Nutrition Interventions in Africa

Wafaie Fawzi

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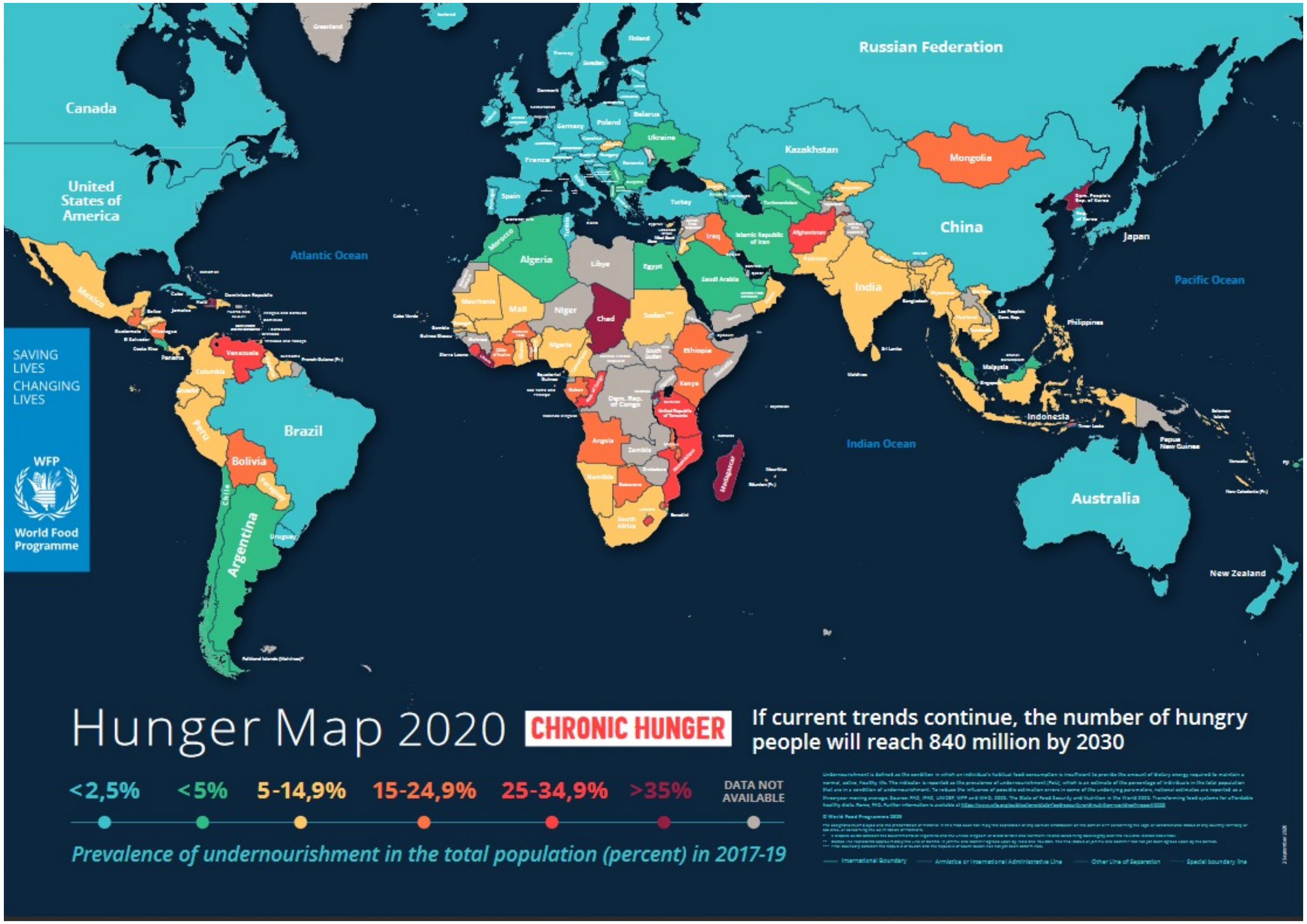
CLIMATE CHANGE, NUTRITION AND HEALTH: GLOBAL CHALLENGES AND POTENTIAL SOLUTIONS

Key takeaway messages for me include:

1. Importance of Integration

- Health or Environment
- Infectious disease or NCD
- Undernutrition or obesity
- Methods – experimental, quasi-experimental, modeling
- Sectors – health, agriculture, roads, other
- Low income, high income, global

2. Need for multi-disciplinary research and training



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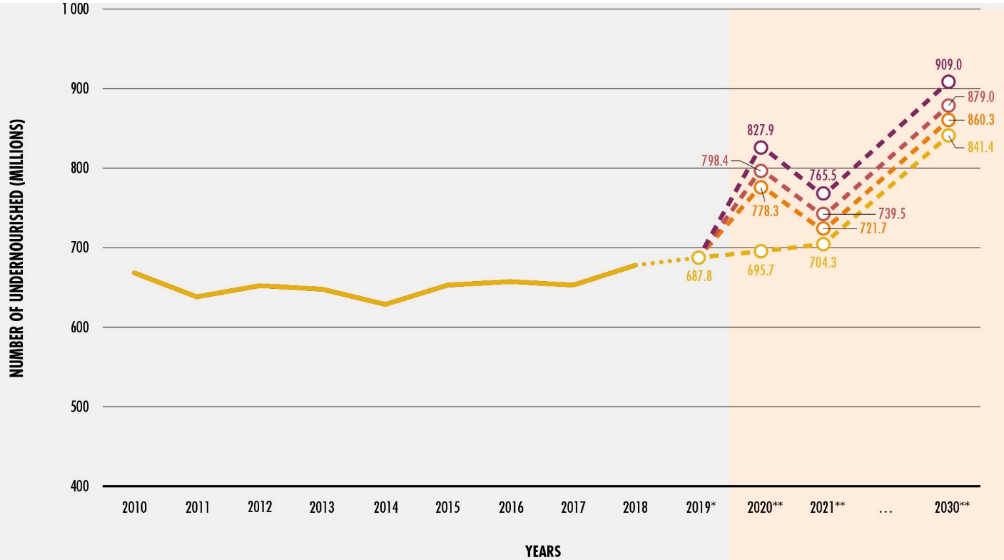
How the COVID-19 pandemic may affect hunger in the world



NOTES: The shaded area represents the projections for the longer period from 2019 to the 2030 target year.
SOURCE: FAO.

Current estimates ≈ 690Mil people are hungry (SOFI, 2020)

The number of people affected by hunger will surpass 840Mil by 2030, without taking into account impacts of COVID-19

COVID-19 pandemic may add between 83-132Mil people to the total number of undernourished depending on the economic growth scenario

Citations: SOFI 2020

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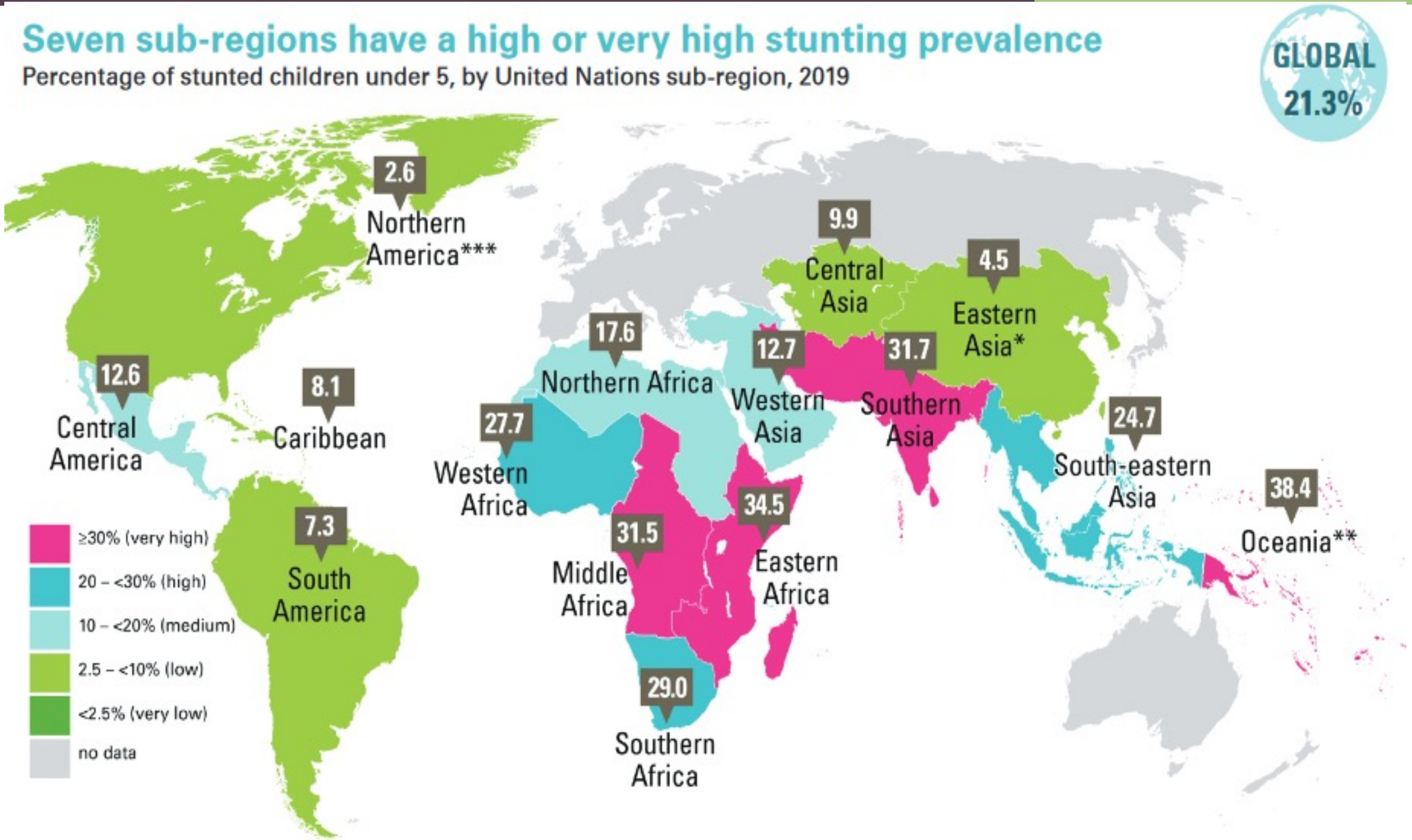
Global stunting burden (< 5y)



Source: UNICEF, WHO, World Bank Group joint malnutrition estimates, 2020 edition. Note: *Eastern Asia excluding Japan; **Oceania excluding Australia and New Zealand; ***Northern America sub-regional estimate based on United States data. There is no estimate available for the sub-regions of Europe or Australia and New Zealand due to insufficient population coverage. These maps are stylized and not to scale and do not reflect a position by UNICEF, WHO or World Bank Group on the legal status of any country or territory or the delimitation of any frontiers.

Citations: UNICEF/WHO/World Bank 2020

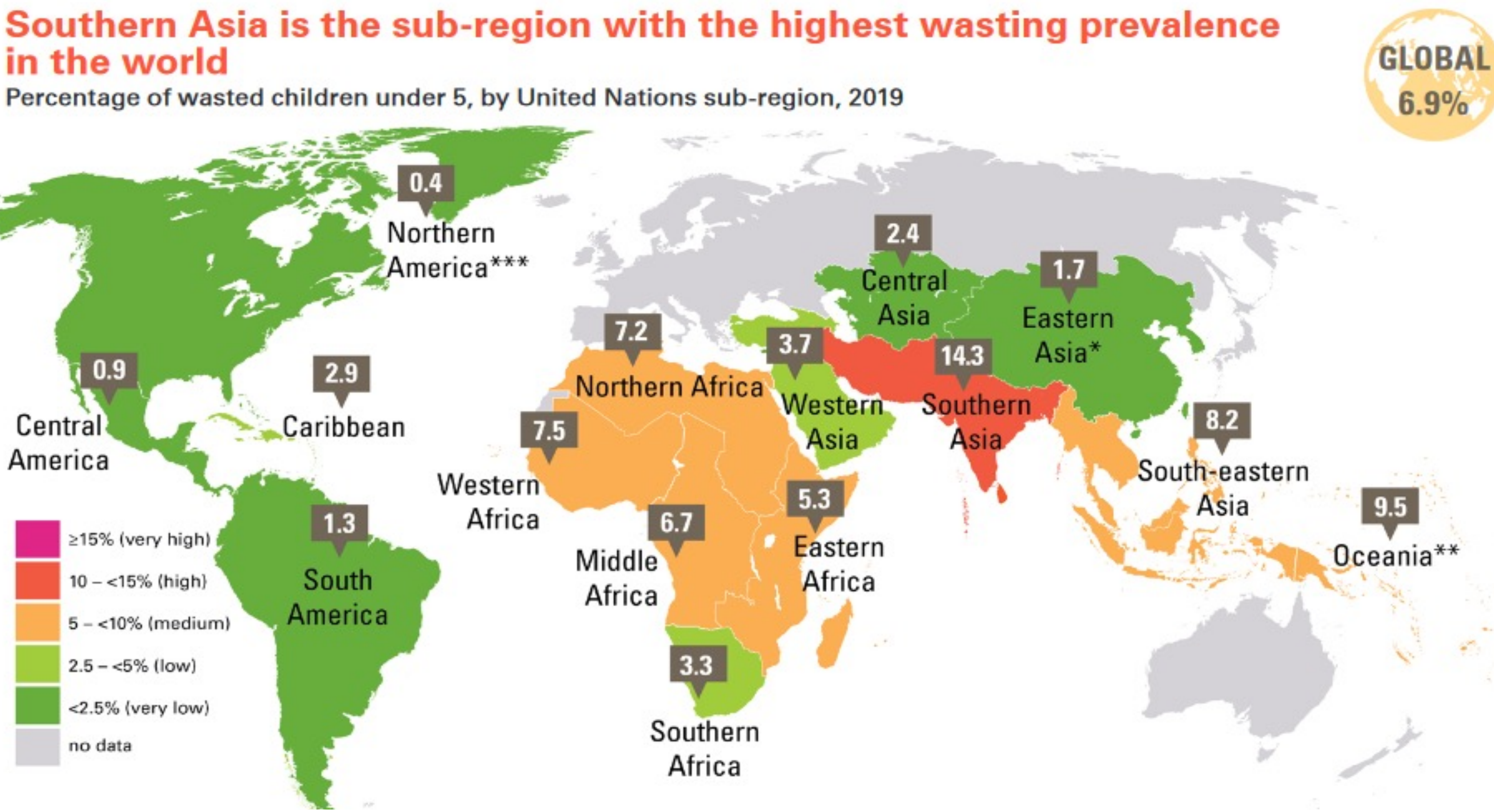
Global stunting burden (< 5y)

Source: UNICEF, WHO, World Bank Group joint malnutrition estimates, 2020 edition. Note: *Asia and Eastern Asia excluding Japan; **Oceania excluding Australia and New Zealand; ***Northern America sub-regional estimates based on United States data. There is no estimate available for the More Developed Region or for sub-regions of Europe or Australia and New Zealand due to insufficient population coverage. †represents regions/sub-regions where the change has been statistically significant; see page 12 for the 95% confidence intervals for graphed estimates.

Citations: UNICEF/WHO/World Bank 2020

Wasting

Global wasting burden (< 5y)



Citations: UNICEF/WHO/World Bank 2020

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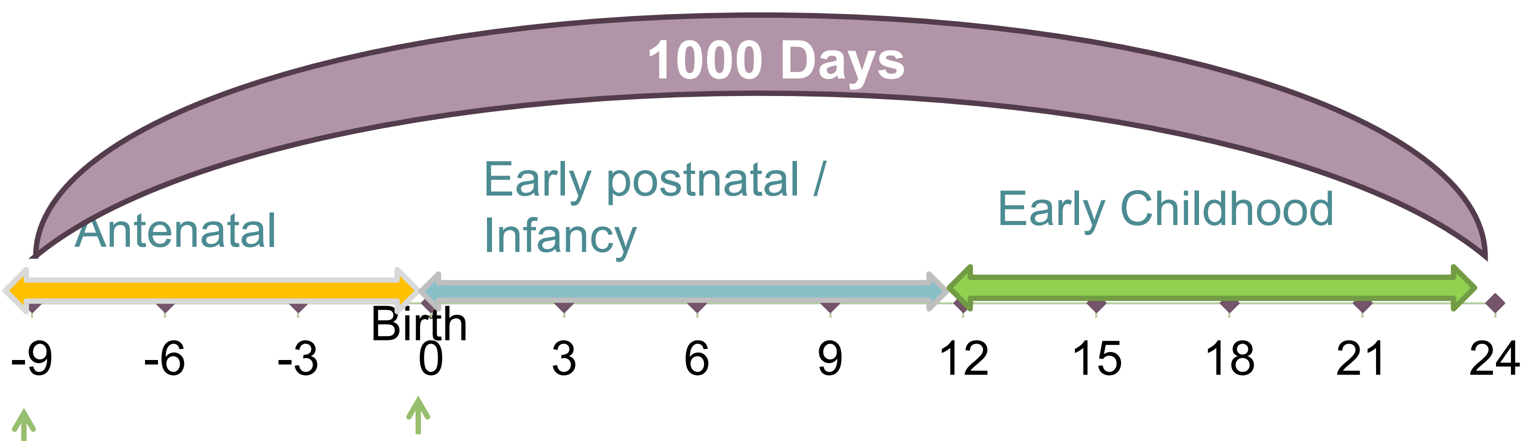
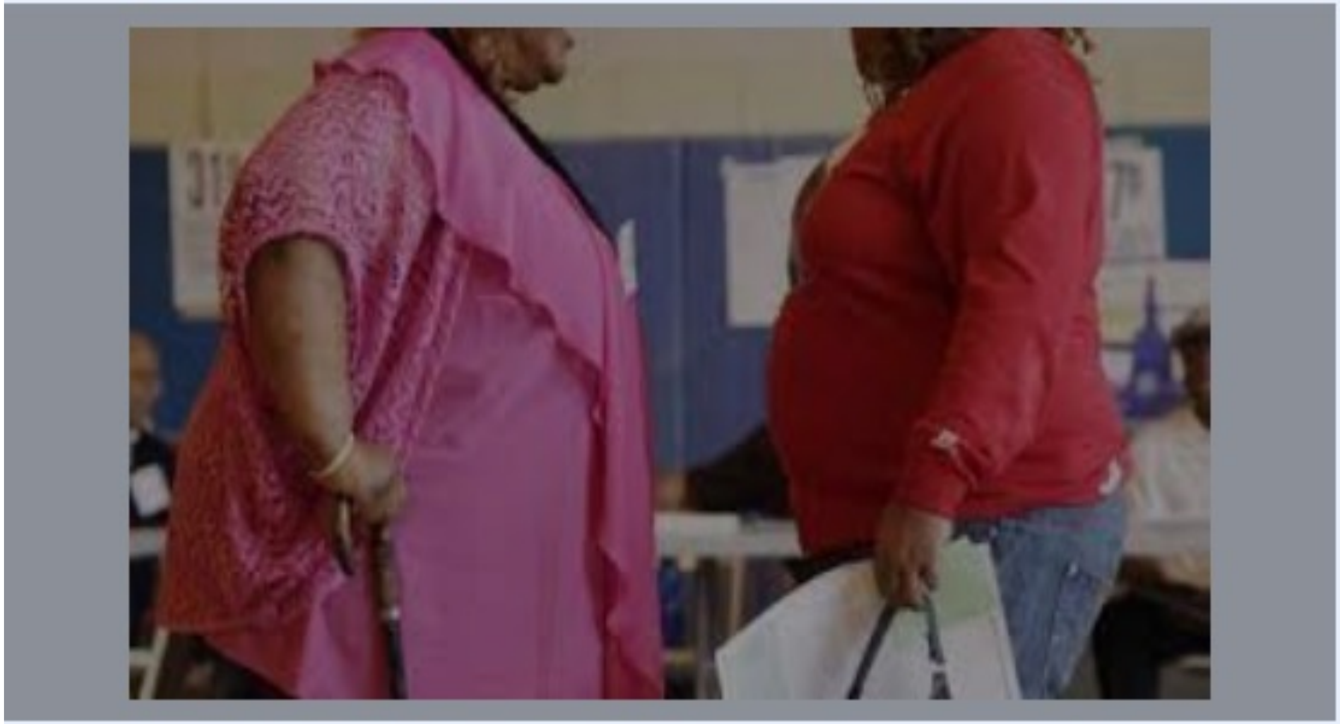
Nutrition-specific Interventions
The First 1000 Days

- Breastfeeding
- Micronutrient supplements
- Dietary counselling
- Fortification
- Infection control and management
- Management of Severe Acute Malnutrition

- Preconception Care; Adolescent Nutrition



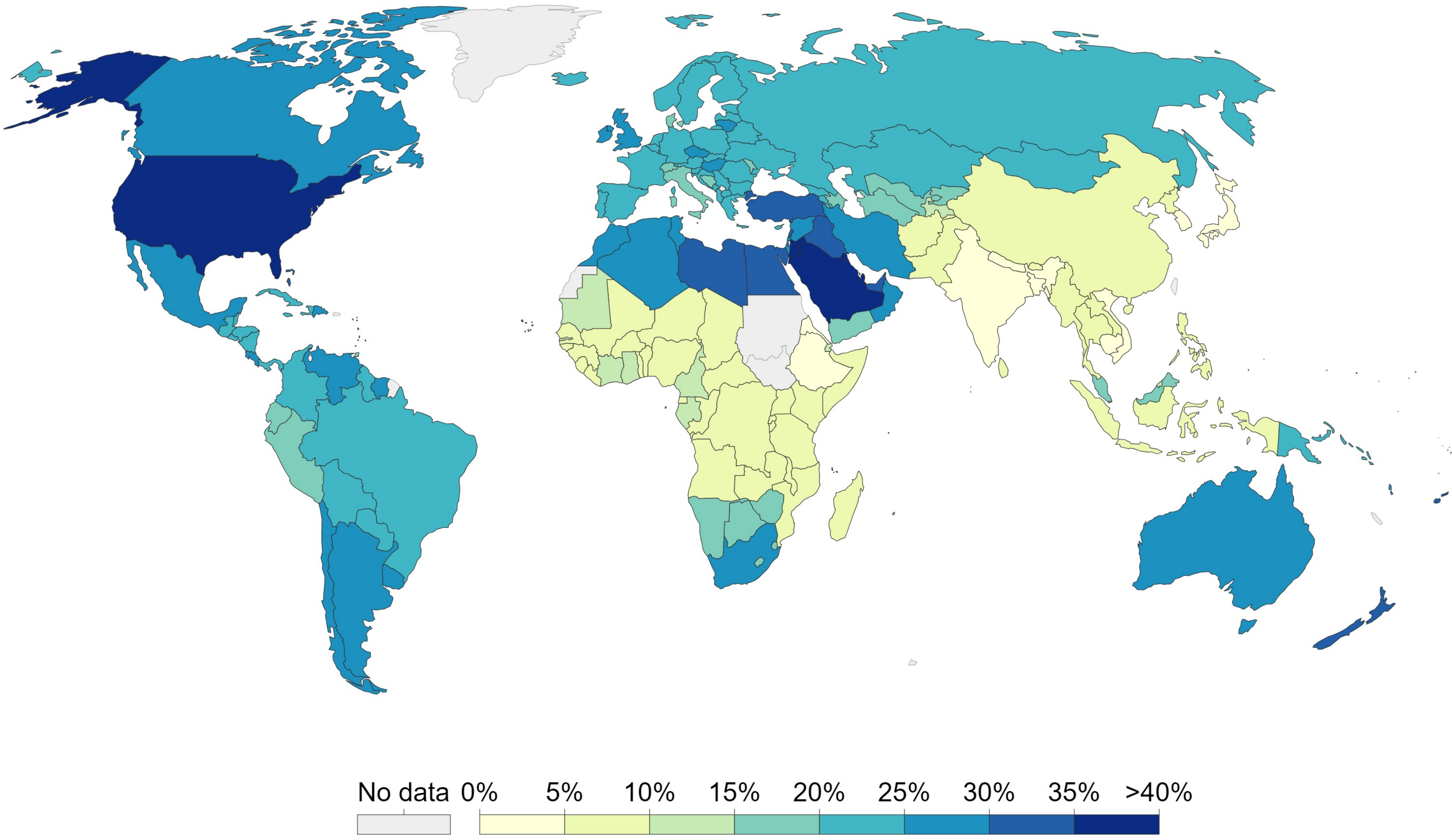
Overweight



Obesity is rising rapidly in Africa ...

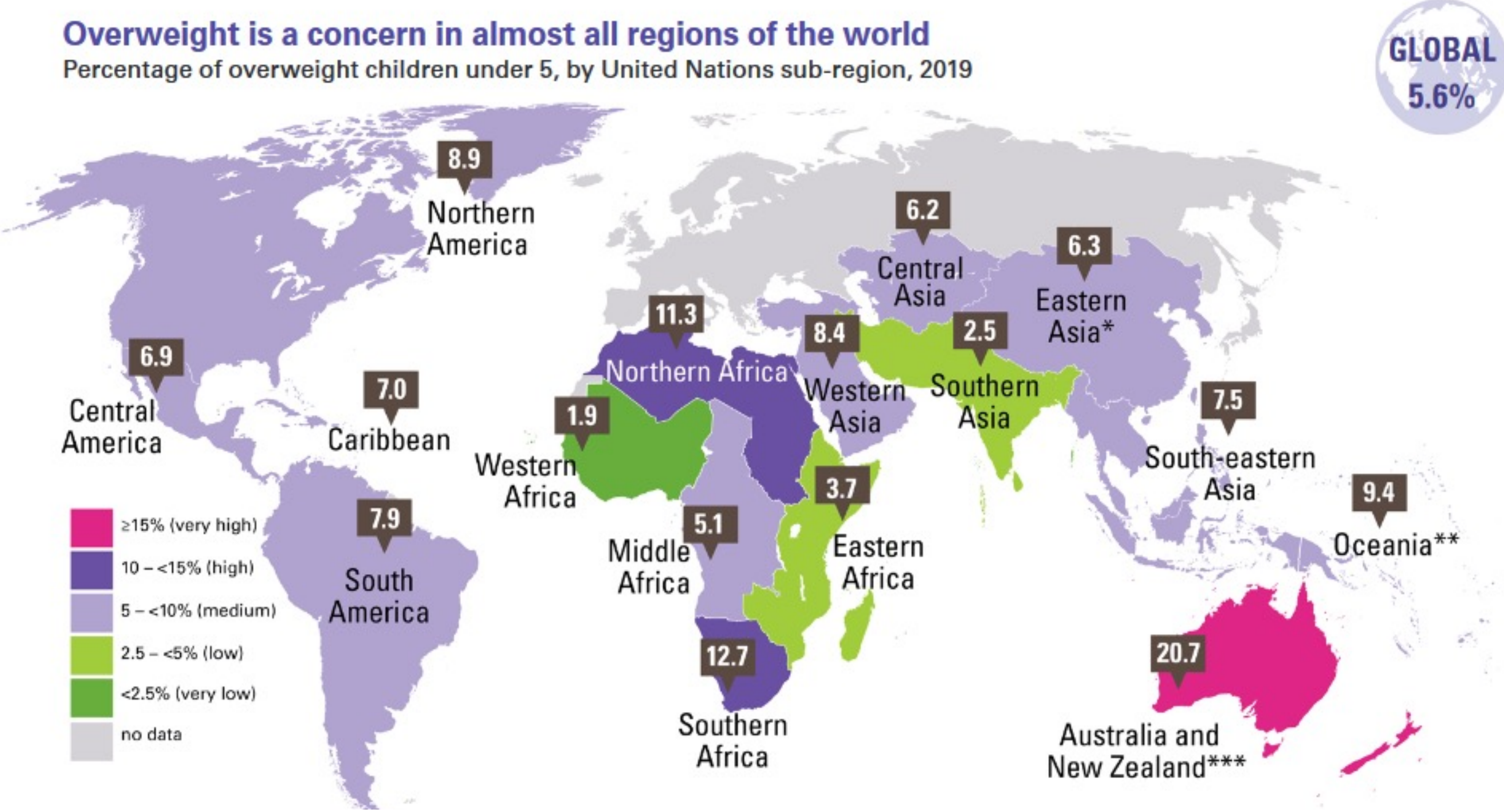
qz.com

Global obesity burden (adults)



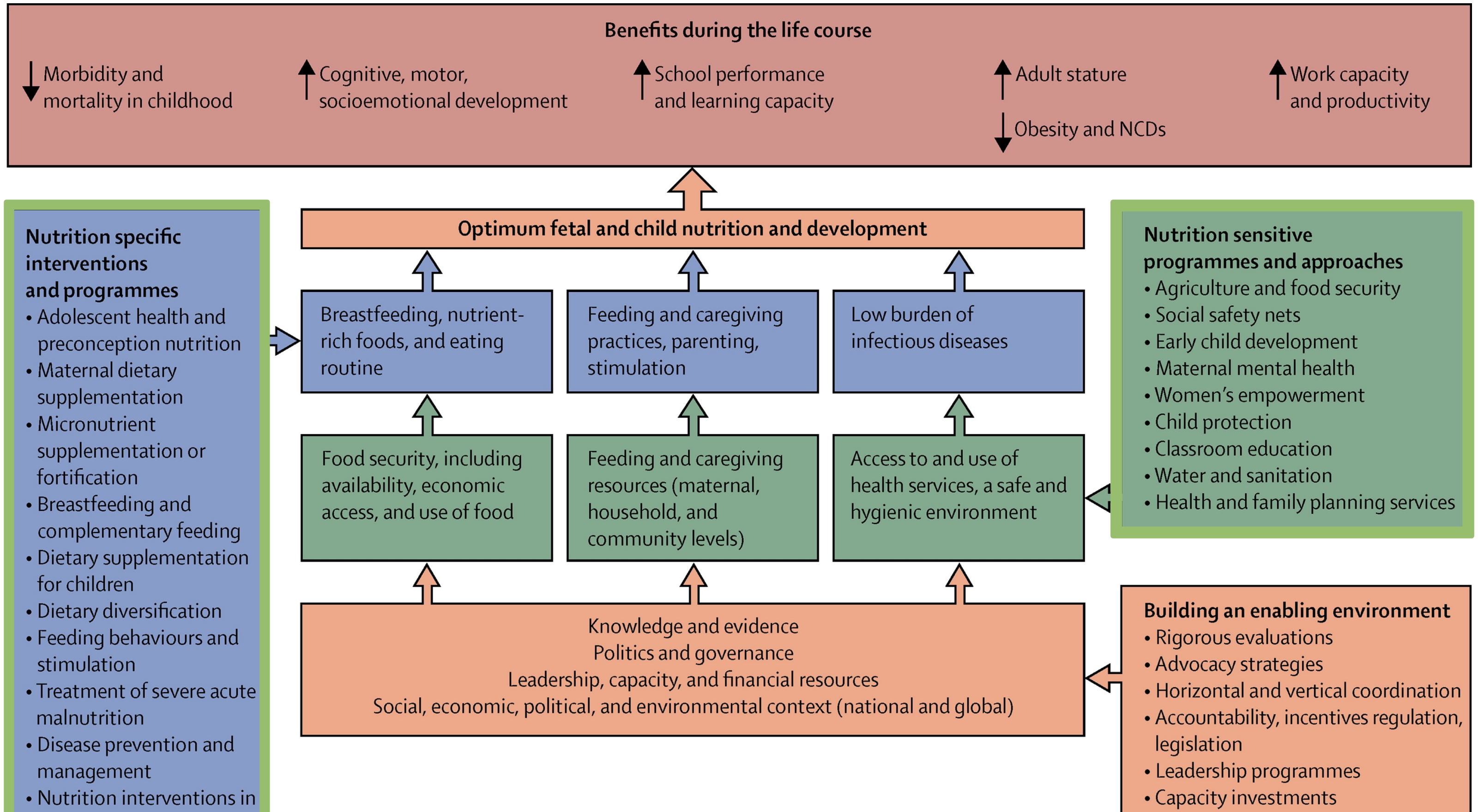
Citations: WHO 2016

Global overweight burden (< 5y)



Citations: UNICEF/WHO/World Bank 2020

Interventions to improve child nutrition in low-income countries



Lancet Framework; Black et al., 2013

The American Journal of
CLINICAL NUTRITION

Volume 112, Issue 3
September 2020

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 ▾**

- Median DDS during pregnancy was 3.0 (IQR: 2.5–3.5).
- Only 213 (2.8%) of the women assessed had a mean DDS of ≥5, the FAO definition of minimum dietary diversity.
- PQDS scores for women ranged from 10 to 28, with a median score of 19 (IQR: 17–20)

TABLE 5 Association of PDQS with birth outcomes in HIV-negative women in Tanzania[1]

Clinical outcome	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	*P*-trend
PDQS median (IQR)	16.0 (15.0–16.0)	18.0 (17.0–18.0)	19.0 (19.0–19.0)	20.0 (20.0–20.0)	22.0 (21.0–23.0)	
Preterm birth[2] (<37 weeks of gestation)						
n	338/1732	347/2194	133/1022	192/1215	142/1390	
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, energy, BMI, and anemia adjusted[3]		0.81 (0.71, 0.93)**	0.66 (0.55, 0.79)***	0.82 (0.70, 0.96)*	0.55 (0.46, 0.66)***	<0.001***
Small for gestational age[4] (<10th percentile for gestational age/sex)						
n	264/1605	338/1971	149/906	187/1110	182/1232	
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, energy, BMI, and anemia adjusted[3]		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[5] (<2500 g)						
n	145/1606	124/2067	56/962	58/1149	65/1334	
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, energy, BMI, and anemia adjusted[3]		0.66 (0.53 0.83)***	0.63 (0.47, 0.84)**	0.55 (0.41, 0.74)***	0.53 (0.40, 0.70)***	<0.001***
Fetal loss[6] (spontaneous abortion, stillbirth)						
n	68/1732	71/2194	38/1022	30/1215	31/1390	
Univariate		0.82 (0.59, 1.14)	0.95 (0.64, 1.40)	0.63 (0.41, 0.96)*	0.57 (0.37, 0.86)*	
Multivariate, energy, BMI, and anemia adjusted[3]		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**

Madzorera et al.

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Infant and Child Feeding Index, proxy for complementary feeding quality, is associated with reduced malnutrition in Tanzania

Table 4. Prospective association of the ICFI with subsequent risk of first episode of growth faltering among children during 6–24 months of life, Dar es Salaam, Tanzania

		Medium ICFI				High ICFI			
Outcome	Low ICFI	Unadjusted HR (95% CI)	P*	Adjusted HR[2] (95% CI)	P*	Unadjusted HR (95% CI)	P*	Adjusted HR[2] (95% CI)	P*
Stunting (482 events)	Reference	0.74 (0.60, 0.91)	<0.01	0.78 (0.63, 0.96)	0.02	0.66 (0.53, 0.83)	<0.01	0.72 (0.57, 0.91)	<0.01
Underweight (386 events)	Reference	0.71 (0.56, 0.90)	0.01	0.76 (0.59, 0.96)	0.02	0.72 (0.56, 0.92)	0.01	0.79 (0.61, 1.02)	0.07
Wasting (456 events)	Reference	0.85 (0.68, 1.07)	0.16	0.89 (0.71, 1.12)	0.33	0.92 (0.73, 1.15)	0.46	1.01 (0.80, 1.27)	0.96

Kamenju et al. 2016

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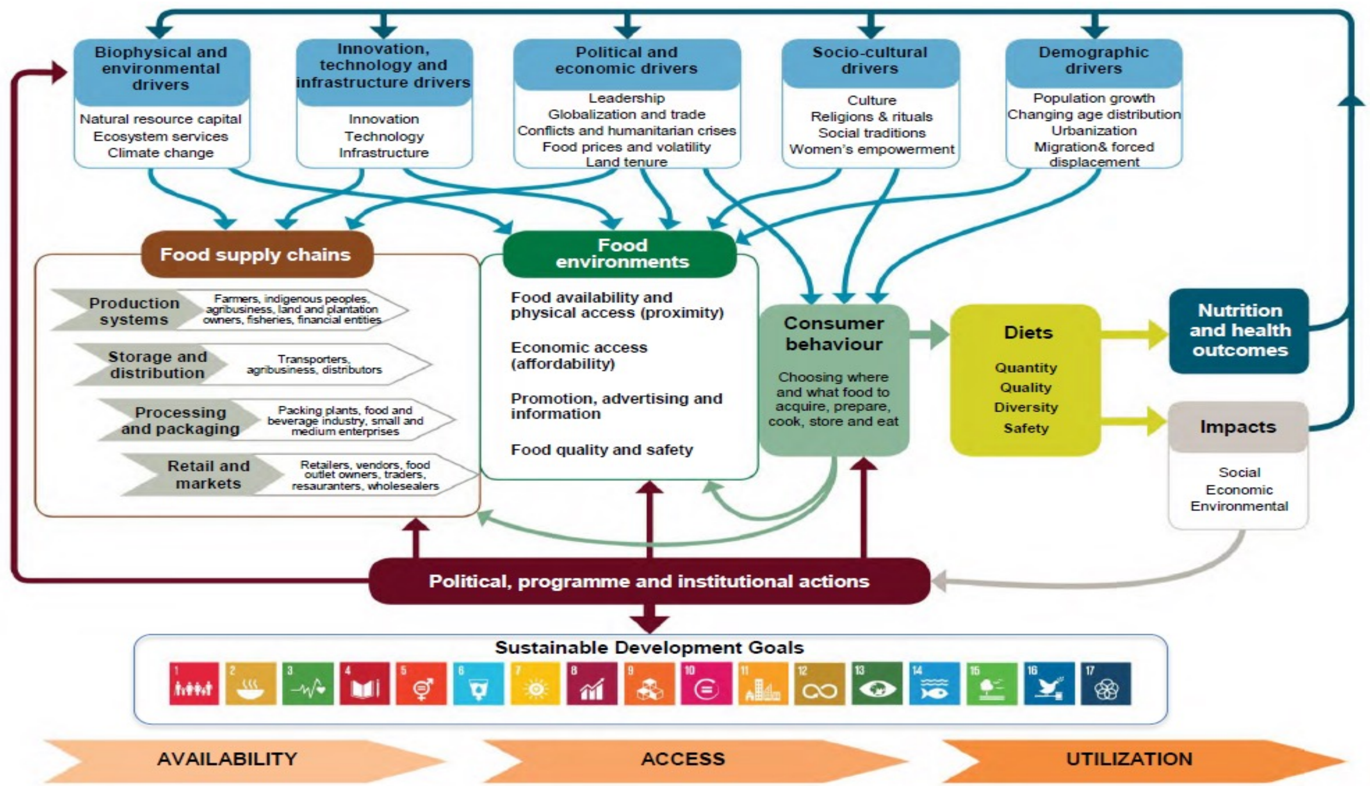
Conceptual Framework for Food systems: Highly Complex



HLPE, 2017

The Journal of Nutrition
Community and International Nutrition

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

Isabel Madzorera,[1] Mia M Blakstad,[1] Alexandra L Bellows,[2] Chelsey R Canavan,[1] Dominic Mosha,[3] Sabri Bromage,[4] Ramadhani A Noor,[1] Patrick Webb,[5] Shibani Ghosh,[5] Joyce Kinabo,[6] Honorati Masanja,[3] and Wafaie W Fawzi[1,4,7]

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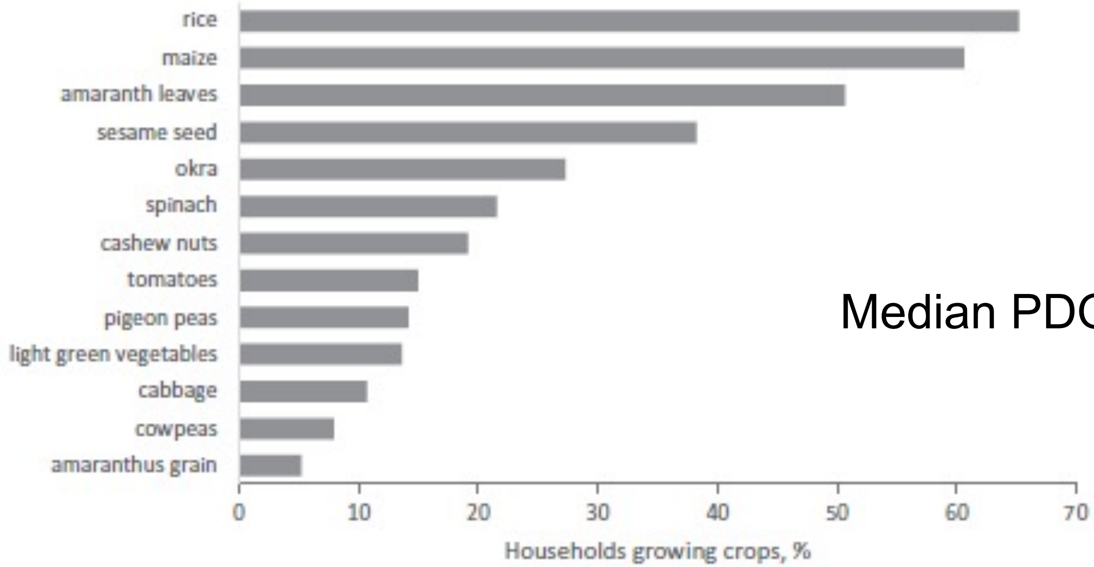
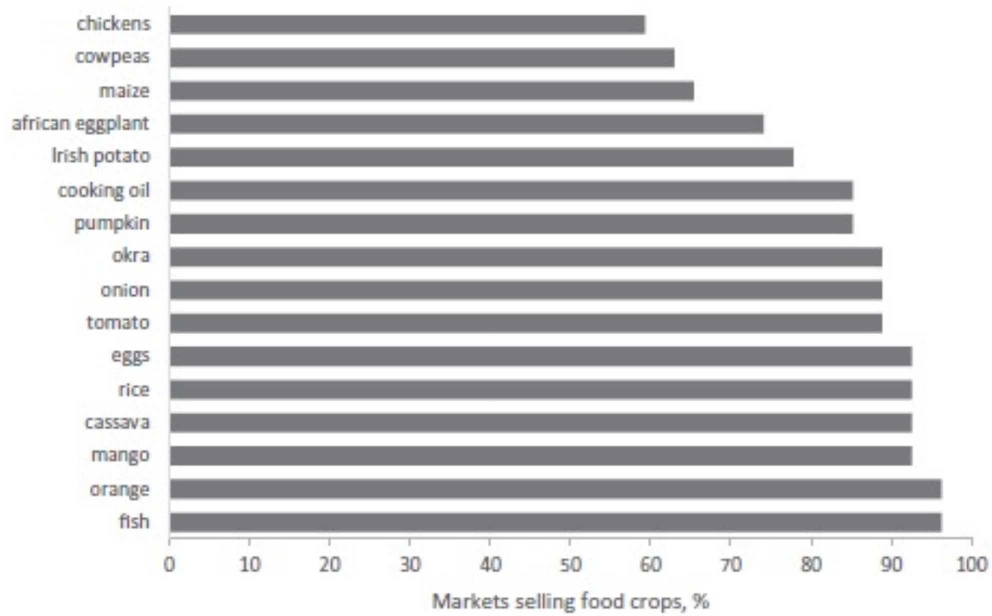
Figure 1: Percentage of study households growing crops in the previous year



Median PDQS=19 (IQR 17-21)

Figure 2: Percentage of markets selling common foods in the previous year based on 27 key informant interviews



Source: Madzorera, et al.

TABLE 3 Association of food crop diversity with prime diet quality score among women in rural Tanzania

	Prime diet quality score	
	Univariate[1]	Adjusted model[2]
Food crop diversity score	0.32 (0.19–0.44)***	0.47 (0.27–0.67)***
Livestock diversity score	0.27 (0.08–0.47)*	– 0.07 (–0.38–0.24)
Women's participation in off-farm activities		
Women's participation in nonfarm economic activities	0.60 (0.22–0.98)**	0.47 (–0.02–0.96)
Women's participation in wage/salary employment	0.87 (0.43–1.32)***	0.96 (0.26–1.67)*

Source: Madzorera, et al.

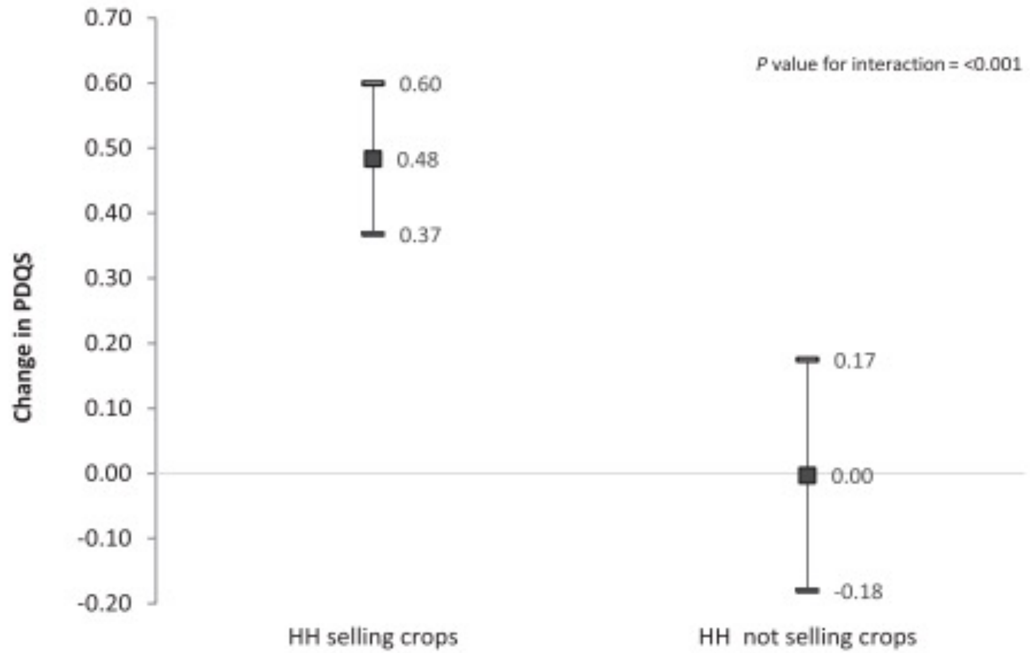


FIGURE 4 Association of crop species richness with PDQS among women in rural Tanzania, stratified by sale of food crops. Error bars are 95% CIs. GEE linear models with exchangeable correlation, controlling for clustering by village pair, were used to evaluate the association of crop species richness with maternal diet quality. Stratified models were restricted to women whose households sold at least 1 food crop or households that did not sell food crops in the previous year. The models control for treatment (HANU/control), maternal age (years), maternal education (none, primary, secondary, and higher), parity (0–2, ≥3), wealth index (quintiles), land size (acres), livestock diversity score, women's participation in nonfarm economic activities, receiving wages or salary, maternal BMI categories, market food diversity score, and distance to market. The association of crop species richness with PDQS is stronger among women from households that sold food crops. Abbreviations: GEE, generalized estimating equation; HH, household; PDQS, prime diet quality score.

ORIGINAL ARTICLE

Maternal & Child Nutrition WILEY

Home gardening improves dietary diversity, a cluster-randomized controlled trial among Tanzanian women

Mia M. Blakstad[1] | Dominic Mosha[2] | Alexandra L. Bellows[1] | Chelsey R. Canavan[1] | Jarvis T. Chen[3] | Killian Mlalama[2] | Ramadhani A. Noor[4] | Joyce Kinabo[5] | Honorati Masanja[2] | Wafaie W. Fawzi[1,4,6]

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[2]Ifakara Health Institute, Dar es Salaam, Tanzania
[3]Department of Social and Behavioral Sciences, Harvard T. H. Chan School of Public Health, Boston, Massachusetts, USA
[4]Department of Nutrition, Harvard T. H. Chan School of Public Health, Boston, Massachusetts, USA
[5]Department of Food Science Technology, Nutrition and Consumer Sciences, Sokoine University of Agriculture, Morogoro, Tanzania
[6]Department of Epidemiology, Harvard T. H. Chan School of Public Health, Boston, Massachusetts, USA

Pair-matched cluster-randomized trial in 10 villages (n=1,006)
The intervention included:
- Provision of small agricultural inputs and garden training
- support, delivered by AEWs
  - Seeds: African eggplant, amaranth, spinach, tomato,
  - okra, and Chinese cabbage (x 3)
- Nutrition and health counseling, provided by CHWs
- Delivered via home visits and farmer field schools every 2 weeks

Control villages received standard of care
Data collection: 0, 12 months (and 36 months)

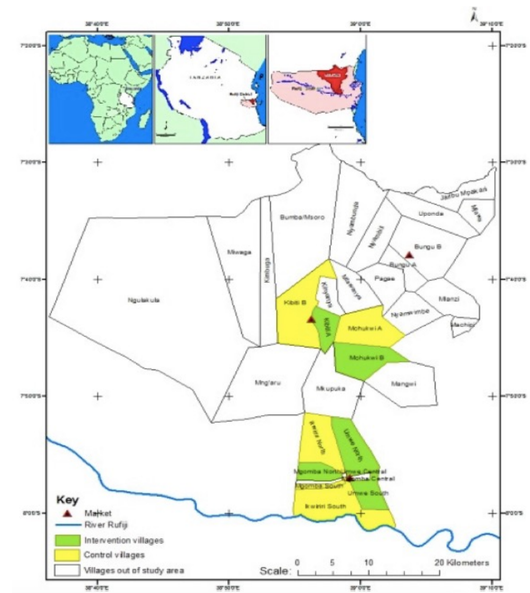

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TABLE 3 Differences in dietary diversity score and household food insecurity score between intervention (INT) and control

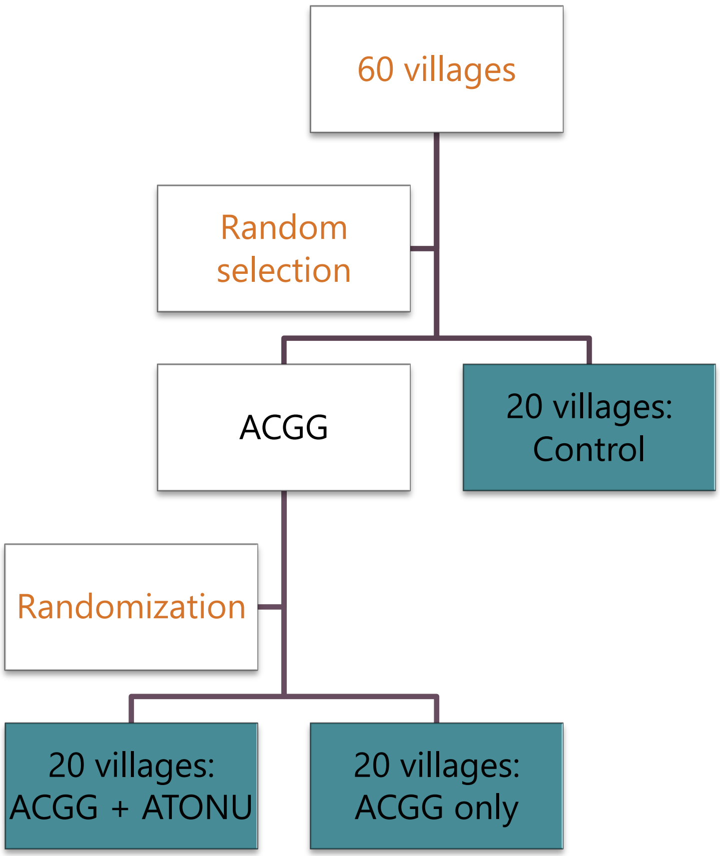
	Unadjusted					Adjusted with treatment weights				
Outcome	β1	N	LCI	UCI	p	β1	N	LCI	UCI	p
Dietary diversity score	0.53	873	0.33	0.74	<0.001	0.50	865	0.20	0.80	0.001
Household food insecurity access scale	−0.39	874	−1.14	0.37	0.312	−0.53	862	−1.46	0.41	0.272
Number of crops grown	3.04	874	2.79	3.31	<0.001	2.65	870	2.35	2.96	<0.001

Source: Blakstad, et al.

See corresponding commentary on page 2617.

A Chicken Production Intervention and Additional Nutrition Behavior Change Component Increased Child Growth in Ethiopia: A Cluster-Randomized Trial

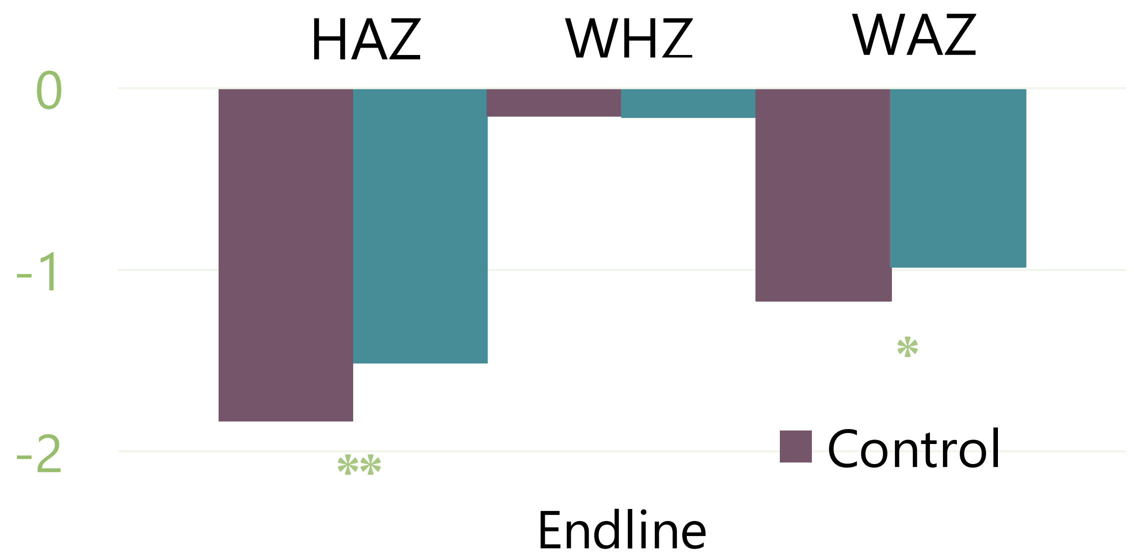
Simone Passarelli,[1] Ramya Ambikapathi,[2] Nilupa S Gunaratna,[2] Isabel Madzorera,[1] Chelsey R Canavan,[1] Abdallah R Noor,[1] Amare Worku,[3] Yemane Berhane,[3] Semira Abdelmenan,[3] Simbarashe Sibanda,[4] Bertha Munthali,[4] Tshilidzi Madzivhandila,[4] Lindiwe M Sibanda,[4] Kumlachew Geremew,[5] Tadelle Dessie,[5] Solomon Abegaz,[6] Getnet Assefa,[6] Christopher Sudfeld,[7] Margaret McConnell,[7] Kirsten Davison,[8] and Wafaie Fawzi[7]



Household inclusion criteria:

- Produced chickens in the last 2 years and currently have <50 chickens
- Have at least one woman of reproductive age (15-49 years at enrollment)
- Plan to remain in the study area for the study duration
- Provide informed consent

Nutrition Effects



The intervention was associated with a 0.25 increase in height-for-age z-score at endline, and a 0.17* increase in weight-for-age z-score at endline, after adjusting for baseline characteristics**

None of the differences at midline were statistically significant

Control variables (baseline) include: region, wealth quintile, # livestock, improved WASH, # household members, maternal age and education, age and sex of index child, baseline value of the z-score. *** p<0.01, ** p<0.05, * p<0.1

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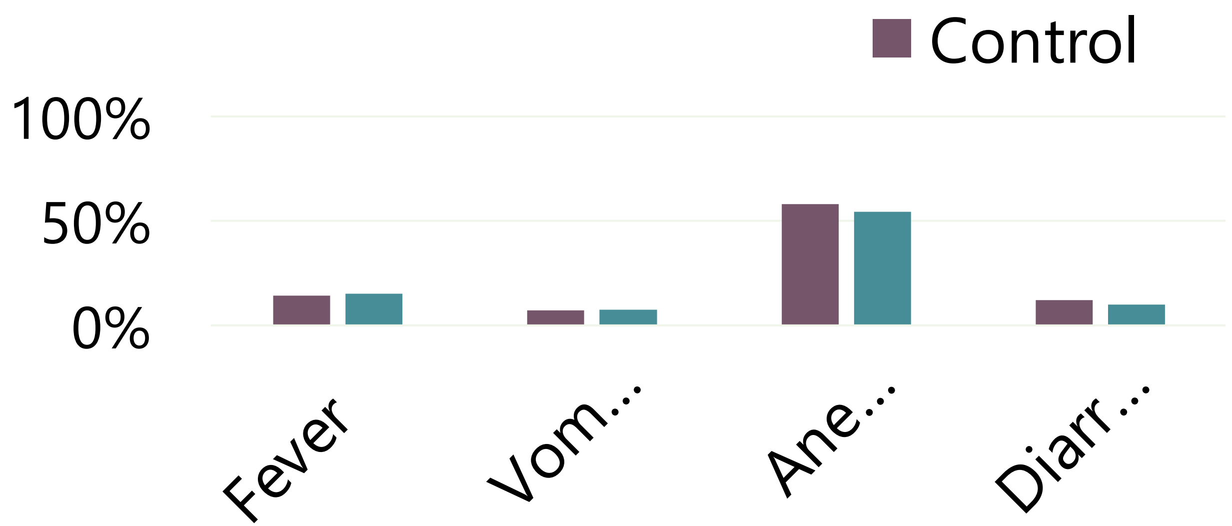
Health Effects



We did not observe any statistically significant effects of the intervention on morbidity outcomes

Control variables (baseline) include: region, wealth quintile, # livestock, improved WASH, # household members, maternal age and education, age and sex of index child.

nature food

ARTICLES

https://doi.org/10.1038/s43016-021-00264-2

Check for updates

Life expectancy and agricultural environmental impacts in Addis Ababa can be improved through optimized plant and animal protein consumption

Mia M. Blakstad[1] ✉, Goodarz Danaei[1,2], Amare W. Tadesse[3,4], Kerstin Damerau[5,6], Alexandra L. Bellows[1], Chelsey R. Canavan[1], Lilia Bliznashka[1], Rachel Zack[7], Samuel S. Myers[5], Yemane Berhane[3] and Wafaie W. Fawzi[1,2,8]

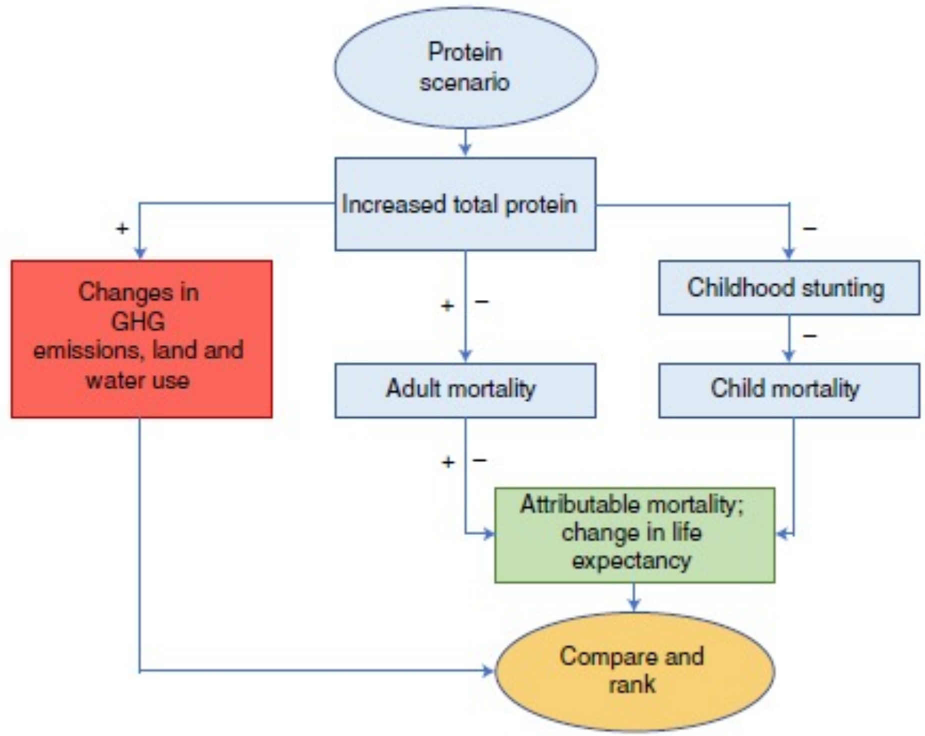


Fig. 1 | Conceptual framework. Analysis flowchart for quantifying the planetary health effects of dietary strategies to meet the protein RDA.

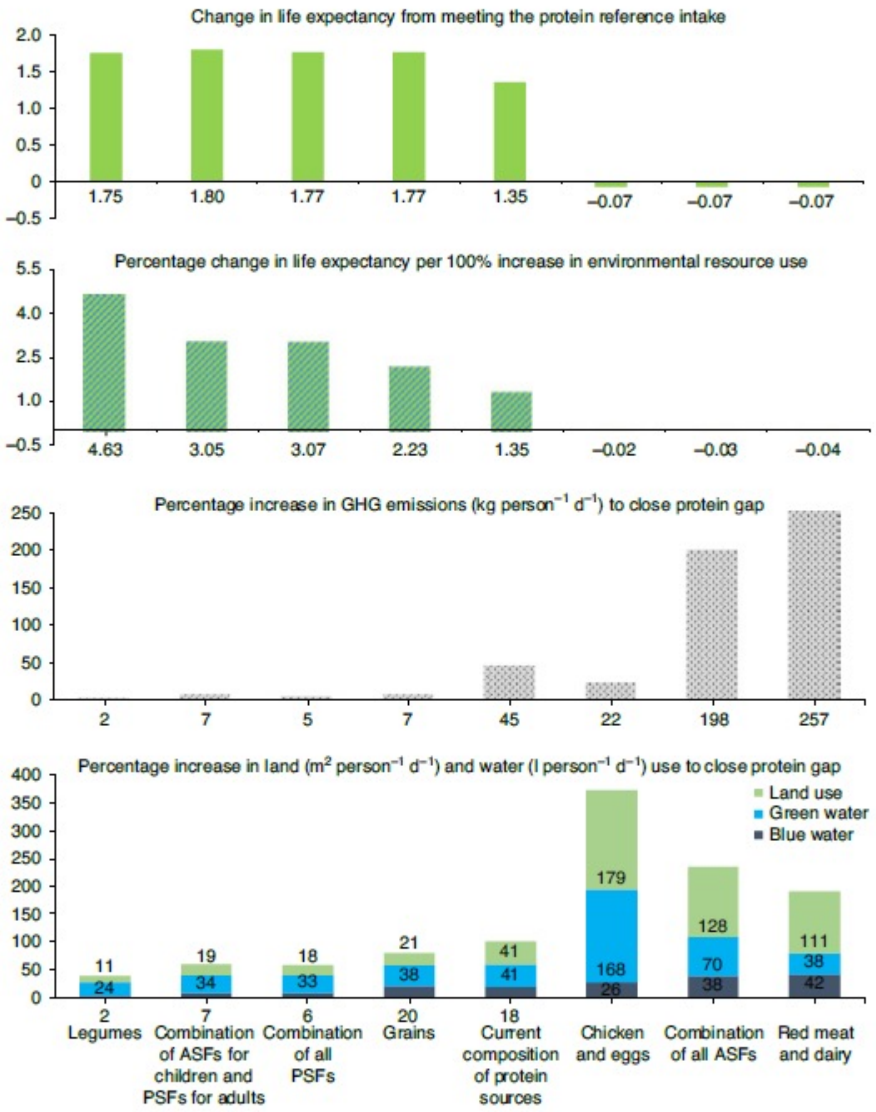


Fig. 2 | Life expectancy and environmental impacts of meeting protein reference intake. Results reflect intakes of children aged between 6 months and 5 yr, and adults aged between 20 and 60 yr in Addis Ababa. ASF, animal-source food; PSF, plant-source food.

Source: Blaskstad, et al.

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Conclusions

- Improving dietary quality is a double duty intervention
- Holistic/food system approach is necessary
- It is critical and possible to improve nutrition and health, while sustaining the environment
- Multidisciplinary teams needed to pursue interventional and observational research
- Cross-national networks play important role in research and training

Darfur, Sudan

North Carolina, US

Peter Manzel –
Hungry Planet

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Home garden, Rufiji, Tanzania