



# FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

This presentation is part of the

## **Agriculture and Nutrition Global Learning and Evidence Exchange (N-GLEE)**

held in Kampala, Uganda from December 10-12, 2012.

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# Dietary Diversity and Nutritional Outcomes

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N-GLEE  
11 December 2012



# Caveats...

- Focus on evidence from Africa
- Simplified results
- Nutshell:
  - Diverse diet increases likelihood of meeting nutrient requirements
    - Variety of nutrient sources
    - Interactions between foods can improve benefit
  - Diverse diet positively associated with nutritional status

# How measure diversity?

- Dietary Diversity Score:

  - # of food groups consumed over 24 hours

    - Many possibilities for grouping foods
    - Some indices use minimum portion to count a food
    - Some based on different time periods

- Feed the Future:

    - 7 food group index for infants and young children (6 if not BF);
    - 9 food group index for women (or the same groups as for children)

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# Dietary Diversity and Nutrient Adequacy

# How measure adequacy?

- Nutrient Adequacy Ratio:

(Nutrient intake ÷ Recommended intake) x 100

- Density Adequacy of diet

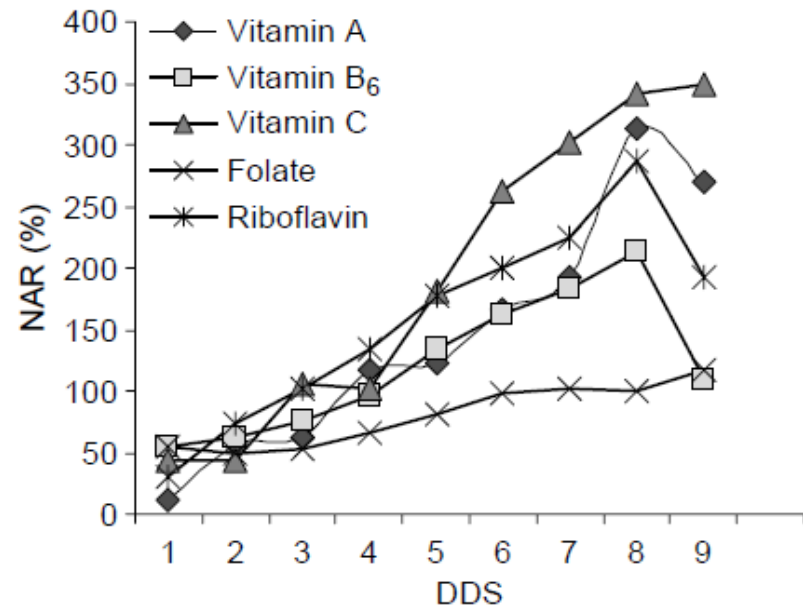
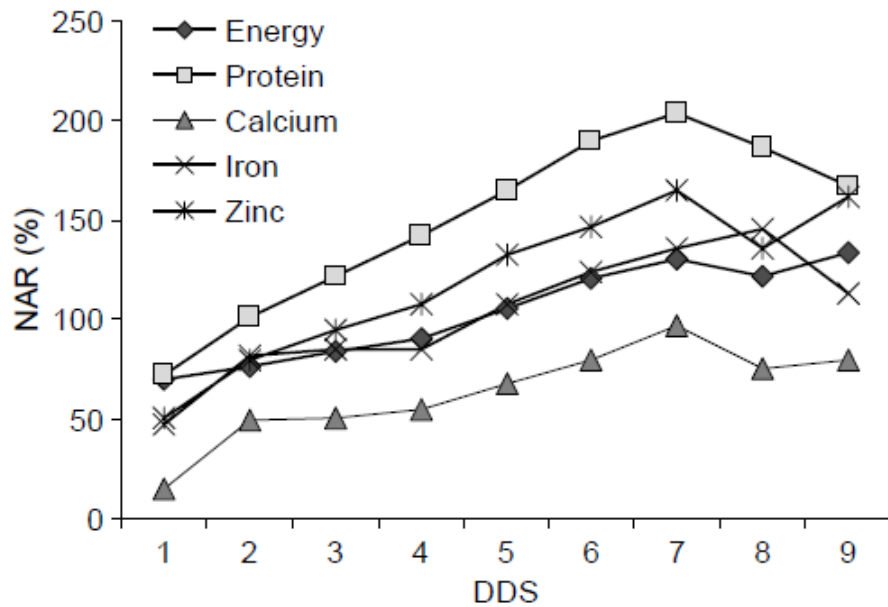
- Nutrient per 100 kcal or 418 kJ of food

- Measures dietary quality

- Mean micronutrient density adequacy: mean density adequacy for several nutrients, capped at 100

- Probability of Adequacy

# Nutrient Adequacy Ratio: South African Children 1-8 years



Mean nutrient adequacy ratio (NAR, expressed as %) of energy and nutrients at different levels of the dietary diversity score (9 groups)

Source: Steyn *et al*, 2006

# Mean MN Density Adequacy: Children 6-23 months in Madagascar

## Correlations of Dietary Diversity Score (8 groups) with Mean Micronutrient Density Adequacy (9 nutrients)

	n	DDS(8)	DDS(8) 10g
Breastfeeding	6-8 m	0.48	0.47
	9-11 m	0.50	0.52
	12-23 m	0.48	0.50
	6-23 m	0.53	0.55
Non-breastfeeding	6-23 m	0.36	0.45
All 6-23 months		0.52	0.55

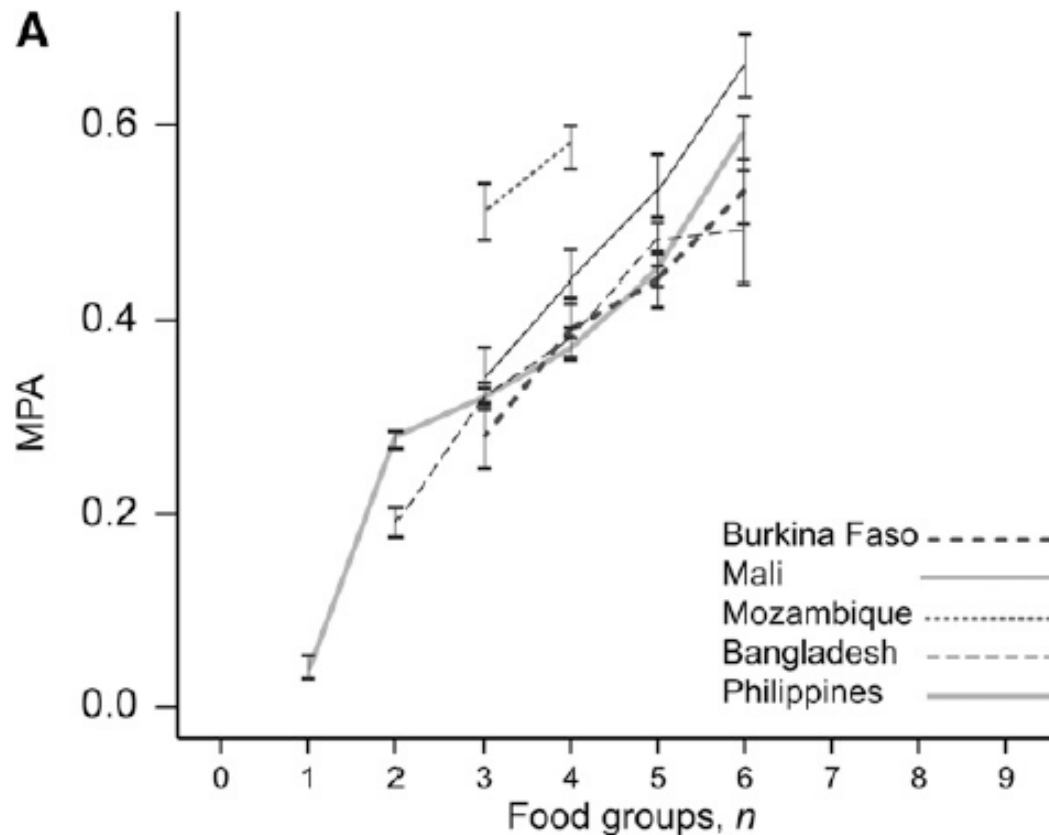
All correlations significant at  $P < 0.05$

Source: Moursi *et al*, 2008



# Probability of Adequacy: Women

Mean Probability of Adequacy for 11 Nutrients  
Among Non-pregnant, Non-lactating Women



1. Vitamin A
2. Thiamin
3. Riboflavin
4. Niacin
5. Vitamin B6
6. Folate
7. Vitamin B12
8. Vitamin C
9. Calcium
10. Iron
11. Zinc

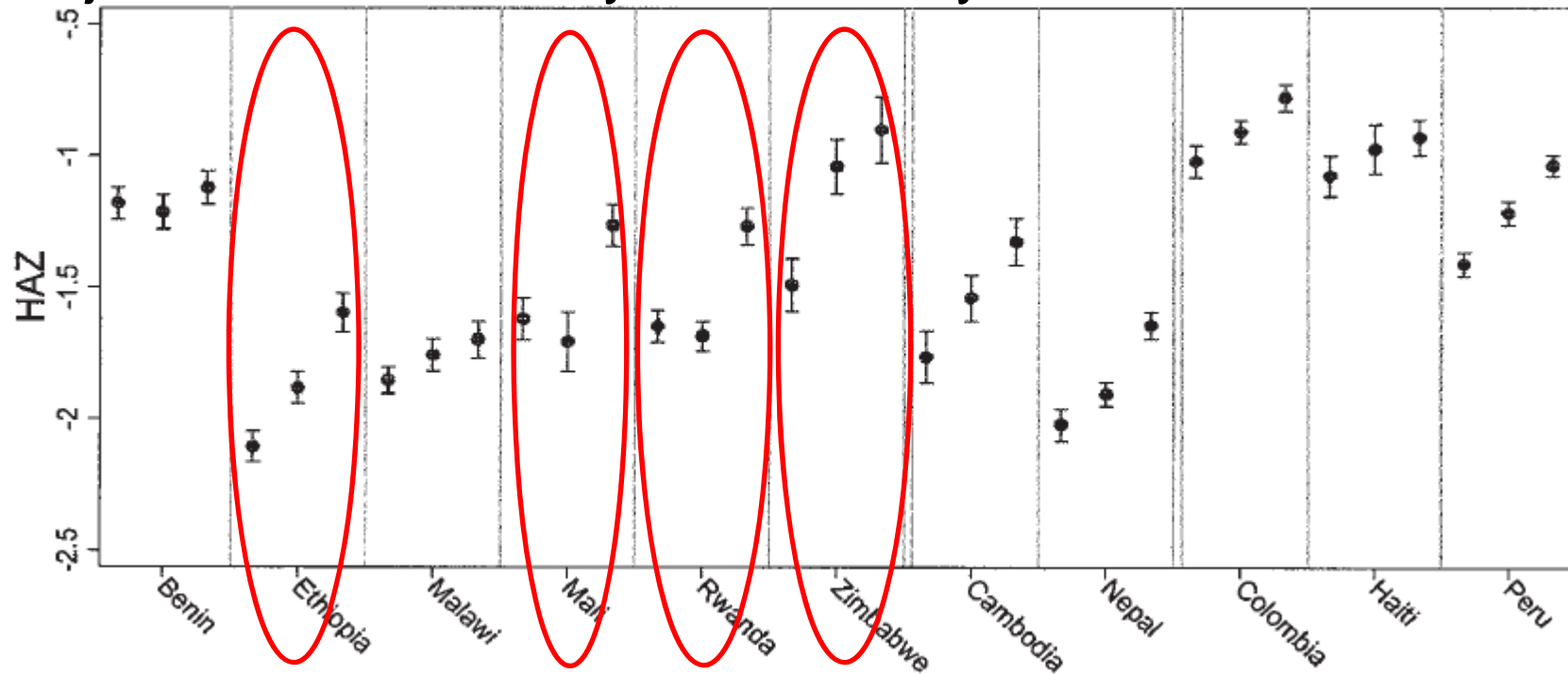
Source: Arimond *et al*, 2010

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# Dietary Diversity and Nutritional Status

# Stunting in Children < 2 years

Adjusted mean HAZ by diet diversity tercile in 11 countries



- Means adjusted for age, age squared, maternal height and BMI, # of < 5 children in household, and wealth/welfare factor scores.
- Age-specific, 7 group score, consumed from group 3+ times/week

Source: Arimond & Ruel, 2004



# Factors Influencing Dietary Diversity

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Dependent Variable		$\beta$
2nd quintile		0.21
3rd quintile		0.49**
4th quintile		0.49**
5th quintile		0.84**
Land area owned (hectares)		-0.01
Irrigation for at least 1 crop		0.79**
Number of crops		0.32**
Farm equipment owned		-0.48**
Membership in cooperative		0.12
Ownership of	cows	-0.02
	milch buffalo	0.98**
	goats	0.25
	sheep	-0.36
	poultry	-0.37*
Constant		5.20**
N		4927.00
F		19.47
R <sup>2</sup>		0.18

- Agricultural households in India Human Development Survey
- 13 food groups

\*  $P < 0.10$

\*\*  $P < 0.001$

Source: Bhagowalia *et al*, 2012

# Number of Crops Grown

Dependent Variable		$\beta$
2nd quintile		0.21
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# Wealth (income)

Dependent Variable		$\beta$
<b>2nd quintile</b>		<b>0.21</b>
<b>3rd quintile</b>		<b>0.49**</b>
<b>4th quintile</b>		<b>0.49**</b>
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Source: Bhagowalia *et al*, 2012

# Mother's Access to Information

Determinants of Dietary Diversity Score, Children < 5 years in Mozambique

Variable	$\beta$ (SE)
Constant	3.027** (0.114)
Child age	0.005* (0.003)
Female sex	-0.0028 (0.047)
Breastfeeding	-0.0044 (0.065)
<b>Mother's schooling</b>	<b>0.019 (0.012)</b>
<b>Mother's nutrition/health knowledge (listens to radio)</b>	<b>0.266** (0.031)</b>
Household size	-0.000 (0.007)
Wealth index	0.276** (0.036)
N	3,202
R <sup>2</sup>	0.120

\*  $p < 0.05$ ; \*\*  $p < 0.01$

Source: Burchi, 2010



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