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**ADVANCING THE USE OF  
HOUSEHOLD SURVEYS FOR  
NUTRITION:**

**Nutrient Adequacy at the household level  
and cost of nutritious diets in Malawi**

**Kate Schneider\*, Will Masters, Anna Herforth, & Yan Bai**

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Atlanta, GA

Motivation

Background

Our  
Approach

Data

Methods

Results



Make more and better use of household surveys for nutrition



Address household unit of observation for food consumption

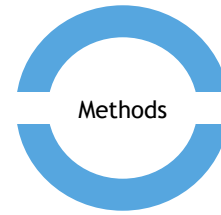
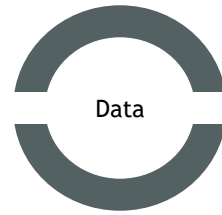


Families procure food together and eat shared meals



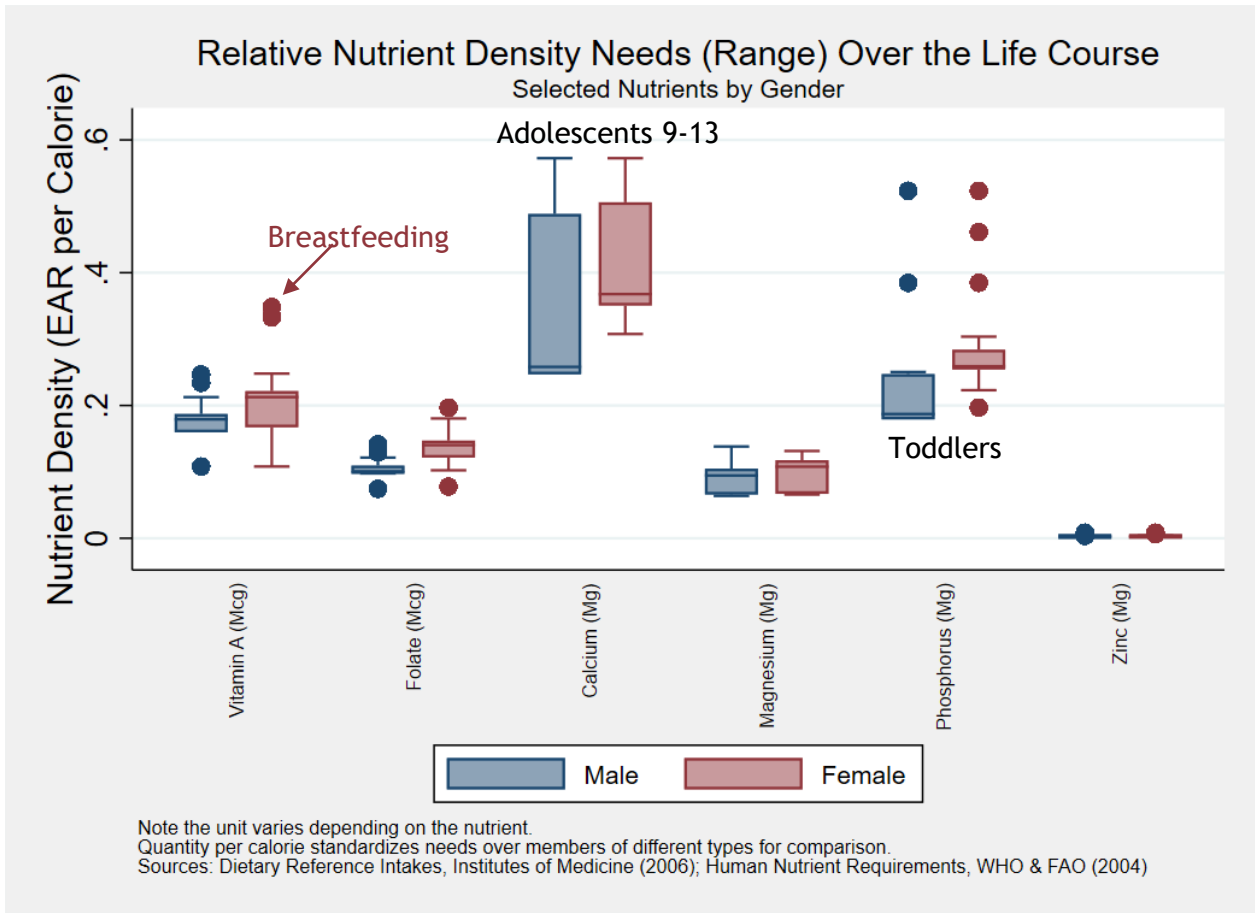
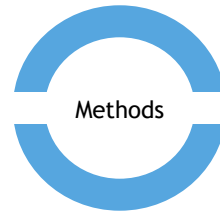
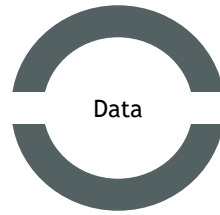
Little is known about the cost of healthy diets





## Prior research using HCES for nutrition analyses divides foods over individuals:

- **Adult male consumption equivalents are the most common approach.**  
Coates et al 2017; Fiedler et al 2012; Mori, Ishibashi & Dyck 2011; Waid et al 2018; Weisell et al 2012.
  - Based on well-established methods to analyze household budgets. [Brown 1954; Friedman 1952; Prais 1953; Prais & Houthakker 1955]
  - But nutrients are needed in different proportions, per nutrient, relative to adult men. [IOM (2006, 2011, 2019); WHO & FAO (2004); FAO, WHO & UNU (2001)]





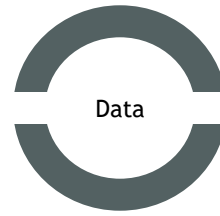
Motivation



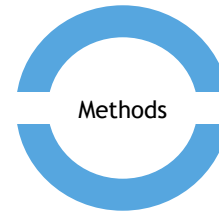
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Our  
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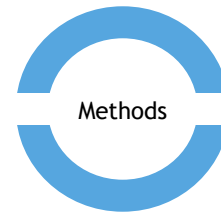
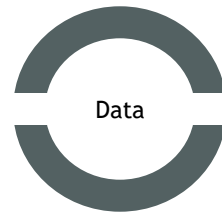


Results

## Linear programming has long been used to determine least cost diets meeting nutritional requirements:

- **Least cost diets have been used to inform dietary guidance and implement nutrition interventions.**

Akhter et al. 2018; Chastre et al. 2007; Daelmans et al. 2013; Deptford et al. 2017; Dizon & Herforth 2018; Masters et al. 2018; Optifood 2012; Stigler 1945



**Key approach:**  
Assuming families share food and each individual eats in proportion to his or her own energy needs. [Beaton 1995, 1999; IOM 2001]

Shared household diet is dense enough in each nutrient to meet everyone's needs.

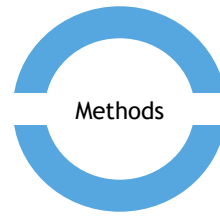
**1** Are current household diets adequate for all family members?

**2** What is the cost of a healthy diet for households?

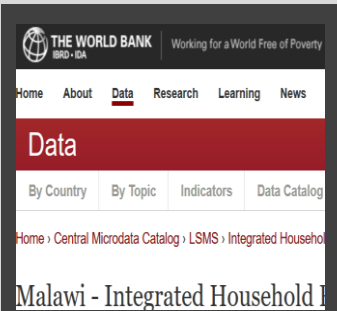


Juma Salim with his family in Tanzania. © 2017 Magali Rochat / VectorWorks, Courtesy of Photoshare





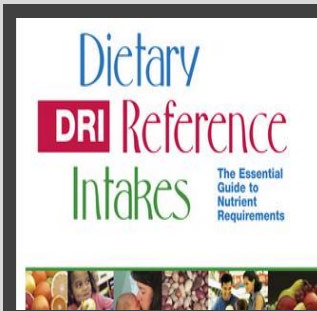
**Consumer Price Index  
Market Food Price Data**  
Malawi NSO



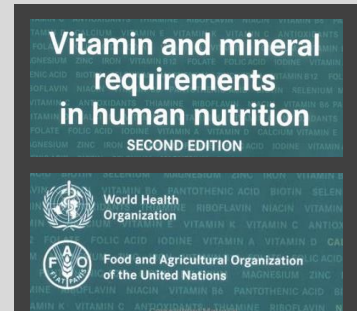
**Integrated Household Panel Survey**  
Malawi NSO & World Bank



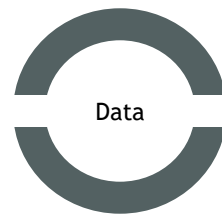
**Malawi Food Composition Table (2019)**  
South African Medical Research Council & Nutrition Innovation Lab (Tufts)



**Dietary Reference Intakes**  
Institute of Medicine, US & Canada



**Nutrient Requirements & Growth Charts**  
WHO & FAO



## Household Nutrient Requirements

Whole family eats a shared diet quality dense enough to meet the needs of the neediest member, per nutrient.

## Household Adequacy Ratios

Common ratios used for individual dietary assessment adapted to the household level.

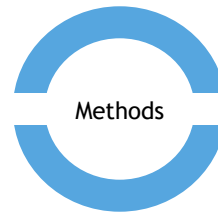
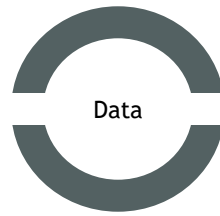
## Household Least Cost Diets

The Cost of Nutrient Adequacy (CoNA) for every month in the household's nearest market.

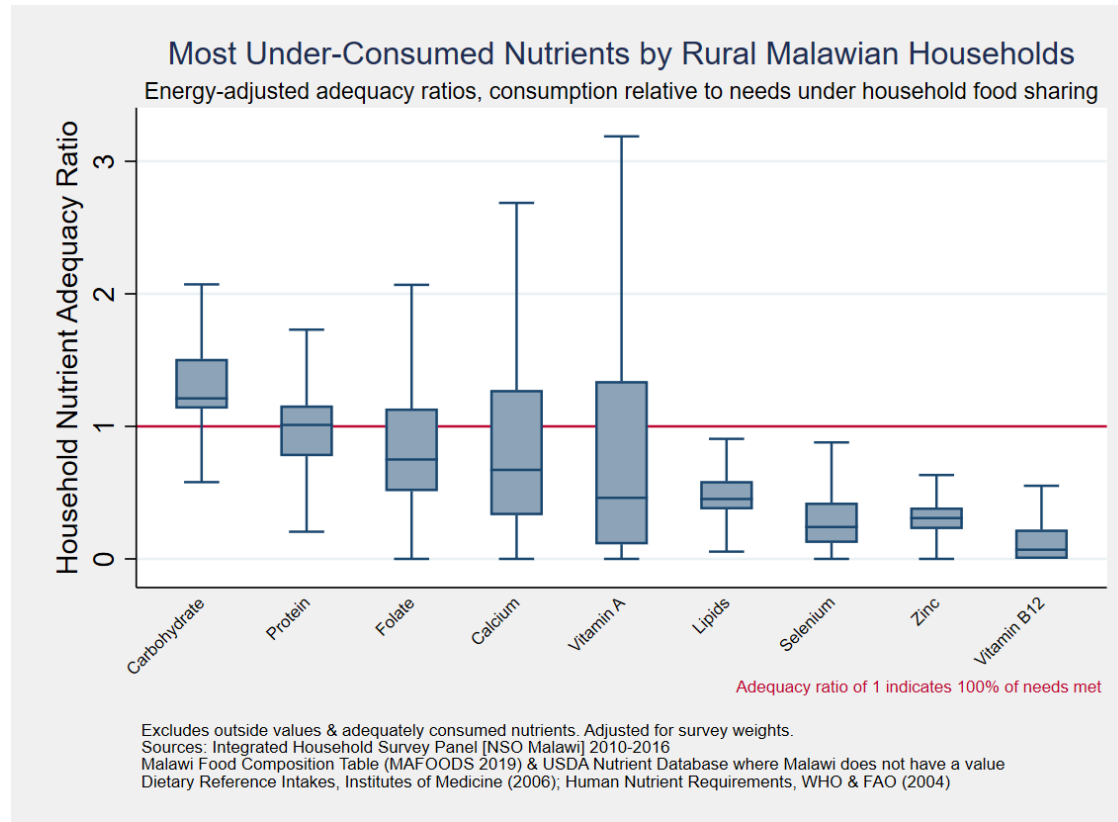
## 22 Nutrients, 5 Nutritional Requirements:

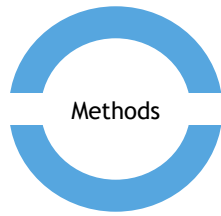
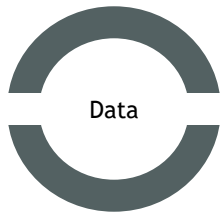
- Energy (EER) for an appropriate level of physical activity for a rural, agricultural population
- Estimated average requirements (EARs) for micronutrients
- Upper limits (UL) not to be exceeded (and chronic disease risk reduction level for sodium)
- Acceptable macronutrient distribution range (AMDR) bound the percentage of calories from carbs, protein, and fats



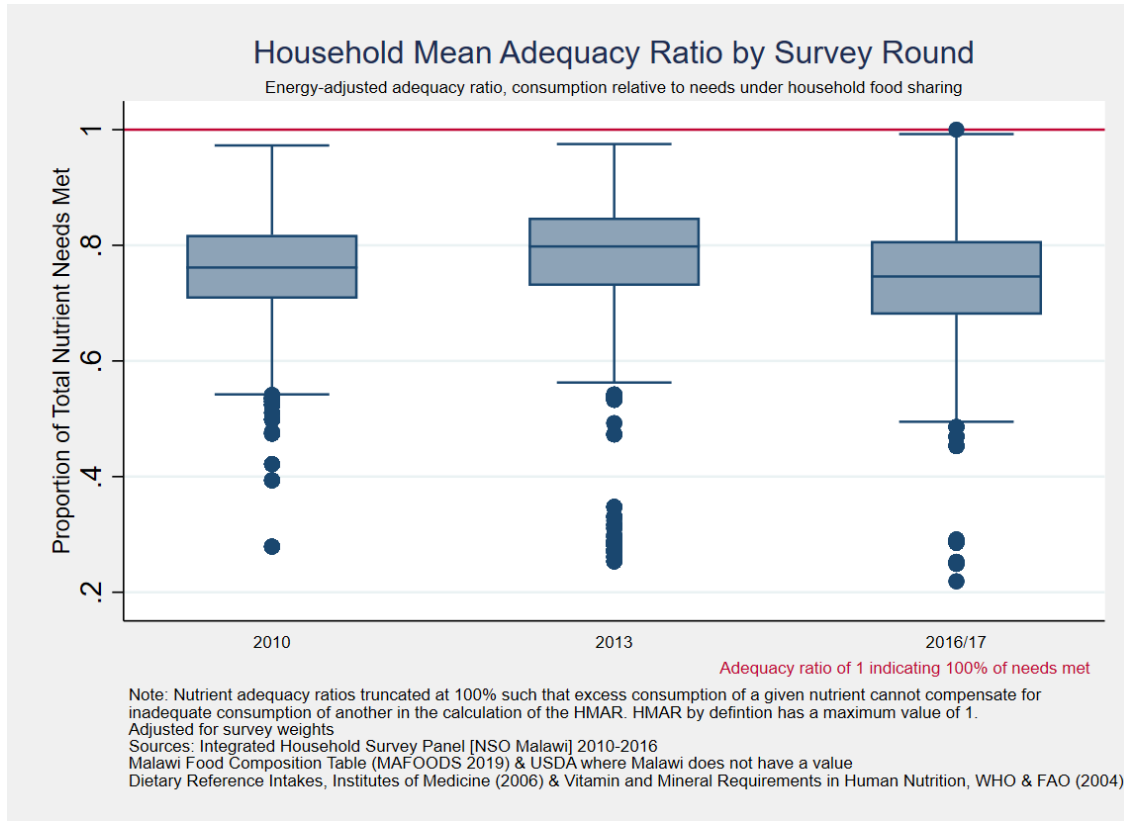


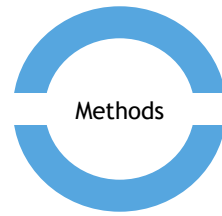
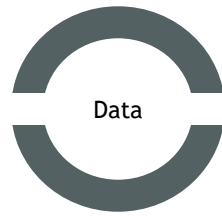
# Are current diets adequate?



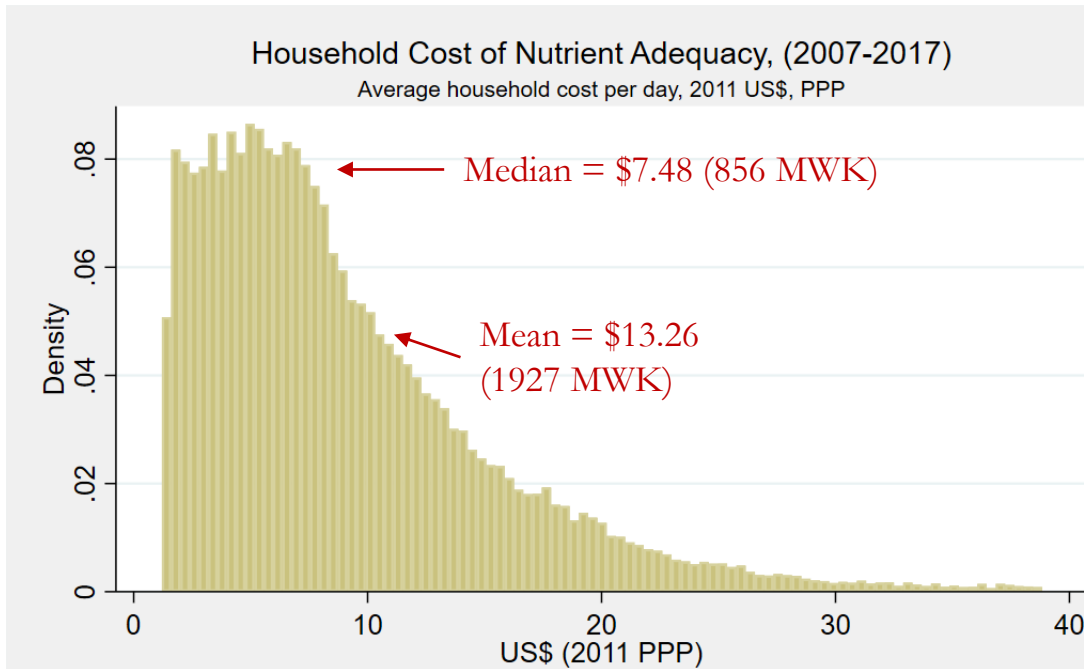


# Are current diets adequate?



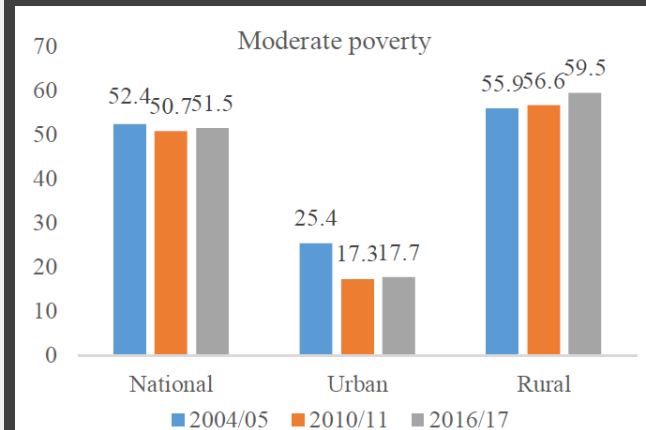


# Household Cost of Nutrient Adequacy (CoNA)



Sources: Integrated Household Survey Panel [NSO Malawi] 2010-2017;  
Malawi Food Composition Table (draft) & USDA where Malawi does not have a value;  
Dietary Reference Intakes, Institutes of Medicine (2006);  
Human Nutrient Requirements, WHO & FAO (2004);  
Consumer Food Price Dataset, National Statistics Office (NSO) [Malawi].  
Note: Winsorized to the 1st and 99th percentiles. Adjusted for survey weights.

Almost 60% of the rural population lived below the national poverty line of 4518 MWK per day in 2016



Over 70% live below \$1.90 per day

Source: World Bank (2018)



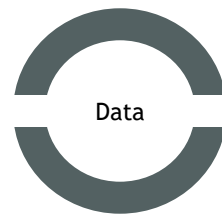
Motivation



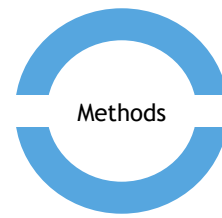
Background



Specific  
Aims



Data



Methods



Results

## Conclusions

- ❑ Defining nutritional requirements at the household level can address the challenge of using HCES for nutrition analysis & incorporates the reality that families share foods
- ❑ Households in Malawi are meeting some of their nutrient needs but not all: fats, zinc, and B12 are especially deficient
- ❑ Least cost diets may be unaffordable for many of the poor

## Next steps

- ❑ Further analysis of the diet cost index including relationships with nutritional adequacy, spatial and temporal variation
- ❑ Analyze nutrient shadow prices

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