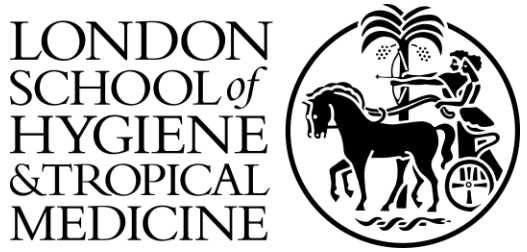
Tanzania HCES Analysis and TFNC training
February 2023

HCES data for nutrition assessment

Edward Joy
edward.joy@lshtm.ac.uk

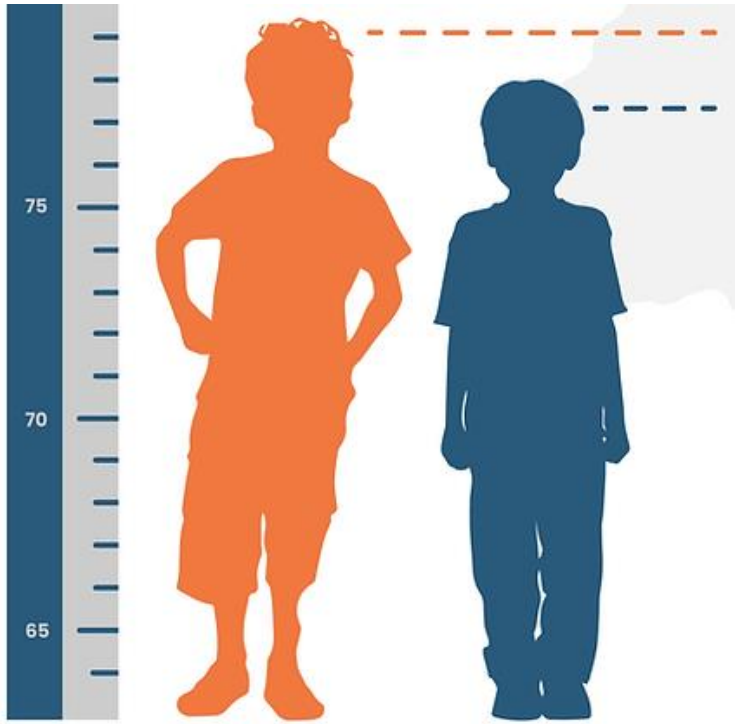


Learning objective

- Critically assess the strengths and limitations of HCES data for estimating micronutrient intakes

Challenge 1

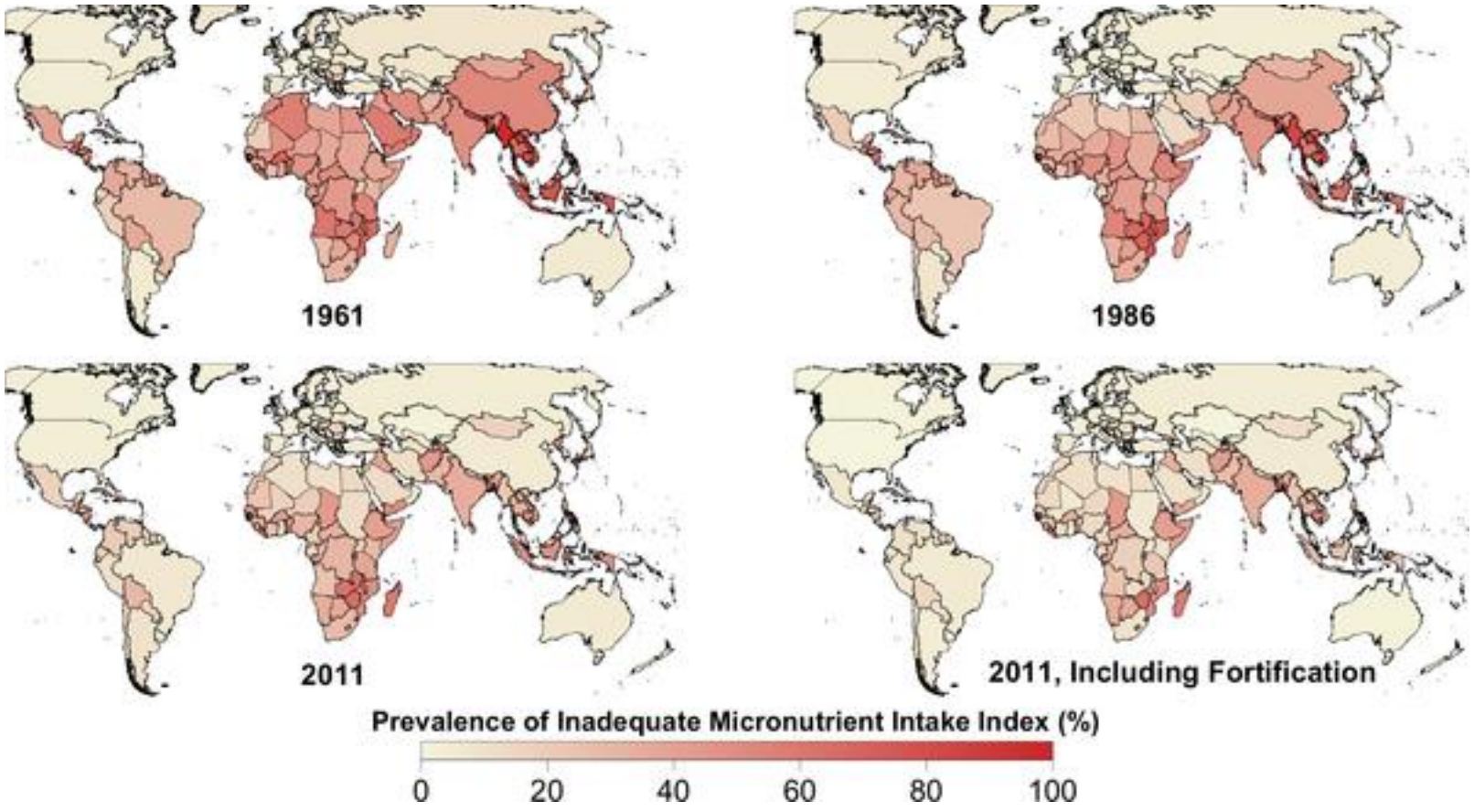
You are conducting a nutritional assessment of a rural population in Nigeria in an area with a high prevalence of stunting. How would dietary data help you assess the situation?



Challenge 2

a. Describe Figure 3 of the Beal et al. paper.

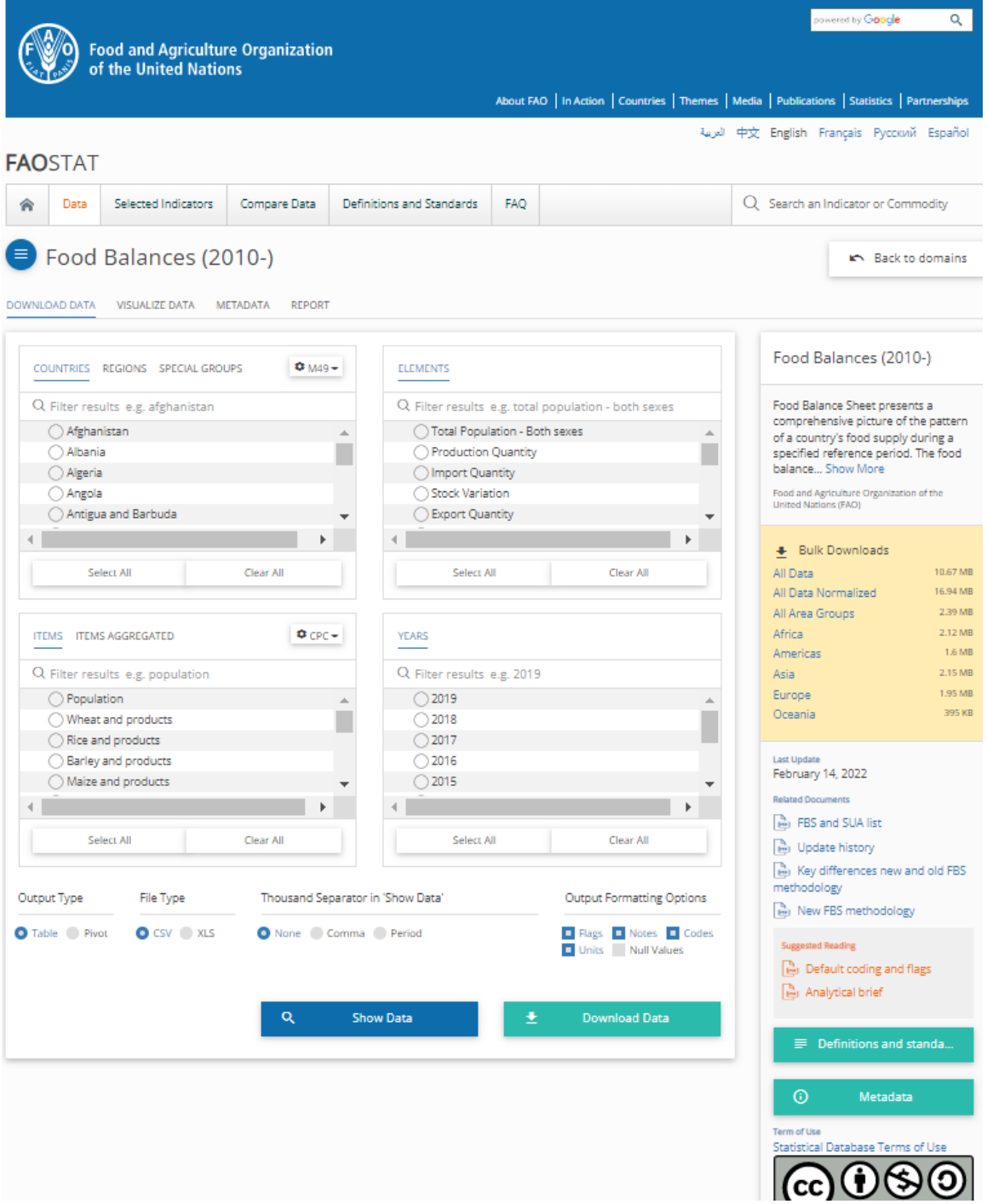
b. You are advising the Ministry of Health in Ethiopia. What do the estimates of deficiency in Beal et al. not tell you about the national situation?



Beal T, Massiot E, Arsenault JE, Smith MR, Hijmans RJ (2017). PLOS ONE 12(4): e0175554. https://doi.org/10.1371/journal.pone.0175554

Sources of food consumption data

- Individual-level data (24 HR, FFQ, diet diversity…)
- Household level recall
- Food Balance Sheets



Food Balance Sheets

- An estimate of food available for human consumption at national level
- 96 discreet food items
- Production + imports – exports – animal feed +/- stocks
- Data compiled by national stats offices and collated by FAO statistics division
- Available for every year since 1961, with updates every ~3 years
- Updated methodology in 2014

https://www.fao.org/faostat/en/#data

Strengths & weaknesses

Strengths
• **Available** for almost all countries (free & open-source) • **Annual** estimates over a long time period • **Consistent** methodology • Good for: **between country** comparison, **trends** over time, '**food system**' applications

Household Surveys

- Introduction to household surveys
  - HCES / LSMS
- How is dietary data captured? How is it processed?
- What insights into the diet can be drawn?
- Strengths/weaknesses

Household Surveys

Nationally representative household surveys are designed to collect data on monitoring and impact evaluation indicators, providing microdata to better inform national development policies.

Household Consumption & Expenditure Surveys (HCES)

HCES (aka LSMS/IHS/HIES) *: family of* **nationally representative**, *multicomponent* **economic surveys** *which provide data to characterize an* **array of socioeconomic conditions**.

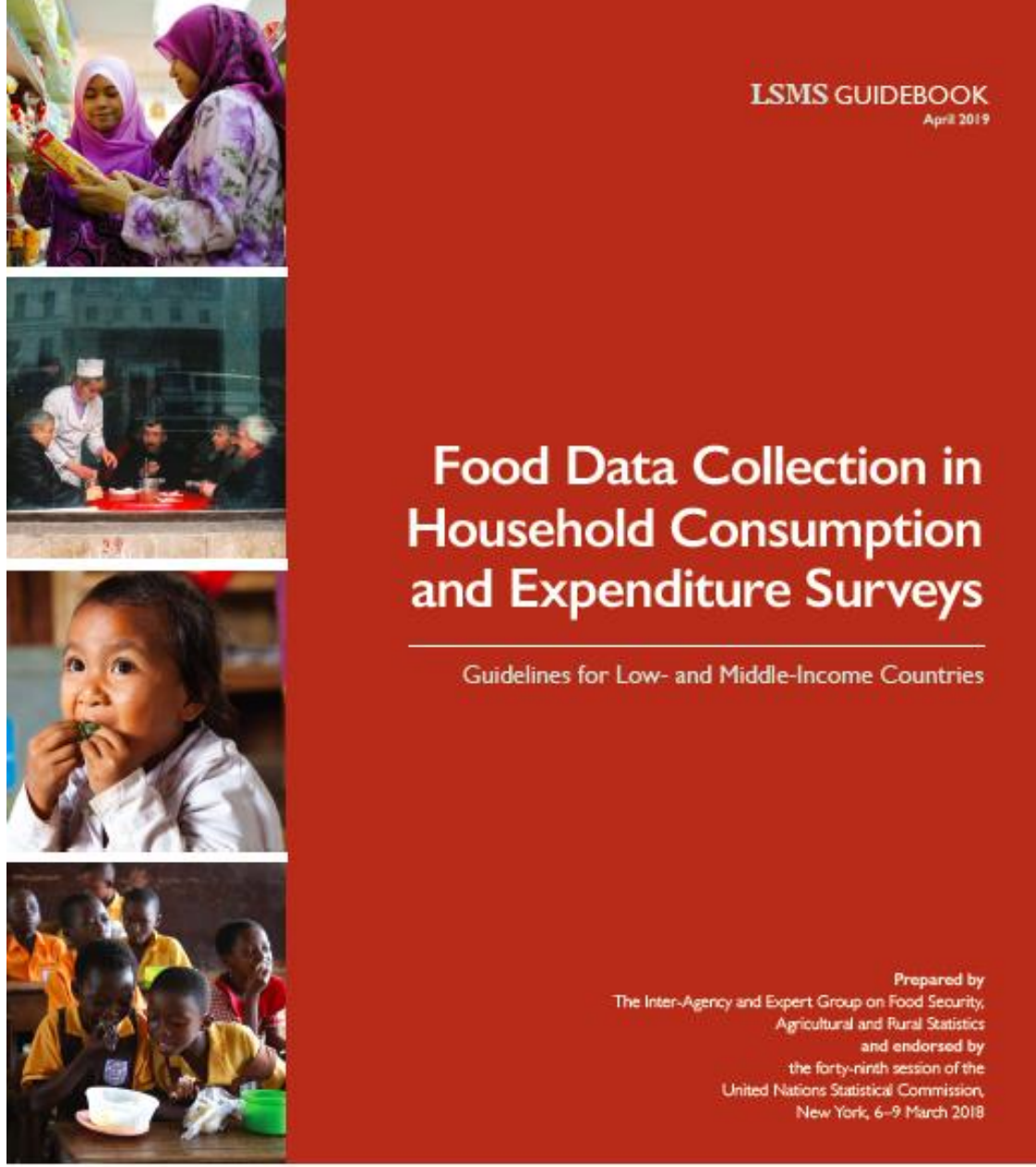
LSMS Living Standards Measurement Study

THE WORLD BANK

HCES Food Consumption Data

Most surveys:

- **Recall** foods consumed by the **household** over a **fixed period**.
- Use a **fixed food item list**.
- Collects information on consumption **quantity**, costs, and origin.



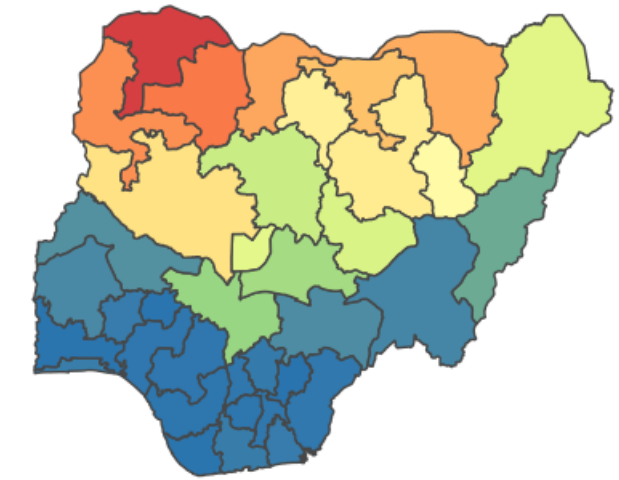
LSMS Living Standards Measurement Study

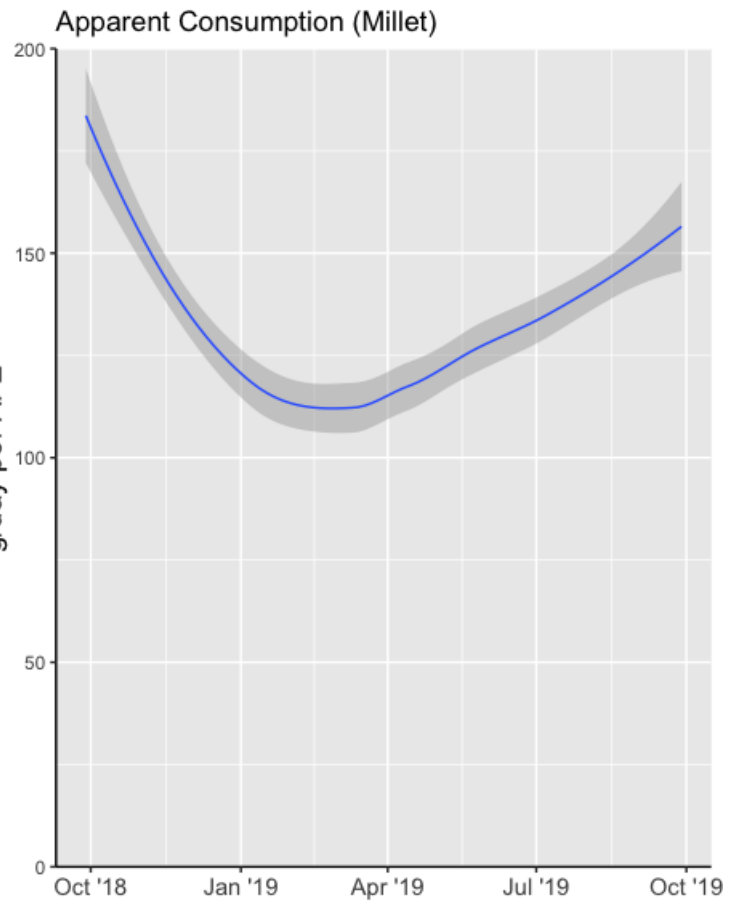
WORLD BANK GROUP

Food and Agriculture Organization of the United Nations

Insights into population diets

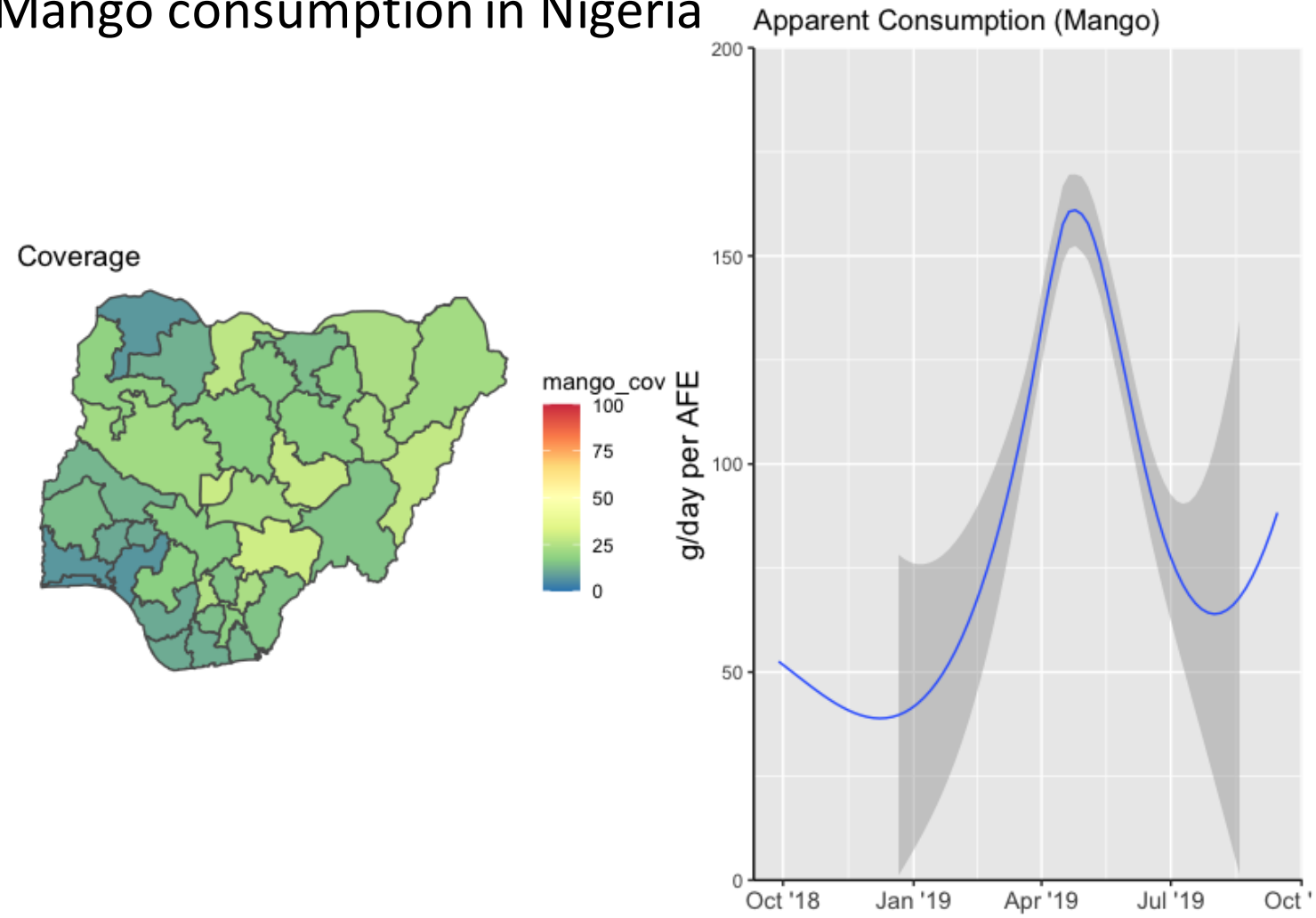
Millet consumption in Nigeria

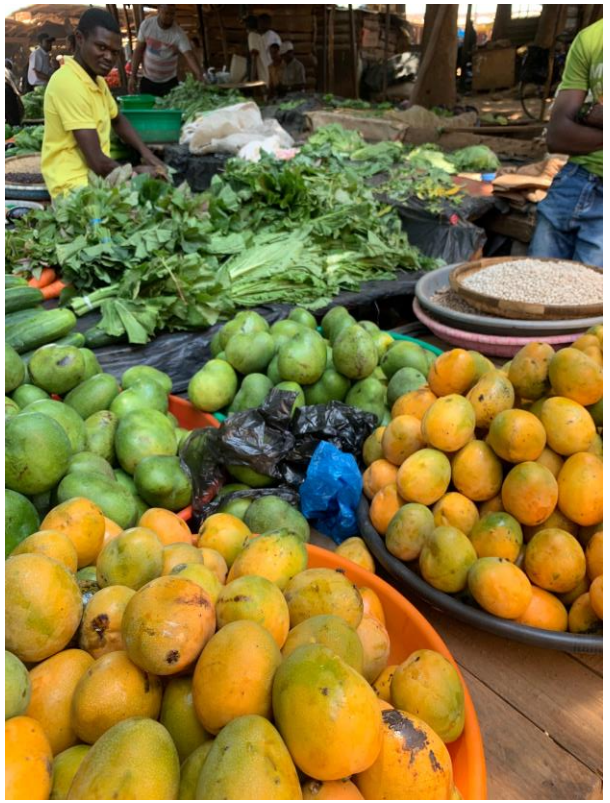




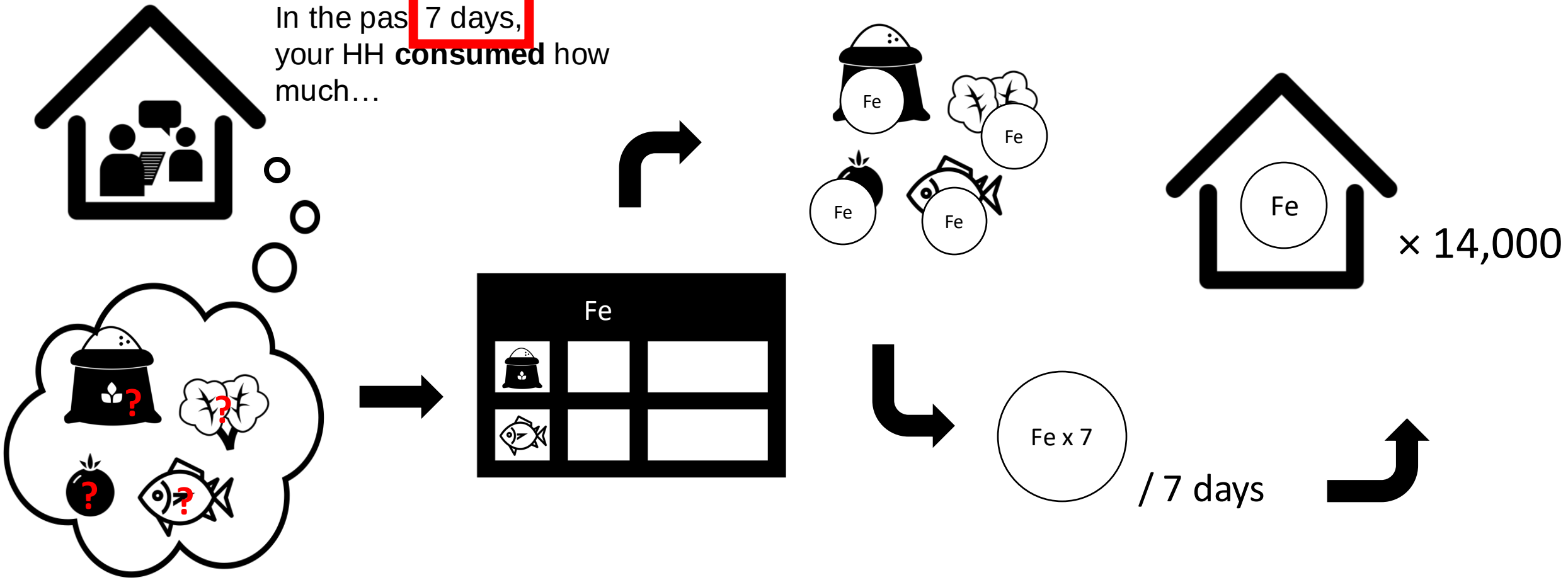
Insights into population diets

Mango consumption in Nigeria



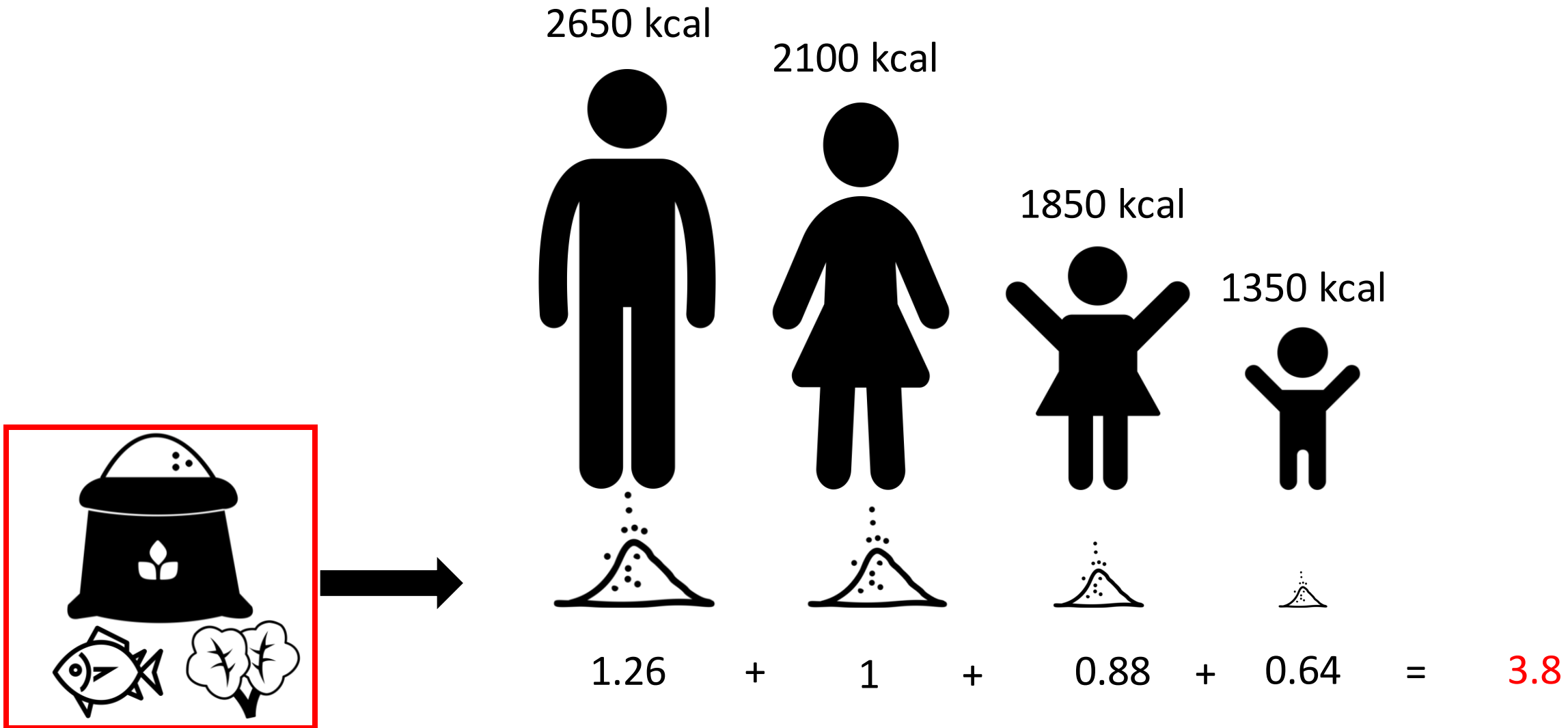


Processing HCES into nutrition metrics



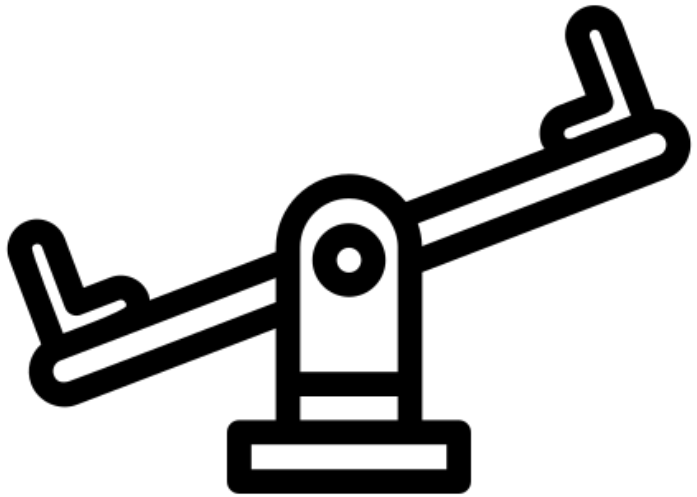
Adult female equivalent (AFE)

Ref. Weisell & Dop 2012

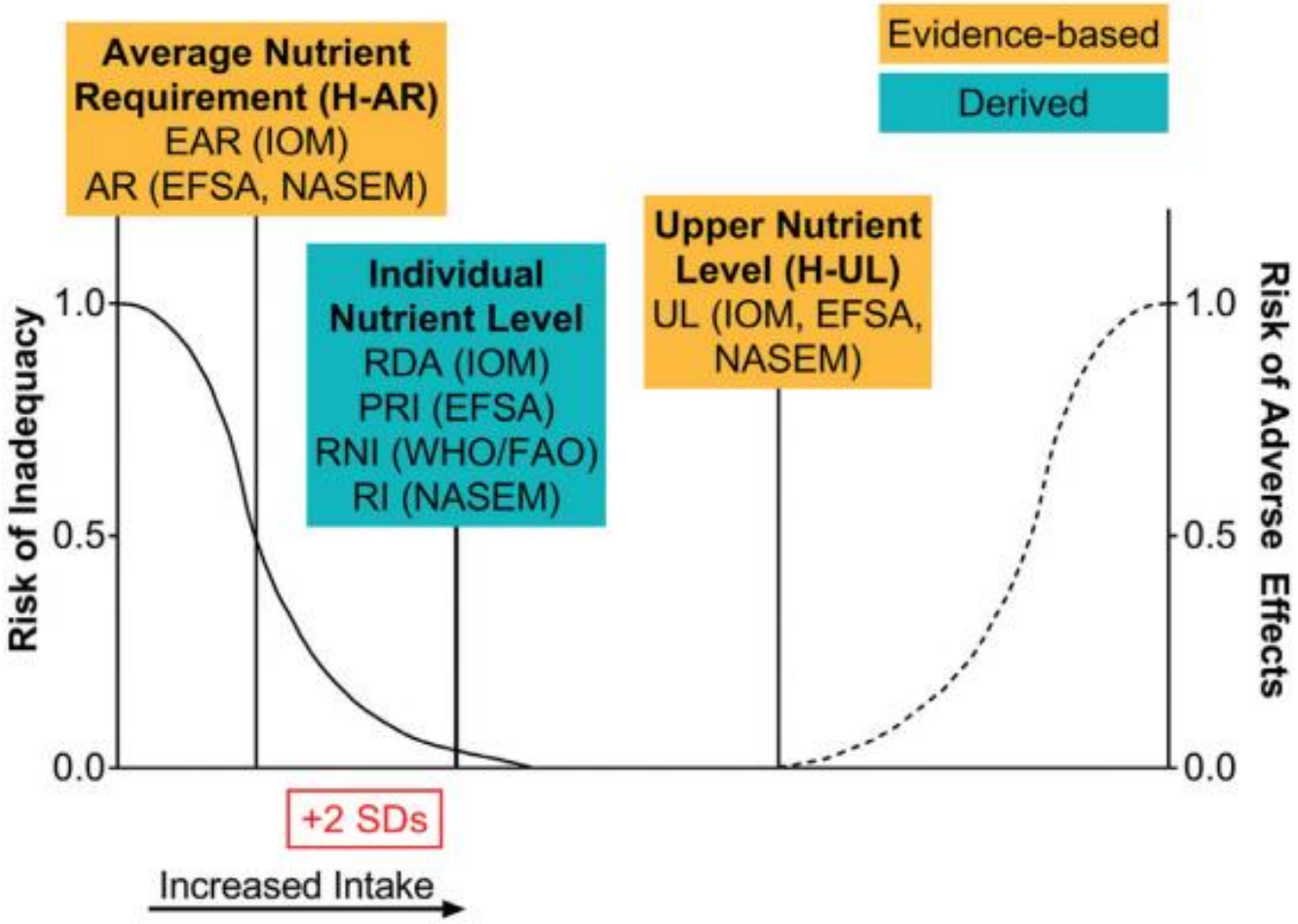


Requirement

Intake



Distribution and terminology for nutrient reference values



AR, average requirement;
EAR, estimated average requirement;
EFSA, European Food Safety Authority;
H-AR, harmonized average requirement;
H-UL, harmonized upper level;
IOM, Institute of Medicine;
NASEM, National Academies of Sciences, Engineering, and Medicine;
PRI, population reference intake;
RI, recommended intake;
RNI, recommended nutrient intake;
UL, tolerable upper intake level.

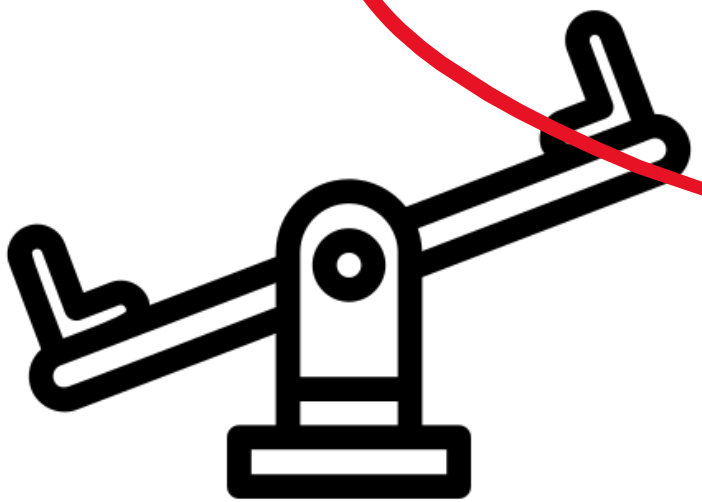
Allen et al. Adv Nutr 2020;11:469–483

- Average requirement: The average daily nutrient intake that is estimated to meet the requirements of half of the healthy individuals in a particular life stage and gender group.
- Upper level: The highest average daily nutrient intake that is likely to pose no risk of adverse health effects to almost all individuals in the general population.

Allen et al. Adv Nutr 2020;11:469–483

Intake

mg *per* AFE *per* day



Requirement

mg *per* day

H-AR
Harmonized Average Requirement
For adult women

Strengths & weaknesses (Household surveys)

Strengths
• **Available** for many LMICs (free & usually open-source!) • Nationally **representative** (big data sets) • Include **several nutrition variables** describing diets, nutritional status, and potential access to food systems interventions • Include **several other variables** describing the household (poverty, geography, living conditions, socioeconomic welfare)

Modeling the potential contributions of large-scale food fortification interventions in Malawi

Kevin Tang

kevin.tang1@lshtm.ac.uk

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

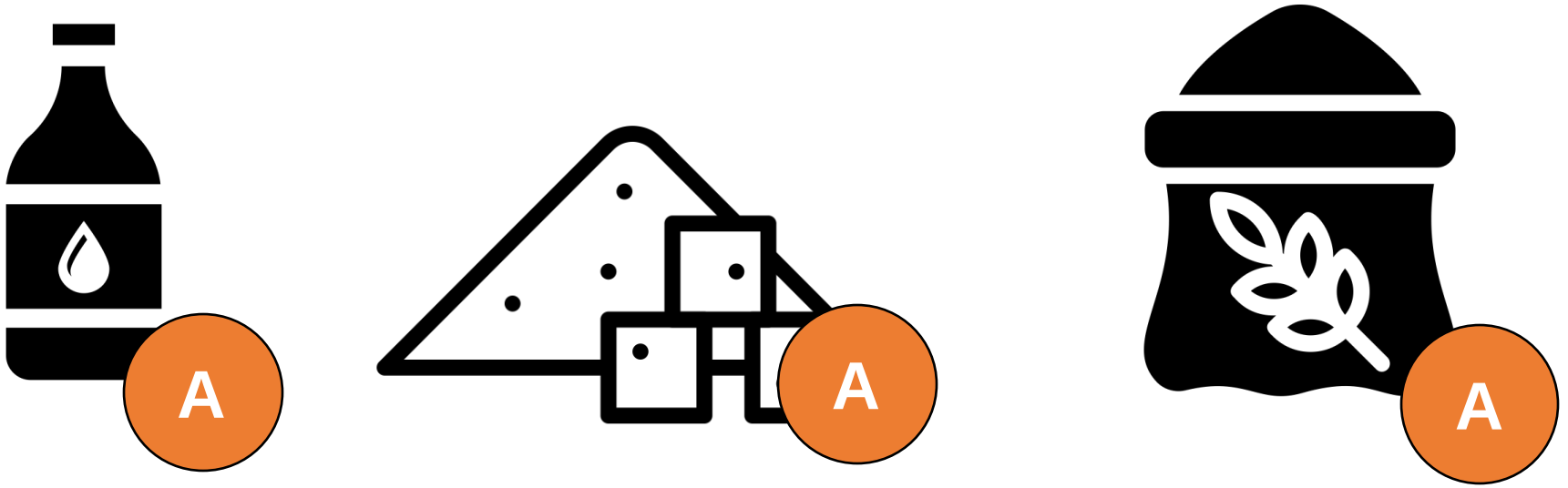
BILL & MELINDA GATES foundation

USAID FROM THE AMERICAN PEOPLE

MAPS www.micronutrient.support

Aim of study

To estimate the potential contributions of industrially fortified oil, sugar and wheat flour towards meeting dietary micronutrient requirements in Malawi using a mathematical modeling framework.



Coverage

Population	Households n	Oil %	Sugar %	Wheat flour & products %
National (total)	**12,447**	**76**	**56**	**52**

Coverage

Population	Households n	Oil %	Sugar %	Wheat flour & products %
National (total)	**12,447**	**76**	**56**	**52**
Geography by administrative region				
North	2491	79	66	50
Center	4220	74	55	55
South	5736	76	52	50

Coverage

Population	**Households** n	**Oil** %	**Sugar** %	**Wheat flour & products** %
National (total)	**12,447**	**76**	**56**	**52**
Residence & socioeconomic position (SEP) by quintile of total annual household expenditure per capita				
Rural	10,175	72	48	44
Urban	2272	96	92	86

Coverage

Population	Households n	Oil %	Sugar %	Wheat flour & products %
National (total)	**12,447**	**76**	**56**	**52**
Residence & socioeconomic position (SEP) by quintile of total annual household expenditure per capita				
Rural	**10,175**	**72**	**48**	**44**
Lowest SEP	2035	44	17	20
Lower Middle SEP	2035	66	34	33
Middle SEP	2035	75	47	42
Higher Middle SEP	2035	83	62	53
Highest SEP	2035	91	80	73
Urban	2272	96	92	86

Coverage

Population	Households n	Oil %	Sugar %	Wheat flour & products %
National (total)	**12,447**	**76**	**56**	**52**
Residence & socioeconomic position (SEP) by quintile of total annual household expenditure per capita				
Rural	10,175	72	48	44
Lowest SEP	2035	44	17	20
Lower Middle SEP	2035	66	34	33
Middle SEP	2035	75	47	42
Higher Middle SEP	2035	83	62	53
Highest SEP	2035	91	80	73
Urban	**2272**	**96**	**92**	**86**
Lowest SEP	455	87	76	64
Lower Middle SEP	454	97	92	84
Middle SEP	455	98	97	92
Higher Middle SEP	454	98	98	95
Highest SEP	454	99	97	94

Apparent consumption quantity* (median g/day per AFE)

Population	n	Oil	Sugar	Wheat flour & products
National (total)	12,447	12	28	9

*among consumers

Apparent consumption quantity* (median g/day per AFE)

Population	n	Oil	Sugar	Wheat flour & products
National (total)	**12,447**	**12**	**28**	**9**
Geography by administrative region				
North	2491	14	31	13
Center	4220	9	28	7
South	5736	13	26	10

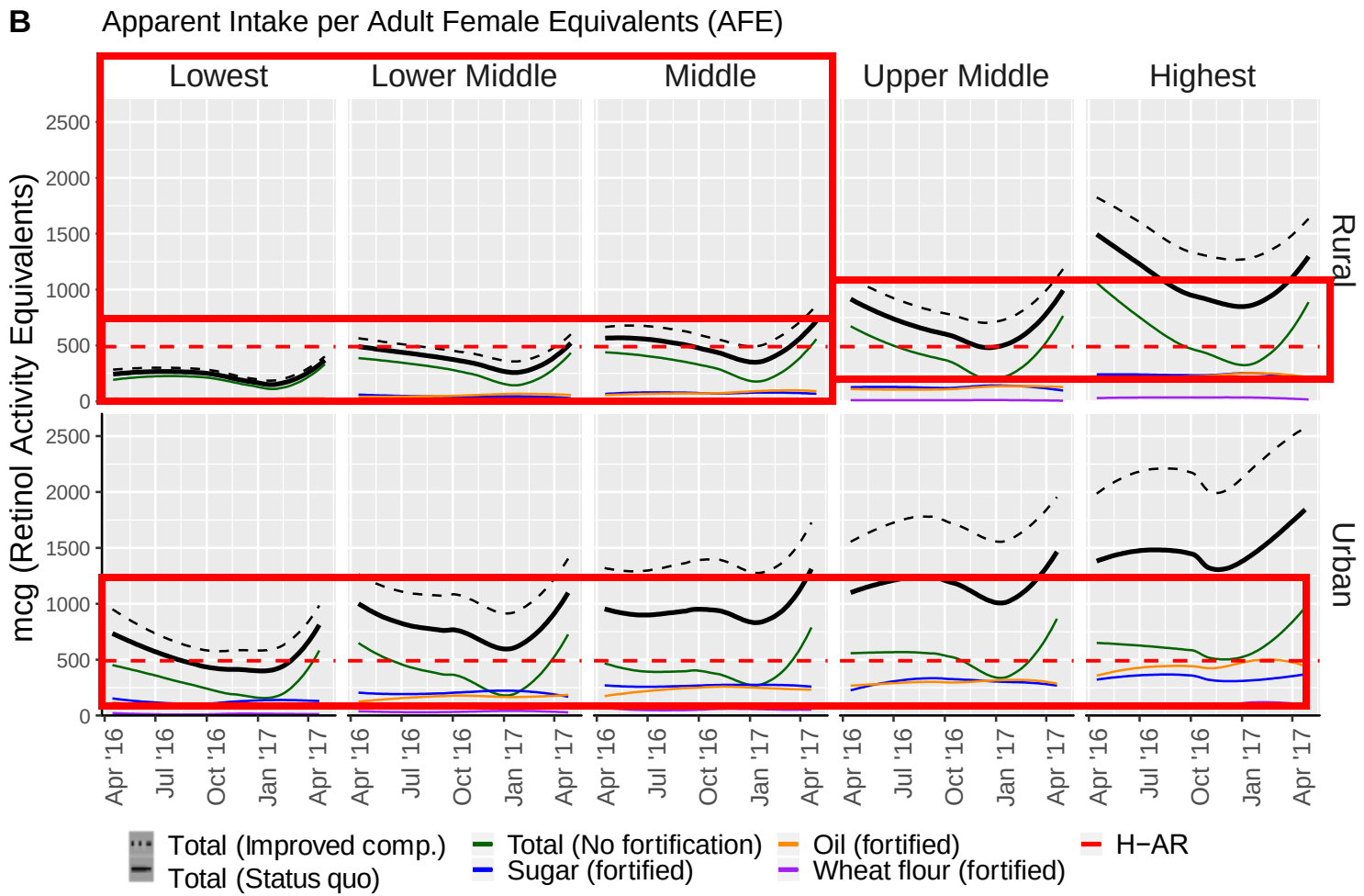
*among consumers

Apparent consumption quantity* (median g/day per AFE)

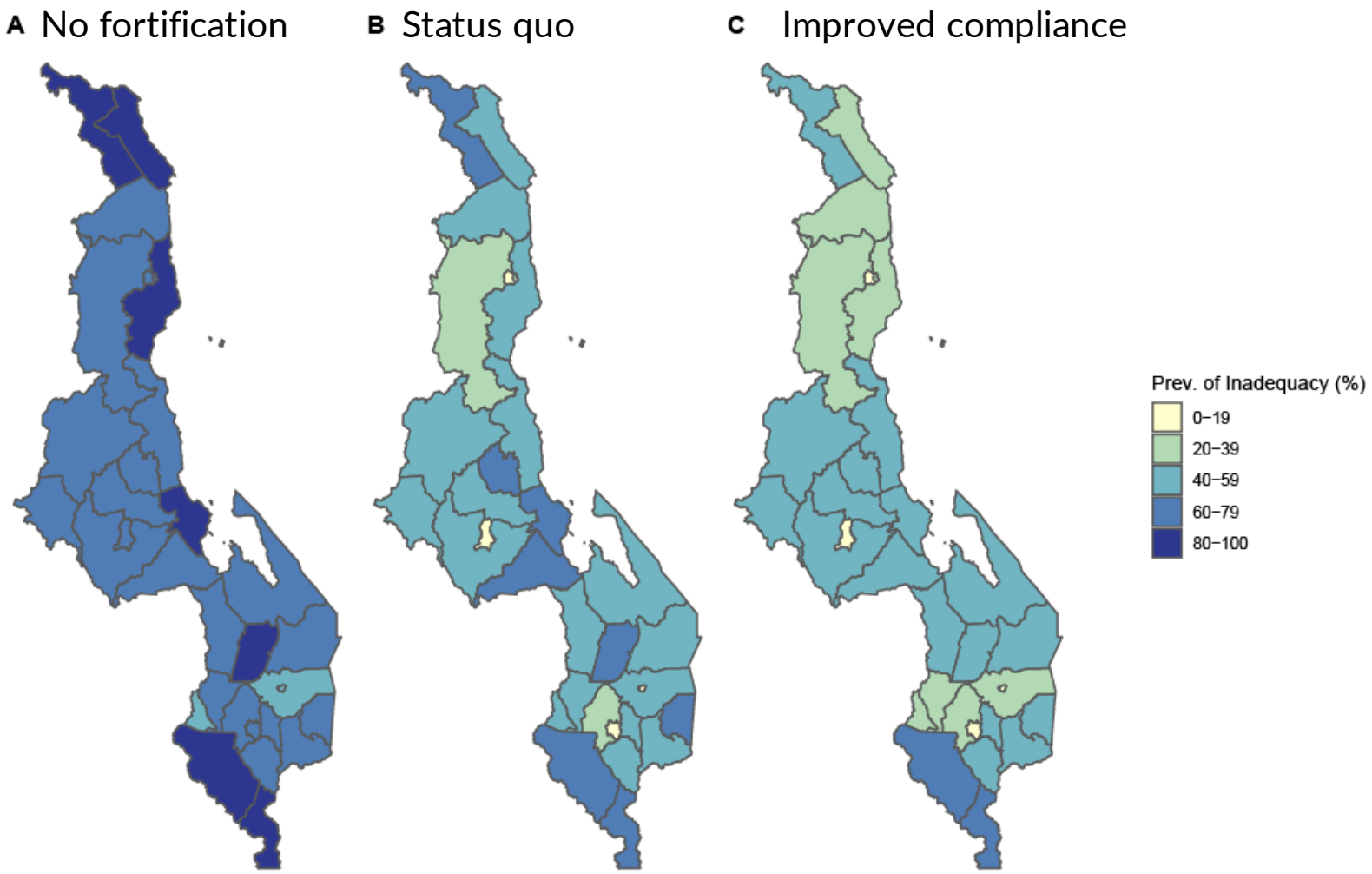
Population	n	Oil	Sugar	Wheat flour & products
National (total)	**12,447**	**12**	**28**	**9**
Residence & socioeconomic position (SEP) by quintile of total annual household expenditure per capita				
Rural	**10,175**	**10**	**25**	**6**
Lowest SEP	2035	3	11	2
Lower Middle SEP	2035	6	18	3
Middle SEP	2035	9	21	4
Higher Middle SEP	2035	11	26	6
Highest SEP	2035	19	36	16
Urban	**2272**	**21**	**34**	**29**
Lowest SEP	455	9	23	7
Lower Middle SEP	454	15	28	19
Middle SEP	455	22	36	29
Higher Middle SEP	454	26	40	40
Highest SEP	454	39	45	58

*among consumers

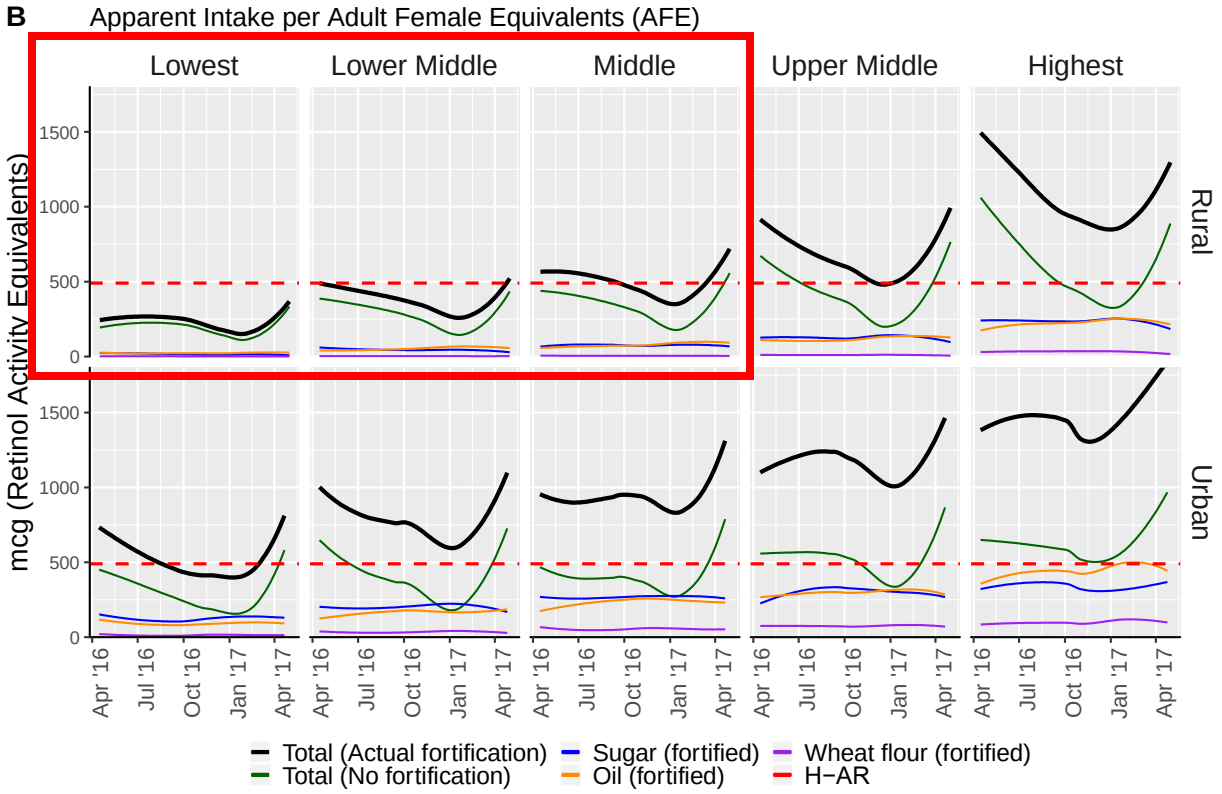
Vitamin A – Apparent intake per AFE



Vitamin A Inadequacy by District (Apparent Intake)



How much does the overall Vitamin A fortification strategy in Malawi contribute?



- Current vitamin A fortification policy likely reduces prevalence of vitamin A inadequacy.
- Potential for improvement if fortification levels complied with industry standards.
- Equity considerations as fortification is less effective for rural populations of low socioeconomic position.
  - Other micronutrient interventions may still be necessary

Further reading

- Food and Nutrition Bulletin, 2012. Special Issue on HCES for nutrition assessment. https://journals.sagepub.com/toc/fnba/33/3_suppl2
- Tang K et al. (2021) Modeling food fortification contributions to micronutrient requirements in Malawi using Household Consumption and Expenditure Surveys. Annals of the New York Academy of Sciences.