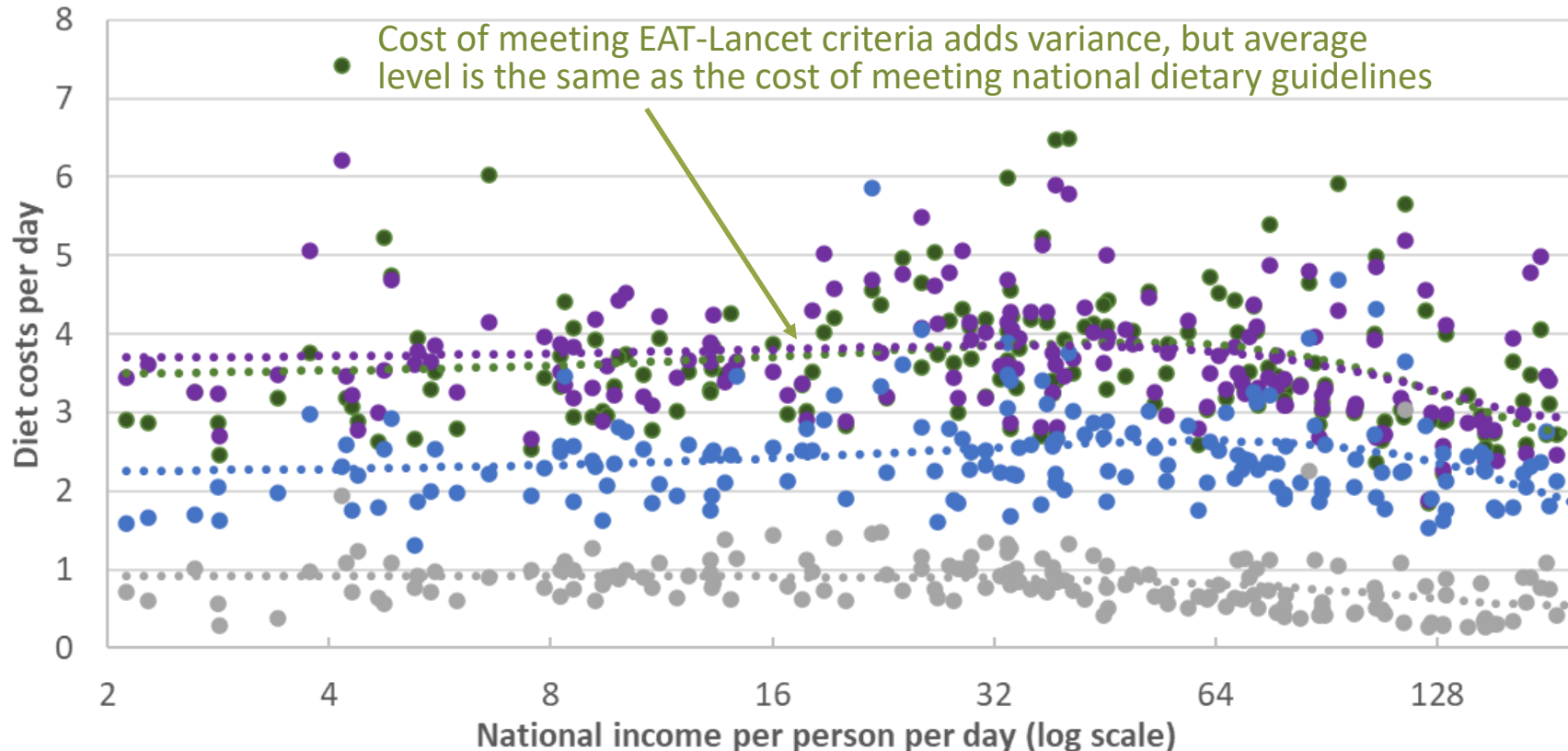
Source: Food Prices for Nutrition (2021). Data shown are national averages for 166 countries in 2017, in US dollars at 2017 PPP price levels. Chart omits two small countries with outlier national income levels, Singapore (240/day) and Qatar (260/day). Regression line is cubic function of income, and methods for diet cost are as defined in the technical background paper accompanying SOFI 2020 (Herforth et al. 2020).



Does adding sustainability criteria raise diet costs?

No, because least-cost healthy diets already use very few animal foods

Diet costs at each level of national income (2017, in US dollars at PPP prices)



- **EAT-Lancet reference diet (flexitarian)**

- Healthy diet (meets national dietary guidelines)

- Nutrient adequate (within bounds for 23 essential nutrients)

- Calorie adequate (energy balance only)

Conclusion: Food prices are full of surprises!

- A healthy diet remains beyond reach for about 3 billion people
 - Food prices are broadly similar across countries, relative to other goods & services
 - fruits & vegetables, fish, eggs have high & variable cost relative to other products
 - dairy (and also eggs) are less expensive in rich countries, relative to other foods
 - Universal affordability requires income & safety nets, as well as food system change
- Adding sustainability criteria does not raise diet costs
 - The lowest-cost items for healthy diets use few animal-sourced foods
 - Unsustainable as well as unhealthy choices are often driven by factors other than price
- For most people (4.9 b.), healthy diets are *already* affordable
 - Healthy & sustainable foods *could* be purchased, but other factors often drive choice
 - food culture, biology of taste and satiation
 - meal preparation costs, time and predictability
 - marketing efforts, advertising and availability



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Food Prices for
Nutrition



<https://sites.tufts.edu/foodpricesfornutrition>



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Thank you!

The Food Prices for Nutrition project (<https://sites.tufts.edu/foodpricesfornutrition>) is conducted at **Tufts University** jointly with **Anna Herforth**, and with **IFPRI** (led by **Derek Headey**) and the **World Bank** (led by **Nada Hamadeh**), with numerous students at Tufts including **Robel Alemu**, **Yan Bai**, **Alissa Ebel**, **Elena Martinez**, **Kate Schneider** and **Aishwarya Venkat**, and faculty collaborators **Steve Block**, **Shibani Ghosh**, **Elena Naumova** and **Patrick Webb**. In-country studies have been led by **Stevier Kaiyatsa** (Ministry of Finance, Malawi), **Fulgence Mishili** (Sokoine University, Tanzania), **Daniel Sarpong** (University of Ghana), **Fantu Bachewe** (IFPRI-Addis) and **Kalyani Ragunathan** (IFPRI-Delhi) among others.



Photo by Anna Herforth
at Agboglobshi market, Ghana

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Q&A



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THANK YOU

- To register for upcoming webinars, you can visit **NutritionInnovationLab.org** or **AdvancingNutrition.org**. More details coming soon!
- Recordings and slides for each webinar will also be posted on our websites.



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