Measuring dietary diversity in resource-poor countries: A decade of experience & remaining challenges

Mary Arimond
Program in Community and International Nutrition
University of California, Davis

Megan Deitchler, Marie Ruel, Yves-Martin Prevel

ICDAM8, May 16, 2012
Why measure dietary diversity?

• Dietary diversity (DD) is one important dimension of dietary quality (also balance, moderation, etc.)

• All food-based national dietary guidelines include this dimension, usually via recommended food groups for daily consumption

• This is based in part on idea that DD relates to micronutrient intakes/adequacy, which was well-established in developed countries (e.g. Kant, 1996 review)
Why measure dietary diversity(2)?

• Until very recently, lack of indicators has constrained programmatic action to improve dietary quality for vulnerable groups

• For **infants**, previous to 2008, no global indicators for quality of complementary diet during critical window 6-24 mo

• For **women**, repeated calls to action on women’s nutrition but few programs beyond antenatal supplements, no indicators or yardsticks for progress in improving diet quality
Why measure dietary diversity(3)?

• For global tracking we need **simplest possible indicators** that meaningfully reflect diet quality

• Quantitative dietary data collection (e.g. 24-hr recalls) on nationally representative samples not affordable/feasible, esp. repeated across time

• **Dietary diversity is feasible** in large-scale survey programs such as the DHS
Operationalizing dietary diversity

• DD has been defined & operationalized many ways
  – Number of individual foods
  – **Number of food groups** (with different levels of aggregation)
  – Varying recall periods (**yesterday** & last week are most common)
  – Indicators can be dichotomous (”% with low diversity”) or continuous scores
Measuring dietary diversity - outline

• Recent progress - impact of DD research
  – *Uptake of dietary diversity indicators, to measure diet quality*

• Dietary diversity, nutrient density & adequacy
  – *Do simple DD indicators predict nutrient density, adequacy?*

• Remaining challenges
  – *Measurement issues*
  – *Responsiveness*
  – *Food groups & cut-offs*
  – *Consensus on uses*
Global DD indicators:
Two large collaborative projects

- Previously, a small handful of studies in resource-poor settings* but no consistency in definitions, indicators

- Two large projects
  - Working Group on Infant and Young Child Feeding Indicators
  - Women’s Dietary Diversity Project (WDDP)

- Both involved teams of researchers from many countries/institutions, and multiple data sets

- Assessed and compared multiple DD indicators using same definitions, analysis protocols across sites

WHO IYCF indicators for global use

Indicators for assessing infant and young child feeding practices

PART 1
DEFINITIONS

US Government “Feed the Future” Initiative

Feed the Future Indicator Handbook: Definition Sheets

Both include infant dietary diversity indicator; FTF also includes women’s DD
Guidance on measuring individual DD harmonized with one of the best performing WDDP indicators
IYCF DD indicator for 6-23 mo
Percent with 4 or more food groups – WHO, 2008

Ethiopia
Niger
Burkina Faso
Mali

DRC
Mozambique
Kenya
Ghana

Bangladesh
India
Cambodia
Indonesia

Haiti
Colombia
Bolivia
Peru
Dietary diversity and nutrient density
(Working Group on IYC Feeding Indicators 2006)
Breastfed infants 6-8 mo, MMDA by # food groups yesterday

“MMDA” is a measure of the adequacy of nutrient density, relative to needs, and averaged across 9 “problem nutrients”
Dietary diversity & micronutrient adequacy
(Arimond et al., Women’s Dietary Diversity Project, J Nutr. 2010)

“MPA” is probability of adequacy averages across 11 micronutrients
Classifying individuals vs. assessing population prevalence

- **Infants**: we assessed cut-offs to predict MMDA above 75%. For selected cut-off of 4 groups out of 7, **misclassification ranged from 5-45%** (across 10 sites and 3 age sub-groups)

- **Women**: We assessed cut-offs to predict MPA above 70%. No cut-off was selected; for 5 or more groups out of 9, **misclassification ranged from 14-42%**

- **At population level**, best choice indicator predicted prevalence reasonably well (within +/- 6%)
Summary of relative validity

- Across all studies and all DD indicators, there are moderate to strong associations with nutrient density and/or nutrient intakes: **DD indicators are robust**

- Indicator performance (sensitivity, specificity, and best cut-offs) vary by context and all indicators result in some misclassification: **DD indicators are imperfect**

- This has implications for uses
Challenges – measurement issues

• One WDDP study compared DD indicators derived from simple qualitative recall to more quantitative approach (24-hr recall)

• Showed substantial differences between the two

• Problems increased with more disaggregated indicators (e.g., 13- and 21-group indicators)

• Questionnaires must be carefully designed and tested to exclude foods consumed in trivial amounts

• Additional methodological work is warranted

Challenges – responsiveness

• DD indicators have been proposed for use in assessment and monitoring progress at national and sub-national levels

• Yet little is known about responsiveness of the indicators to interventions, shocks

• Study of 2008 food price shock in Burkina Faso showed impact on DD (next slide)

• Inclusion of indicators at baseline and post-intervention in Feed the Future projects will yield more insights (18 countries, large geographic areas)
Response to spike in food prices*
Ouagadougou

Food groups that showed the largest percent decrease were nutrient-dense: Dairy, meat, poultry, fruits, vitamin A-rich vegetables, nuts & seeds

*(Martin-Prevel et al, presented FENS Madrid 2011)
Challenges – consensus on food groupings & on cut-offs

• **Dichotomous indicators** are likely necessary for advocacy and communication with policy-makers

• Decisions on specific indicator definitions are informed by study results, but also by considerations of **feasibility and communication**

• For IYCF indicators, WHO facilitated a **multi-stakeholder process** → consensus on indicator definitions and cut-offs (including DD indicator)
Challenges – consensus on uses

• Simple DD indicators (across all studies) show only moderate sensitivity and specificity for classifying intakes; *never recommended for individual-level use* (e.g. never recommended for screening)

• Recommended for use at *population level*, but due to measurement error only when *sample sizes are reasonably large*

• For repeat uses in same population, and for comparisons between populations, *attend to seasonality*
Conclusions

• **DD indicators are imperfect** but imperfect indicators can be very useful (e.g.: exclusive breastfeeding indicator)

• **DD indicators are robust** – many different versions of indicators consistently associated with MN adequacy

• Going forward – need to **balance indicator improvement** (e.g. improvements in measurement) against the value of having comparable measurement over time in data series