



# Infant and Young Child Feeding Measurement: A Comparative Analysis of Data Collection Methods for Dietary Data

May 31, 2023



Photo Credit: FH



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## Agenda

- Background
- Introduction
- Data collection
  - Cambodia
  - Zambia
- Analyses and main results
- Interpretations and conclusions
- Q&A
- Closing remarks



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## Complementary Feeding

- Around the age of 6 months, an infant's need for energy and nutrients starts to exceed what is provided by breast milk, and complementary foods are necessary to meet those needs
- Complementary feeding ensures healthy growth and development of children through the variety of nutritious food introduced in addition to breastmilk
- Complementary foods need to be timely, **adequate**, safe and properly fed

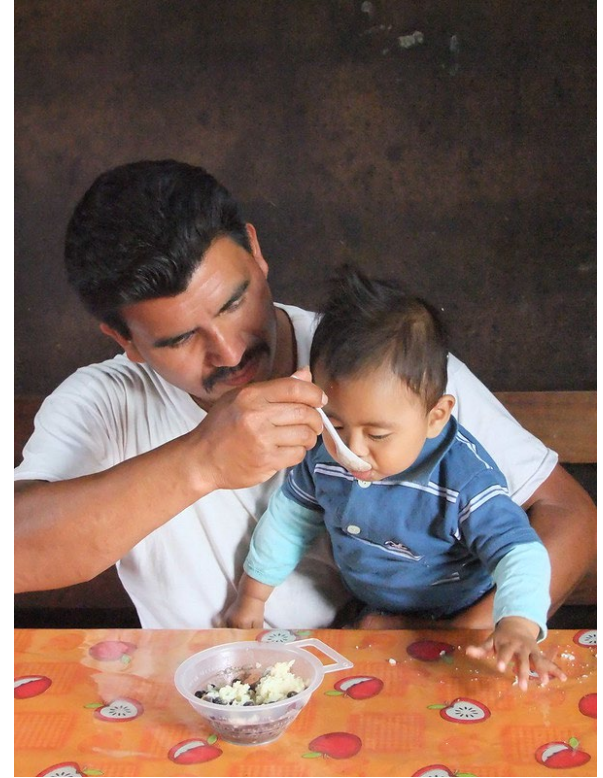


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## Complementary Feeding

- Nine (9) complementary feeding indicators included in *Indicators for assessing infant and young child feeding practices: definitions and measurement methods (WHO & UNICEF, 2021)*
  - Minimum dietary diversity 6–23 months (MDD)
  - Minimum meal frequency 6–23 months (MMF)
  - Minimum acceptable diet 6–23 months (MAD)

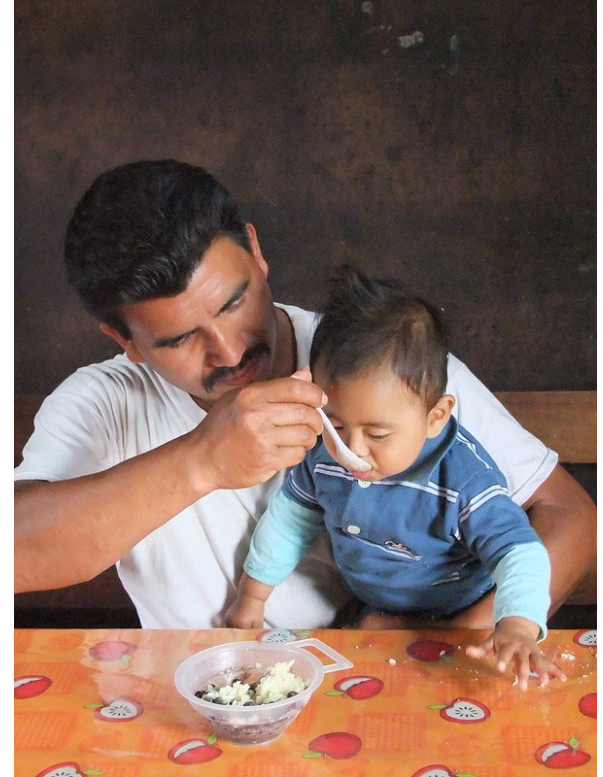


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# Dietary Diversity in Children

Measured by Minimum Dietary Diversity indicator (WHO and UNICEF, 2021):

**Indicator definition:** percentage of children 6–23 months of age who consumed foods and beverages from at least five out of eight defined food groups during the previous day.

**Numerator:** children 6–23 months of age who consumed foods and beverages from at least *five (5) out of eight (8)* defined food groups during the previous day. The eight food groups used for tabulation of this indicator are:

1. breast milk;
2. grains, roots, tubers and plantains;
3. pulses (beans, peas, lentils), nuts and seeds;
4. dairy products (milk, infant formula, yogurt, cheese);
5. flesh foods (meat, fish, poultry, organ meats);
6. eggs;
7. vitamin-A rich fruits and vegetables; and
8. other fruits and vegetables

**Denominator:** children 6–23 months of age.



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## Motivations

- Hanley-Cook, Giles T., Ji Yen A. Tung, Isabela F. Sattamini, Pamela A. Marinda, Kong Thong, Dilnesaw Zerfu, Patrick W. Kolsteren, Maria Antonia G. Tuazon, and Carl K. Lachat. 2020. "Minimum Dietary Diversity for Women of Reproductive Age (MDD-W) Data Collection: Validity of the List-Based and Open Recall Methods as Compared to Weighed Food Record." *Nutrients* 12(7): 2039. doi.org/10.3390/nu12072039.
  - Conducted in Ethiopia, Cambodia, and Zambia; found an over-estimation of MDD-W by 10 points (open recall) and 16 points (list-based recall)
- USAID supports Demographic Health Surveys and Feed the Future Zone of Influence surveys
  - Different methods
  - Interest in looking at accuracy and comparability for MDD estimates

# Study Objectives

## PRIMARY

To compare estimations of MDD from two dietary recall data collection methods (multiple-pass and sentinel food list) to an observation

## SECONDARY

To quantify the tradeoff between the costs associated with collecting data with each recall method and the accuracy of the estimated MDD indicator compared to the observation reference.

# Study Design

## Day 1: Observation

1. Enumerator arrives at the participant's (child) home in the morning, (i.e., before any food is consumed), and leaves when the participant goes to sleep.
2. Enumerator asks whether the participant consumed any food during the previous night (after going to sleep) or before their arrival and records that information.
3. Enumerator observes the participant during the entire day and records all food items the participant receives, regardless of the consumed quantities (i.e., there is no minimal quantity for a consumed food to be considered (WHO and UNICEF 2021)).

For mixed dishes, the enumerator records all main ingredients –usually the top two or three ingredients. Enumerators were trained to probe for main ingredients as per UNICEF and WHO (2021) guidance. The enumerator also records who prepared the food and who fed the participant during each feeding episode.

# Study Design

## Day 2: Dietary recall data collection (random order; different enumerators)

### MULTIPLE PASS

Following the WHO/UNICEF guidance (2021), for the open/hybrid/multiple pass recall, interviewers—

1. Assess the participant's liquid intake following a list (Yes/No, as well as frequency of milk product intake).
2. First pass (open recall): Use a script with probing questions for the respondent to recall the participant's dietary intake and select food groups from reported foods in the survey CAPI (electronic data collection).
3. Second pass (using list): whether the participant consumed any foods from food groups not mentioned in the first pass; captures those food groups from this second pass in the CAPI.
4. Third pass: ask about any other solid, semi-solid or soft foods consumed.

In case none of the food groups were marked as “yes” during this recall, the interviewer asks a follow up question regarding intake of any solid, semi-solid, or soft food during the previous day or night

# Study Design

## Day 2: Dietary recall data collection (random order; different enumerators)

### LIST-BASED DIETARY RECALL USING SENTINEL FOOD LISTS

1. The enumerator will ask the respondent (caregiver) to indicate which foods the participant consumed during the previous day and night by reading out items from a questionnaire. The enumerator will mark all the responses in the CAPI.
2. A question about the number of meals will also be asked in addition to questions about breastfeeding and milk feeds to calculate MMF and MAD.
3. This adapted diet quality questionnaire contains 30 sub food groups. The sub food groups are subsequently collapsed into the eight food groups used to assess the MDD indicator for children (UNICEF and WHO 2021).

## Sample Size and Sampling Approach

- Samples are representative of the USAID Feed the Future Phase I ZOI in Cambodia and Zambia
- Accounting for country-specific estimates of attrition, the sample sizes provide >80% power to conclude that two methods are equivalent +/- 10 points, assuming a reference MDD prevalence of 30 percent, alpha of 0.05, correlation of measures within subjects of 0.2 and a cluster design effect of 2
- Cambodia: 636
- Zambia: 608

### **Two stages of sampling:**

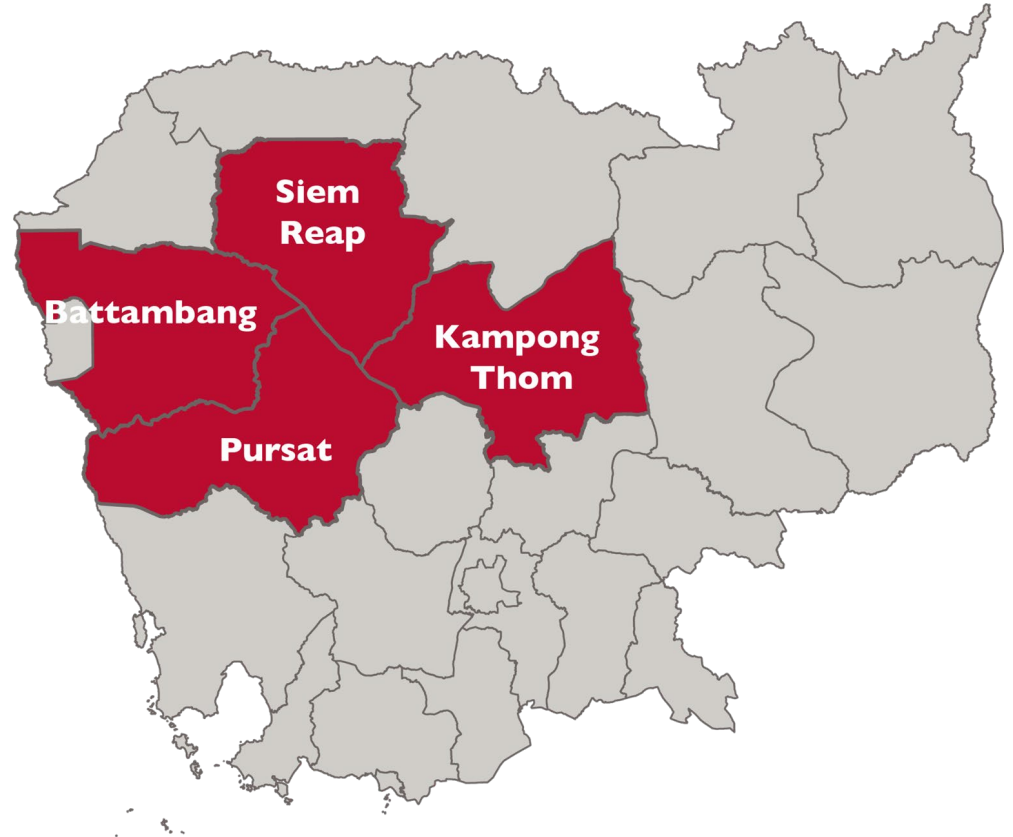
- In the first stage, we selected 30 enumeration areas (clusters) within the Feed the Future Phase I ZOI using probability proportional to size
- In the second stage, we randomly selected 20 or 21 households in each cluster based on a complete listing of all eligible households (at least one infant aged 6 to 23 months)



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## Cambodia

- Total population is 16 millions
- Total land area of 181,035 square kilometer
- Cambodia is divided into 24 provinces and a special administrative unit, Phnom Penh
- Study sites: Kampong Thom, Siem Reap, Battambang and Pursat
- GDP per capita: \$3,200 (2021)



Reference: [https://www.cia.gov/the-world-factbook/countries/zambia/#:~:text=%243%2C200%20\(2021%20est.\)](https://www.cia.gov/the-world-factbook/countries/zambia/#:~:text=%243%2C200%20(2021%20est.))



# Cambodia

## Complementary feeding practices

<b>IYCF indicators (%)</b>	<b>National <sup>1</sup></b>	<b>Feed the Future Zone of Influence baseline (2017) <sup>2</sup></b>
Minimum dietary diversity	48.6	
Minimum meal frequency	81.7	
Minimum acceptable diet	42.0	35.5

Source: 1. DHS Survey, 2021

2. FEED THE FUTURE CAMBODIA Zone of Influence Baseline Report, 2017, <https://www.feedthefuture.gov/resource/cambodia-feed-the-future-baseline-report/> (Data sources: (a) Cambodia Socio-Economic Survey (CSES, 2009); (b) Cambodia Demographic and Health Survey (CDHS, 2010); and (c) Cambodia HARVEST Project Impact Evaluation Baseline Survey (IE Baseline, 2012)

# Cambodia

## Questionnaire development and CAPI preparation

### Adaptation: questionnaires

- Questionnaires shared by USAID Advancing Nutrition were used as a basis to be adapted based on the local foods
- Data collection forms of the three methods developed and revised through series of discussions and meetings
- The three tools were designed in Kobo Collect format based on finalized paper versions of the final questionnaires

### Translation

- Questionnaires were translated into Khmer by national expert of SBK
- Back translation was made to make sure the translation is accurate

### Pilot test

- Pilot was conducted in a commune in Kandal province from 12 – 13 May, 2022, which was outside of actual study site
- A total of 50 HHs with children aged 6 to 23 months old were randomly selected for this pilot data collection

# Cambodia

## Organization of the field data collection

### Recruitment of enumerators and supervisors

- Experienced enumerators and supervisors were recruited (GIZ, Plan Int, Save the Children...)
- Roles and responsibilities of all data collections were clearly described in the implementation manual and elaborated during the training

### Training of enumerators and supervisors

- Orientation workshop
- Main training of the data collectors
- Pilot testing
- Refresher training

# Cambodia

## Organization of the field data collection

### Field work

- Data collection started on 08 June 2022 and ended on 15 July 2022.
- 30 sample villages in the four target provinces
- A total of 641 home visits were approached (638 HH observations, 636 multiple-pass recalls and 636 list-based recalls)
- Four teams were responsible for this study (one team: one supervisor and between 7 to 8 enumerators)
- Five HHs were replaced after three rounds of attempts to meet the sampled respondent

### Recruitment of participants

- The supervisor contacted the village chief to get a list of HHs with children 6-23 months old
- Then randomly sampled 21/22 children aged 6-23 months old (plus reserved list) one day before starting the data collection at that particular village

# Cambodia

## Challenges and responses during data collection

- Data collection was taking place during rainy season, some roads and paths were broken and slippery so it was difficult for the car to enter the area .
- In some villages, some of the sampled households were a bit far away from each other especially in the mountainous area.
- Some village chiefs were at first reluctant to cooperate (just after commune election)
- All visited villages have not updated the list of children between 6 – 23 months old
- Five HHs were replaced from the randomly selected HH list; Three HHs decided not to join (did not give a consent)
- Six additional neighboring villages were randomly selected and added
- Majority of the respondents felt uneasy while being observed and followed by the enumerators everywhere.
- Supervisors needed to spend long hours in the evening to review the filled-in questionnaires

# Cambodia

## Challenges and responses in food classification

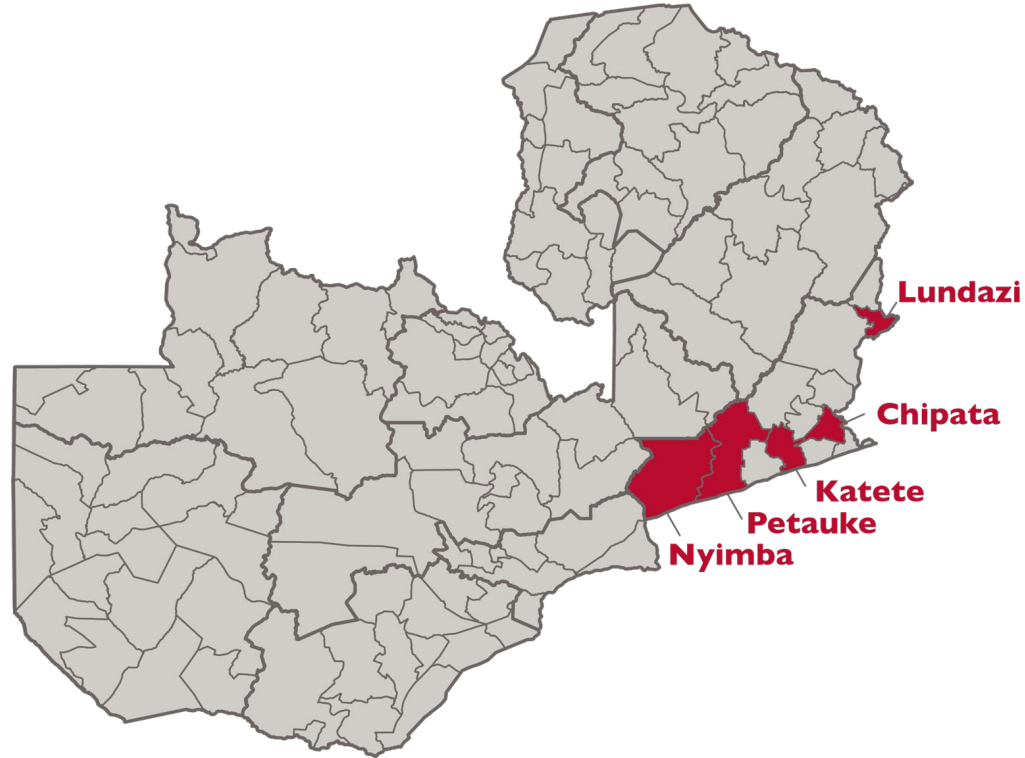
- Some enumerators had difficulty in asking on all the ingredients for mixed dishes and foods purchased from outside
- CAPI design for the HH observation form should capture all the 8-food groups. This will reduce the time to do the food classification later by data manager.
- Classification of food prepared in the market with different ingredients was difficult, in such case the mother/caretaker did not know the name and the amount of different ingredients mixed in such food (for example piece of pizza, different types of soup, porridge...).



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# Zambia

- Among the “youngest” countries globally by median age (World Bank, 2022)
  - Total population of Zambia is 19.6 million (ZAMSTA, 2022)
  - 60% of the population lives in rural areas
- 10 provinces
  - The Eastern province is the third most populous province
  - Eastern province’s Economy largely depends on rainfed agriculture
- Total land mass, –743390 square km





# Zambia

## Nutritional status and complementary feeding practices

<b>IYCF indicators (%)</b>	<b>National <sup>1</sup></b>	<b>Feed the Future Zone of Influence <sup>2</sup></b>
Minimum dietary diversity	23.2	37.5
Minimum meal frequency	41.4	60.4
Minimum acceptable diet	12.3	34.9

Source: 1. DHS Survey, 2018

2. Feed the Future. 2019. Feed the Future Zambia Zone of Influence Survey [2018 Endline Assessment](#). Indaba Agricultural Policy Research Institute (IAPRI). Lusaka, Zambia.

# Zambia

## Questionnaire development and CAPI preparation

### WHO/UNICEF Multiple-pass dietary recall

- The questionnaire was updated with the local food examples
- The English version of the questionnaire was translated into Nyanja and Tumbuka
- The local languages were back-translated into English to ensure the accuracy

### List based recall

- The study used the IYCF sentinel list questionnaire, the Diet Quality Questionnaire (May 2022-v) for Zambia
- The questionnaire was not adapted at all inline with developers (Global diet quality project)
- The questions were read exactly as written.
- The English version of the questionnaire was translated into Nyanja and Tumbuka
- The local languages were back-translated into English to ensure the accuracy

# Zambia

## Organization of the field data collection

### Recruitment and Training of enumerators and supervisors

- Both enumerators and supervisors were initially recruited as data collectors
- Supervisors were selected at the end of the main training and refresher training
- Pre- and post-tests for trainees
- Individuals with prior knowledge and experience in dietary assessment were prioritized
  - Over half of the data collectors previously participated in MDD-W study (Zambia component)

### Field work

- The study was conducted between 2nd March and 8th April, 2023
- Participants were recruited following the Sampling protocol developed under guidance from USAID Advancing Nutrition
  - The sampling frames were obtained from the Zambia Statistics Agency

# Zambia

## Lessons-learned and experiences (I)

### Team composition and leadership

- Team supervisors should be identified during the course of the training
- Supervisors should have strong technical knowledge of dietary assessment, general field experience coupled with leadership skills and community development experience

### Structure of the training

- The training program should have more role plays accompanied by question and answer sessions than lengthy theoretical sessions
- Internalizing training materials is enhanced when participants actively assess dietary intake during training

### Field data collection

- Actual field data collection should be undertaken immediately, preferably not more than a week, after completing training

# Zambia

## Lessons-learned and experiences (2)

### Data collection supervision and feedback

- Active data collection supervision reinforces cordial relationship between the survey team and the community.
- Successful dietary data collection exercise in communities is largely influenced by how the community perceives the survey team

### Use of community volunteers

- Community volunteers and frontline community workers should have a clear understanding of the dos and don'ts related to the survey implementation.
- For example, it is not the responsibility of the community members to decide which households to participate in the survey, the study team's should clearly explain the need to adhere to the study protocol at all times

# Zambia

## Challenges and responses

### Transportation

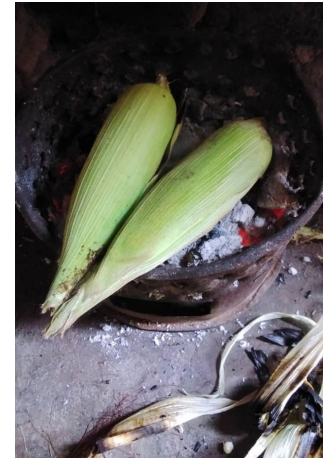
- Moving data collection team from household to household in rugged terrain, from households to central lodging places usually quite late in the night

### Classification of other vegetables

- Green maize (boiled or roasted) as vegetable
- Ifisashi (any dish with groundnut flour/paste/butter) as an example of a vegetable

### Solution

- Refresher training
- Continuous feedback by supervisors
- Group feedback via WhatsApp platform





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# Methods

## Statistical Analysis

- Equivalence testing
  - Estimated the prevalence of consumption of each food group, MDD, MMF, and MAD for all three methods
  - Estimates from the two recall methods were compared to observation estimates using linear probability models following two-one sided test (TOST) equivalence approach
    - Controlled for sequence of method collection
  - 10% equivalence margin
    - If the estimated differences were within +/- 10 percentage points from the observation at  $p < 0.05$  the methods are considered equivalent
- Sensitivity
- Specificity



# Methods

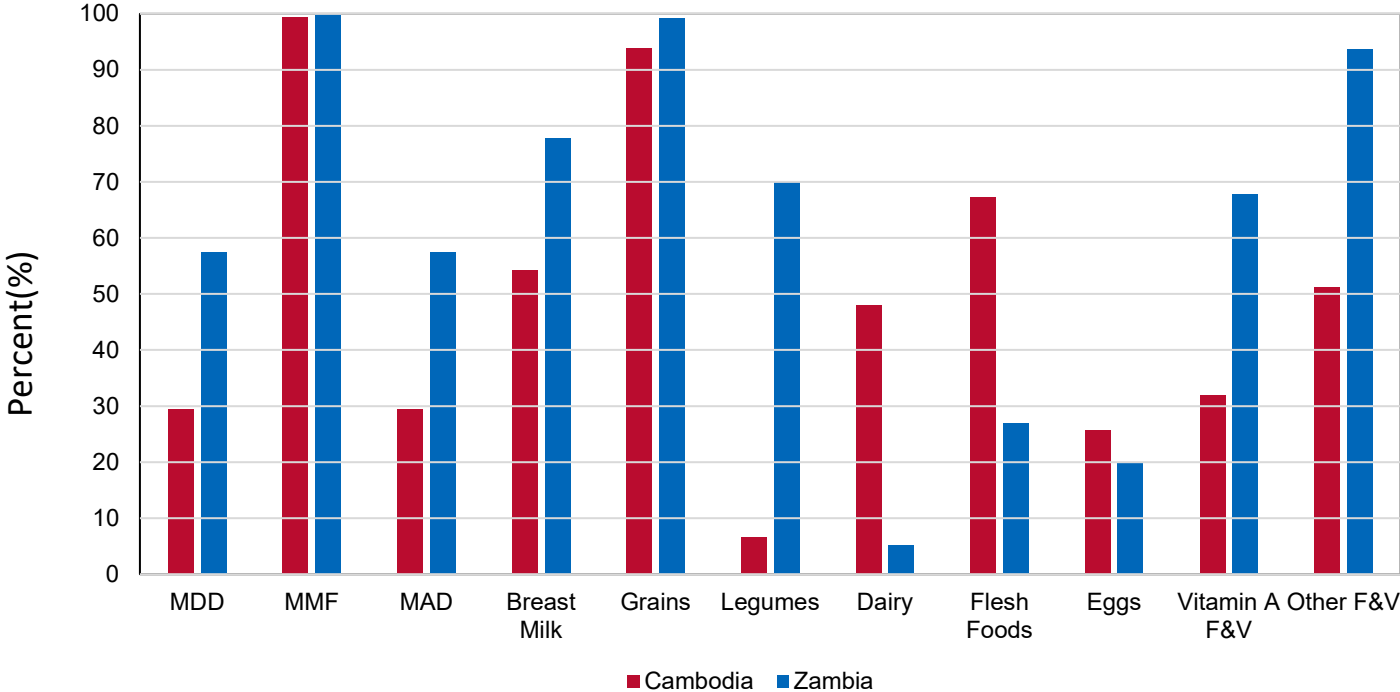
## Cost-Accuracy Assessment

- Estimated total economic cost to prepare for, collect, clean, and analyze the dietary data to estimate MDD using each of the recall methods, including
  - Personnel costs
  - Expenditures (equipment and supplies, venues, transportation, etc.)
  - Opportunity cost of respondents' time
- Cost-accuracy of each recall method
  - Calculated the percentage points of deviation of each method's MDD prevalence estimate from the observation MDD prevalence estimate (e.g., MDD prevalence from list method minus MDD prevalence from observation)
  - Subtracted deviation from 100
  - Divided total economic cost by this value
  - Final number = cost per unit of agreement with the observation

# Results: Participants Characteristics

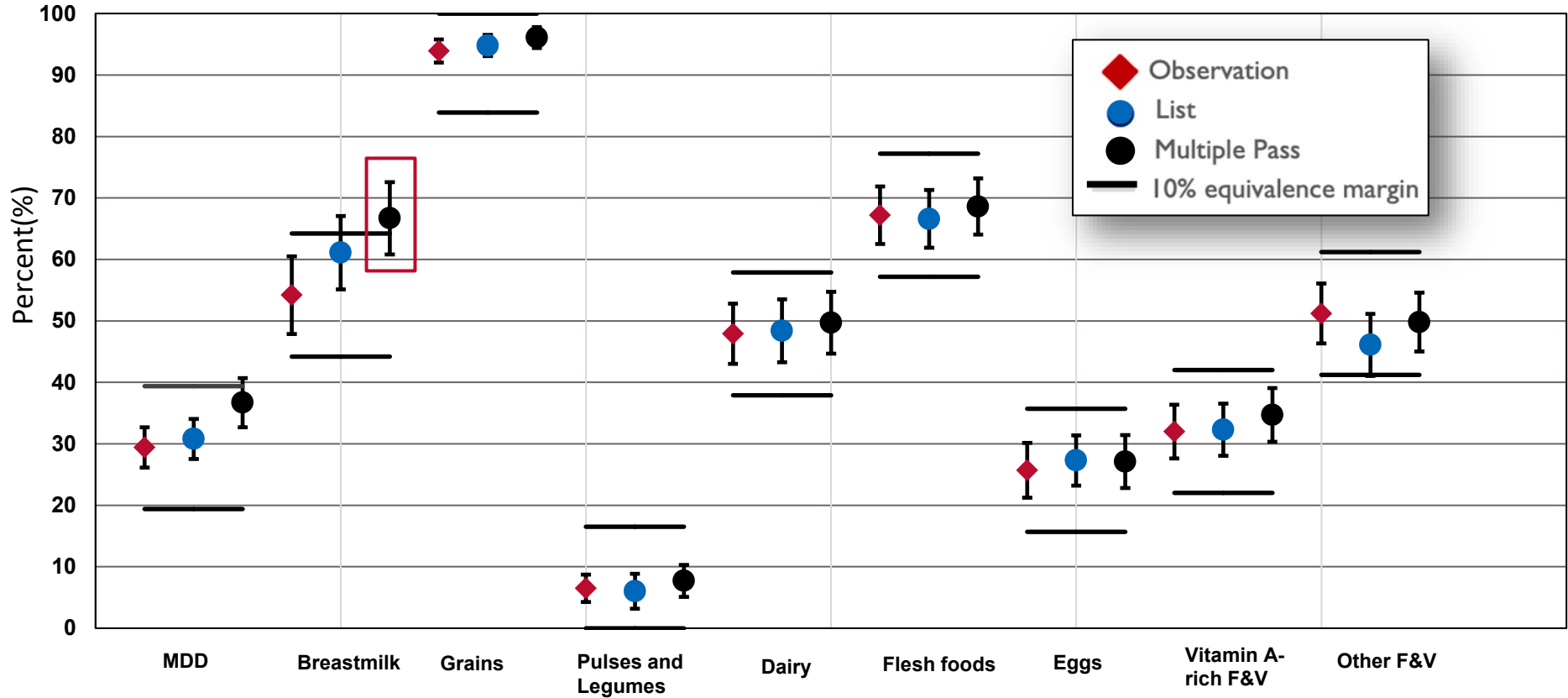
	Cambodia (N=636)	Zambia (N=608)
<b>Child age, mo</b>	14.6± 5.2	14.4± 5.0
<b>Child sex (% male)</b>	52.0 (331)	49.8 (303)
<b>Respondent relationship to the child- Mother (%)</b>	81.1 (516)	93.1 (566)
<b>Respondent educational attainment</b>		
Completed primary (%)	44.2 (281)	62.1 (338)
Completed secondary (%)	43.4 (276)	36.0 (196)
<b>Respondent marital status (% married)</b>	98.0 (623)	75.3 (458)
<b>Respondent occupation</b>		
Housewife (%)	38.5 (245)	30.1 (183)
Farming (%)	15.9 (101)	46.7 (284)
<b>Household characteristics</b>		
Improved sanitation (%)	81.9 (521)	35.8 (218)
Improved water (%)	100 (636)	87.8 (534)
Clean cookstove use (%)	36.0 (229)	2.2 (13)
Improved roof materials (%)	98.3 (625)	76.2 (463)
Improved flooring (%)	44.3 (282)	53.2 (323)
Improved wall materials (%)	51.6 (328)	75.8 (460)

# In-Home Observation Cambodia and Zambia



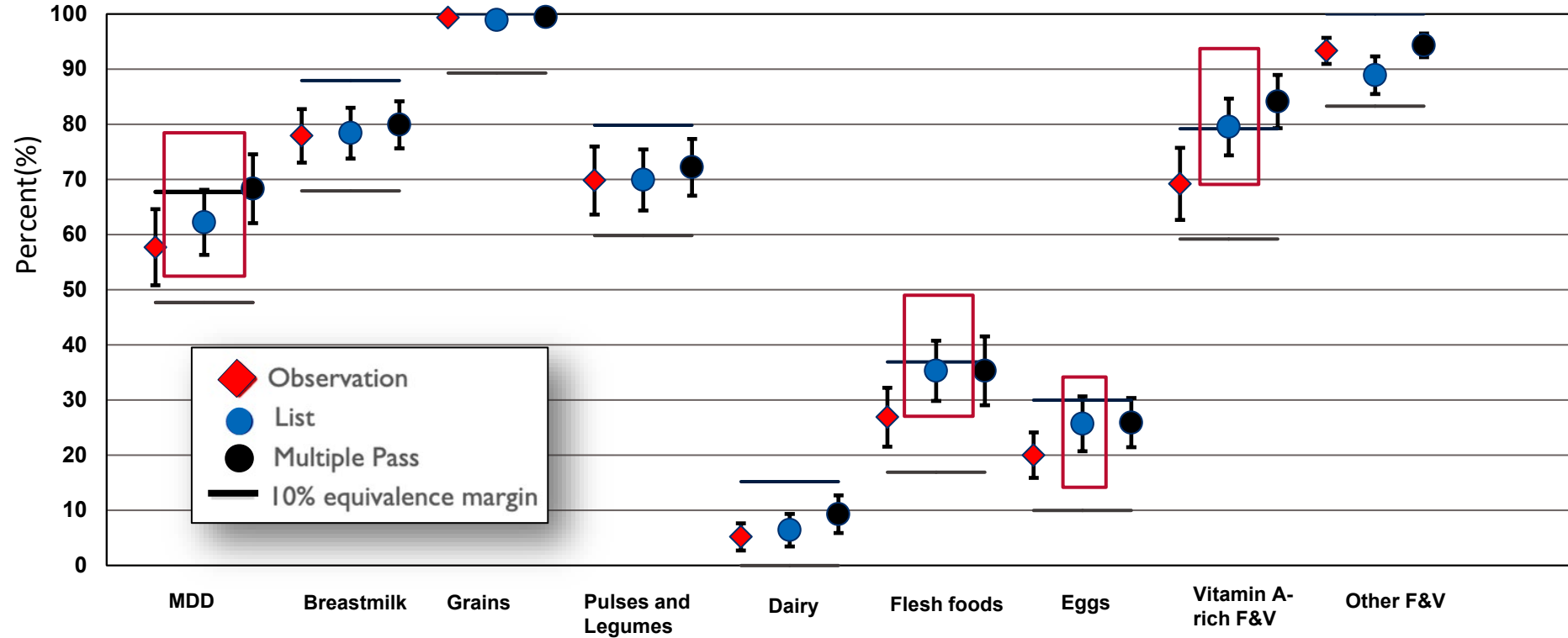
# Cambodia

## Equivalence of Methods Compared to In-Home Observation

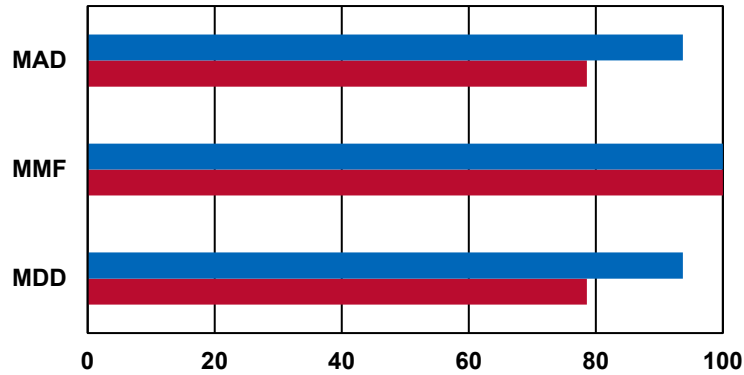


# Zambia

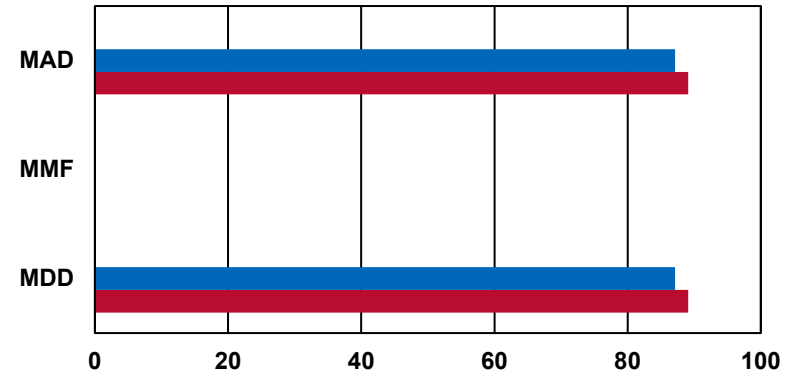
## Equivalence of methods compared to in-home observation



### Sensitivity Cambodia

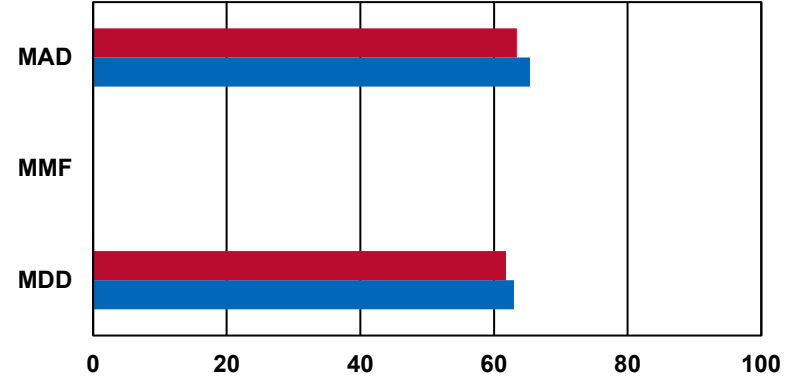
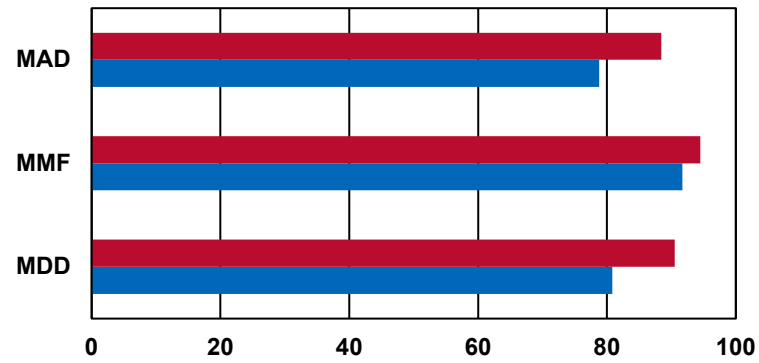


### Specificity Cambodia



■ Multiple Pass  
■ List

### Sensitivity Zambia



# Results Summary

## Cost-Accuracy

- The multiple pass method was more expensive
  - \$7 more in Cambodia and \$5 more in Zambia per participant
  - Higher costs from personnel time to prepare for data collection and administration
- Administration of the multiple pass method took longer
  - ~8 minutes longer in Cambodia and ~11 minutes longer in Zambia
- The list method had better cost-accuracy
  - \$79 lower per unit agreement in Cambodia
  - \$69 lower per unit agreement in Zambia

# Results Summary

## Cambodia

- Both methods were equivalent to the in-home observation in estimating:
  - MDD
  - All food group consumption **except breast milk**
  - MMF
  - MAD
- The list-based method, but not the multiple pass method was equivalent to the observation method in estimating breast milk consumption
- Both methods were highly sensitive and specific for most indicators



# Results Summary

## Zambia

- Both methods were equivalent to the in-home observation in estimating:
  - Breast milk
  - Grains, white/pale starchy roots, tubers, and plantains
  - Beans, peas, lentils, nuts, and seeds
  - Dairy products
  - Other fruits and vegetables
- Neither method was equivalent to the in-home observation method in estimating:
  - MDD
  - Flesh Foods
  - Vitamin-A rich fruits and vegetables
- The multiple pass, but not the list method was equivalent to the observation in estimating:
  - Eggs
- In cases of non-equivalence both methods were overestimates
- Both methods had generally high sensitivity (>80%) and generally low specificity (<65%)



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## Discussion

List based recall: estimates of the MDD prevalence were closer to the in-home observation and slightly less costly to administer

- **Cambodia:**

- List-based recall: equivalent to the in-home observation (30.8% vs. 29.4%)
- Multiple-pass recall: marginally higher MDD prevalence (36.7%) compared to in-home observation (29.4%)
  - Magnitude may be of importance to programs, even though it fell within our equivalence margin.
  - Primarily due to more frequent reports of breast milk consumption than was observed

- **Zambia:**

- List-based recall: significantly higher MDD (62.2%) than the in-home observation (58.2%).
- Multiple-pass recall: significantly higher MDD prevalence (66.5%) compared to in-home observation (58.2%)
  - Primarily due to more frequent reports of flesh foods, vitamin A rich fruits and vegetables, and eggs
  - Possible reporting bias: food groups promoted as a part of complementary feeding SBCC campaigns

## Discussion

- The observed prevalence of MMF was nearly 100% in both sites
  - Cambodia: both recall methods were equivalent
  - Zambia: the list-based recall yielded lower prevalence (91.7%) compared to the in-home observation (99.9%)
- Results for the accuracy of the MAD indicator were nearly identical to that of the MDD

# Strengths and limitations

## Strengths:

- Reasonably large sample size in both countries
- Two country study with representative sampling within defined regions (ZOIs that comprise several provinces in Cambodia and Zambia): results may be generalizable to other similar settings
- Time and cost tracking enabled us to determine which is the most cost-accurate method

## Limitations:

- 10 percentage point equivalence margin may be considered too large
- Due to in-home observation, participants may have been primed to better recall foods on the subsequent day than they would under normal field conditions. May have been less random error (i.e. forgetfulness)
- Difficult to disentangle time and costs incurred under “normal” survey conditions vs within a research study. Some time tracking was done retrospectively rather than in real time

## Conclusions and global implications

- For large-scale, multi-topic surveys, the list-based recall method produces slightly more accurate estimates of MDD at the population level, takes less time to administer, and is less costly to implement
- As with any dietary recall assessment method, reporting bias is a substantial concern
  - Social desirability and social approval bias: may lead people to overreport ‘healthy’ foods and under-report ‘unhealthy’ foods. (Gibson et al, Adv. Nutr. 2017)
  - Use caution in interpreting data from these indicators in the context of interventions promoting particular food groups
- Reminder: single-day recalls are not recommended for estimating individual-level dietary patterns due to random within-person error due to day-to-day variability in dietary intake
  - Random errors will reduce both sensitivity and specificity of the assessment instrument

## Acknowledgments

Thanks to all data collection team members and participants' families. Data collection partners have or will share results with participating communities and local authorities.

We consulted many stakeholders while designing this study. We would like to acknowledge Giles Hanley-Cook (Ghent University), Dr. Anna Herforth (Harvard University), Dr. Sorrel Namaste (The Demographic and Health Surveys Program), and Dr. Anne Swindale (USAID). We also wish to thank Dr. Reina Engle-Stone and Dr. Stephen Vosti (University of California, Davis), Julia Krasevec, Chika Hayashi, Vrinda Mehra, and Bo Pedersen (Multiple Indicator Cluster Surveys/United Nations Children's Fund), as well as Dr. Pamela Marinda (University of Zambia) and Dr. Ok Amry (freelance consultant) for their valuable feedback. Thanks also to our USAID Advancing Nutrition colleagues Silvia Alayon, Dr. Gina Kennedy, Dr. Chris Vogliano, and Monica Woldt.



Photo Credit: CNFA

## *Questions & Reactions*





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## Closing Remarks

- USAID's motivation for this research
- Value of understanding the accuracy and feasibility of using different methods to assess IYCF
- Implications that the list-based recall method may be the more cost-accurate method
- Importance of understanding the context of data collection
- Utility of harmonized methods
- Influential contribution to inform decisions about designing, monitoring, and evaluating policies and programs to improve children's diets and nutrition



## **USAID ADVANCING NUTRITION**

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This presentation is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of JSI Research & Training Institute, Inc. (JSI), and do not necessarily reflect the views of USAID or the United States government.

## Key References

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