

Global Forum on Research and Innovation for Health 2015

Nutrients Requirement and Food Intake in South East Asia : Research Gaps and Policy Implications

Validating WHO Indicators of Complementary Feeding against Weighed Food Intake

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August 26, 2015

Manila, The Philippines

The presenter declares no conflicts of interest with the sponsoring agency.

Purpose of the study

- Age-appropriate infant and young child feeding (IYCF) practices are imperative for child health and survival.
- In 2008, the World Health Organization (WHO) recommended a set of population-level breast feeding practices and food-related aspects of child feeding practices appropriate for children aged 6 to 23 months (WHO, 2010).
- The WHO (2010) on IYCF is “the result of a collaborative effort to improve the measurement and use of indicators to assess infant and young child feeding practices”.
- WHO recommended the reporting of IYCF based on 15 standard indicators (8 core + 7 optional indicators)
 - Standardized indicators enable international comparisons of IYCF results.

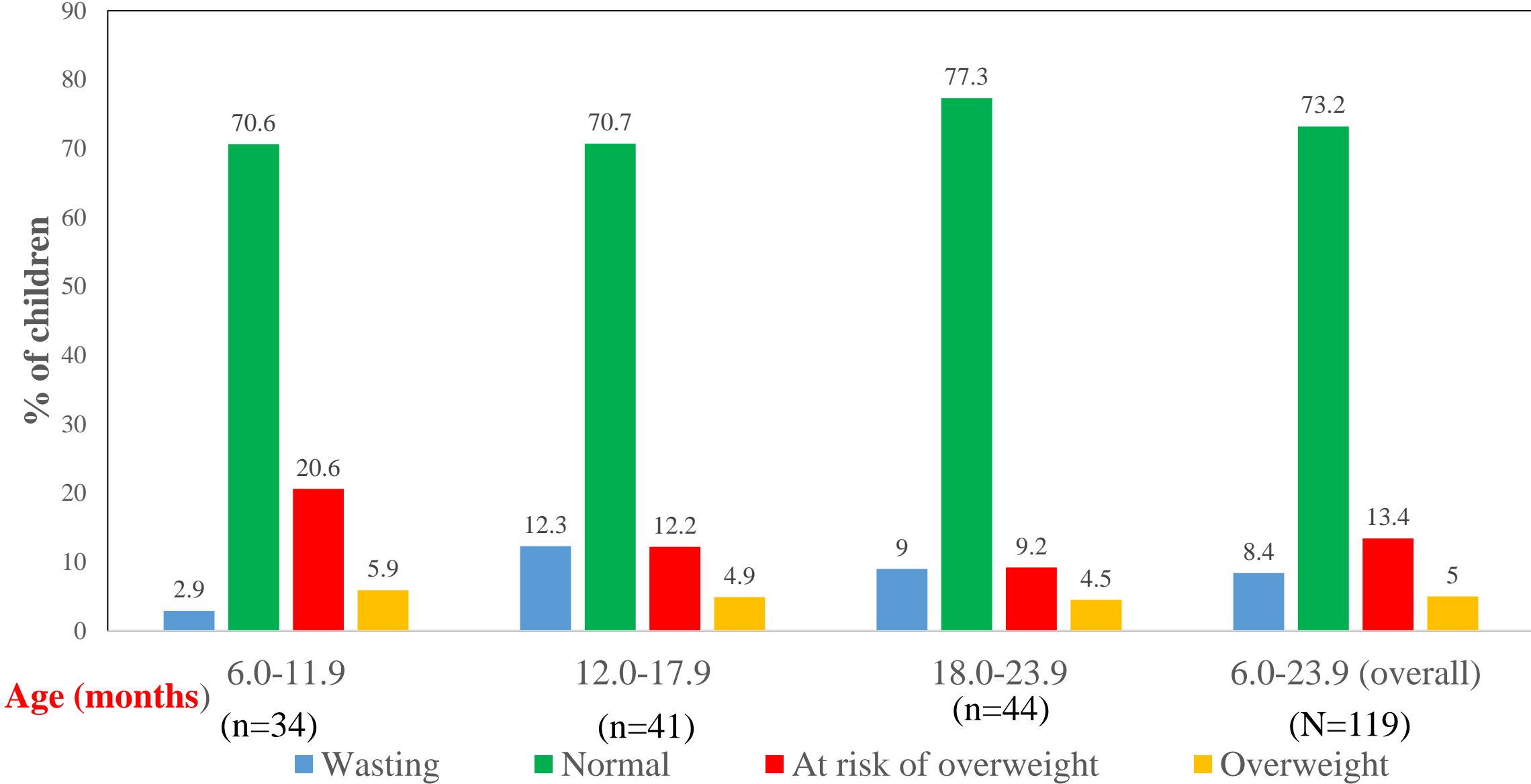
Purpose of the study

- **To what extent these Indicators reflect adequacy of intake by the infant/child?**
- **To address this question, a study was undertaken in 2013-2014, aimed at validating the WHO Complementary Feeding Indicators against weighed intake of foods and beverages over 2 days.**
- **Sample size comprised 300 Malay children aged 6.0 – 23.9 months living in the suburbs of Kuala Lumpur**
- **Weighed dietary intake records taken of a sub-group of 120 children.**

Socio-demographic background of children

	Overall study	Validation study
Sample size	300	119
Age (months)		
6.0-11.9	N=105 (48 m; 57 f)	N=34 (12 m; 22 f)
12.0-17.9	N=97 (49 m; 48 f)	N=41 (19 m; 22 f)
18.0-23.9	N=98 (54 m; 44 f)	N=44 (22 m; 22 f)
Ethnicity	Malay	Malay
	Mean ± SE	
Household size	4.5 ± 0.1	4.4 ± 0.1
No. of children aged <18 years /household	2.3 ± 0.1	2.3 ± 0.1
No. of children aged ≤ 3 years /household	1.4 ± 0.1	1.7 ± 0.1
Age of mother (years)	30.9±0.3	31.8±0.1

Nutritional status of children in validation study (BMI-for-age z score) (N=119)



CORE INDICATORS	(WHO, 2010)	AGES (MONTHS)
1. Early initiation of breastfeeding		0 – 23.9
2. Exclusive breastfeeding under 6 months		0 – 5.9
3. Continued breastfeeding at 1 year		12.0 – 15.9
4. Introduction of solid, semi-solid or soft foods		6.0 – 8.9
5. Minimum dietary diversity		6.0 – 23.9
6. Minimum meal frequency		6.0 – 23.9
7. Minimum acceptable diet		6.0 – 23.9
8. Consumption of iron-rich or iron-fortified foods		6.0 – 23.9
OPTIONAL INDICATORS		
9. Children ever breastfed		Past 24 months
10. Continued breastfeeding at 2 years		20.0 – 23.9
11. Age-appropriate breastfeeding		0 – 5.9 and 6.0 – 23.9
12. Predominant breastfeeding under 6 months		0 – 5.9
13. Duration of breastfeeding		0 – 5.9
14. Bottle feeding		0 – 23.9
15. Milk feeding frequency for non-breastfed children		6.0 – 23.9

Indicator (4): Timely Introduction of solid, semi-solid or soft foods

Definition: Proportion of infants 6-8 months of age who receive solid, semi-solid or soft foods

$$\frac{\text{Infants 6-8 months of age who received solid, semi-solid or soft foods during the previous day}}{\text{Infants 6-8 months of age}}$$

Indicator (5) Minimum dietary diversity

Definition :Proportion of children 6-23 months of age who received foods from 4 or more food groups*

$$\frac{\text{Children 6-23 months of age who received foods from } \geq 4 \text{ food groups during the previous day}}{\text{Children 6-23 months of age}}$$

Indicator 5: Minimum dietary diversity

***Consumed food from at least any 4 of these 7 food groups :**

- (1) grains, roots and tubers
- (2) legumes and nuts
- (3) dairy products (milk, yogurt, cheese)
- (4) flesh foods (meat, fish, poultry and liver/organ meats)
- (5) Eggs
- (6) vitamin-A rich fruits and vegetables
- (7) other fruits and vegetables

(Breast milk is excluded as this indicator is meant to reflect the quality of complementary feeding).

Indicator 6: Minimum meal frequency *

- (a) For **breastfed children**, the minimum number of times of meal feeding in the previous 24 hours, depends on the age of the child:
- for ages 6.0-8.9 months: 2 times
 - for ages 9.0-23.9 months: 3 times
- (b) For **non-breastfed children**, the minimum number of times of meal feeding in the previous 24 hours, does not vary by age
- for ages 6.0 – 23.9 months: 4 times .

Indicator (6): Minimum meal frequency

Definition: Proportion of breastfed and non-breastfed children 6-23 months of age who received solid, semi-solid, or soft foods the minimum number of times or more*

Breastfed children 6-23 months of age who received solid, semi-solid or soft foods
the minimum number of times or more during the previous day
Breastfed children 6-23 months of age

Non-breastfed children 6-23 months of age who received solid, semi-solid or soft foods or
milk feeds* the minimum number of times or more during the previous day
Non-breastfed children 6-23 months of age

*e.g. infant formula, milk (tinned, powdered, or fresh animal milk), or yogurt.

Indicator (7): Minimum acceptable diet

(a) For breastfed children: must meet the

- **minimum dietary diversity score (4 out of 7 food groups) and**
- **the minimum meal frequency**
 - for ages 6.0-8.9 months: 2 times
 - for ages 9.0-23.9 months: 3 times

(b) For non-breastfed children: must meet the

- **minimum dietary diversity score (4 out of 6 food groups*) and**
- **the minimum meal frequency**
 - for ages 6.0 – 23.9 months: 4 times

*Dairy products group is excluded as the equation includes milk feeds

Indicator (7): Minimum acceptable diet

Definition: Proportion of children 6-23 months of age who received a minimum acceptable diet (apart from breast milk)

Breastfed children 6-23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day

Breastfed children 6-23 months of age

Non-breastfed children 6-23 months of age *who received at least 2 milk feedings* and had at least the minimum dietary diversity and the minimum meal frequency during the previous day

Non-breastfed children 6-23 months of age

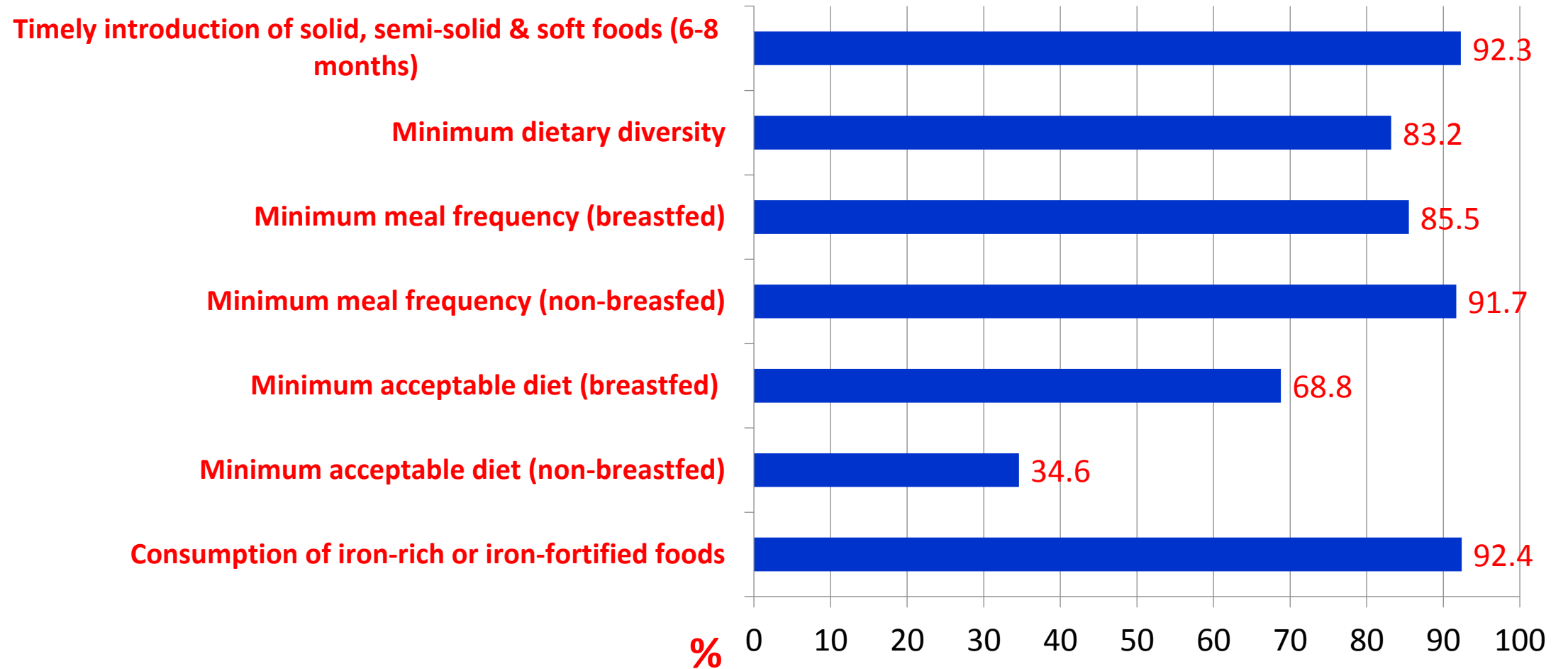
Indicator (8): Consumption of iron-rich or iron-fortified foods

Definition: Proportion of children 6-23 months of age who receive an iron-rich food or iron-fortified food that is specially designed for infants and young children, or that is fortified in the home

Children 6-23 months of age who received an iron-rich food or a food that was specially designed for infants and young children and was fortified with iron, or a food that was fortified in the home with a product that included iron during the previous day

Children 6-23 months of age

Prevalence of compliance with WHO complementary feeding indicators (6-23 months) (N=119)



Adequacy of Energy and Nutrient Intake according to RNI (NCCFN, 2005) : BOYS

Energy/ Nutrients	% of RNI (Mean ± SE)	
	6.0-11.9 months (n=12)	12.0-23.9 months (n=41)
Energy (kcal)	143.9±14.8	103.2±6.0
Protein (g)	230.3±19.4	198.4±12.2
Vitamin A (µg)	51.7±31.8	61.7±9.1
Thiamin (mg)	74.9±25.4	63.4±11.5
Riboflavin (mg)	107.8±24.5	102.1±13.2
Niacin (mg)	77.4±25.4	84.9±12.6
Folate (µg)	11.9±4.6	16.26±2.03
Vitamin C (mg)	35.7±17.2	38.10±5.71
Vitamin D (µg)	4.7±3.2	23.0±9.7
Vitamin E (mg)	7.6±3.0	17.85±2.47
Calcium (mg)	139.1±19.4	129.4±14.5
Iron (mg)	127.1±28.1	292.4±36.1
Zinc (mg)	49.4±15.1	83.1±11.2

Adequacy of Energy and Nutrient Intake according to RNI (NCCFN, 2005) : Girls

Energy/Nutrients	% of RNI (Mean ± SE)	
	6.0-11.9 months (n=22)	12.0-23.9 months (n=44)
Energy (kcal)	111.4±14.1	116.6±9.0
Protein (g)	189.2±35.5	216.7±16.7
Vitamin A (µg)	25.2±10.3	51.1±8.3
Thiamin (mg)	33.35±7.11	51.7±5.9
Riboflavin (mg)	43.36±8.20	71.4±6.3
Niacin (mg)	52.85±13.40	80.1±11.3
Folate (µg)	13.4±3.5	15.6±1.9
Vitamin C (mg)	61.5±22.7	77.75±13.84
Vitamin D (µg)	8.8±7.1	21.5±8.4
Vitamin E (mg)	7.65±1.69	15.91±2.09
Calcium (mg)	117.7±20.8	140.7±18.8
Iron (mg)	201.4±53.4	251.0±35.3
Zinc	85.0±13.5	92.6±24.1

Correlations between energy / nutrient intake adequacy (% RNI) and compliance with WHO indicators

	Minimum Dietary Diversity	Minimum Meal Frequency
*Energy from protein	✓	
*Protein		
**Vitamin A	✓	✓
**Thiamin		
**Riboflavin		
**Niacin		
**Folate	✓	✓
**Vitamin C	✓	✓
**Vitamin D	✓	
**Vitamin E	✓	✓
*Calcium		
*Iron		
**Zinc		

✓ Children who complied with complementary feeding indicator had **significantly higher (p<0.05)** energy/nutrient intake adequacy (% of RNI), compared to children who did not

*Independent t-test;

** Mann-Whitney Test

Correlations between energy / nutrient intake adequacy (% RNI) and compliance with WHO indicators

Minimum Acceptable Diet		Consumption of Iron-rich/ Iron-fortified Foods	
*Energy from protein	✓	*Energy	✓
*Protein		*Energy from fat	✓
**Vitamin A	✓	*Energy from carbohydrates	✓
**Thiamin			
**Riboflavin			
**Niacin			
**Folate	✓		
**Vitamin C	✓		
**Vitamin D	✓		
**Vitamin E	✓		
*Calcium			
*Iron			
**Zinc		**Zinc	✓

✓ Children who complied with complementary feeding indicator had **significantly higher (p<0.05)** energy/nutrient intake adequacy (% of RNI), compared to children who did not

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** Mann-Whitney Test

Study findings with policy implications

- **Appropriate complementary feeding reduces risks of under-nutrition, morbidity and mortality in infants and children. Globally, several studies have reported significant associations between the WHO indicators of complementary feeding and nutritional outcomes.**
- **This study of Malaysian urban children from households of middle to upper-middle socio-economic status showed generally quite high prevalence of compliance with the WHO indicators of complementary feeding practices.**

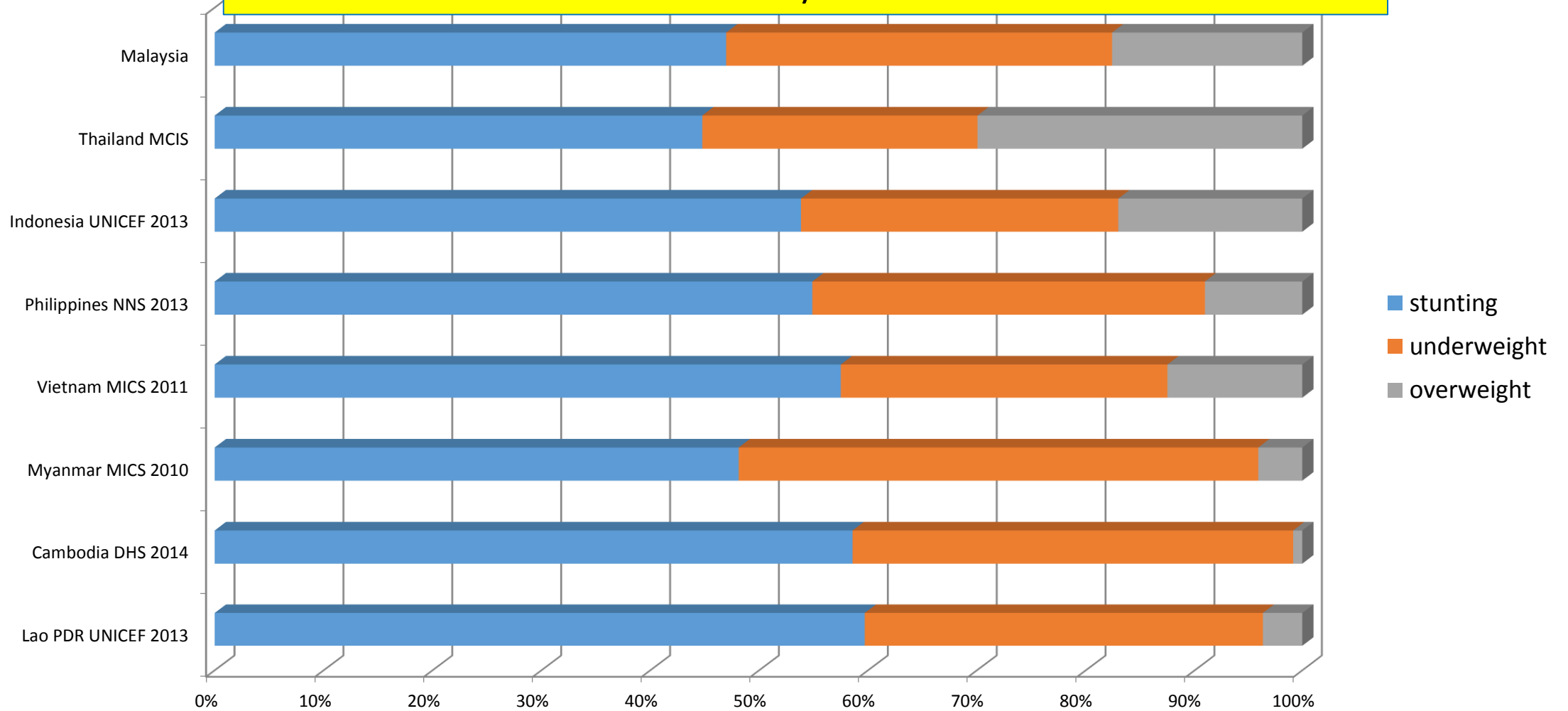
Study findings with policy implications

- **The WHO Indicators for complementary feeding correlated with adequacy of intake, based on weighed food intake over 2 days, for a limited number of nutrients – protein (% of calories), vitamins A, D, E, C, and folate.**
- **Compliance with the WHO indicators appear not sensitive enough to capture adequacy of intake of several key nutrients including iron, calcium, zinc, and B vitamins.**
- **The WHO Indicators may be used as a rapid screening tool; however, additional dietary assessment tools are needed to provide quantitative data on adequacy of food consumption.**

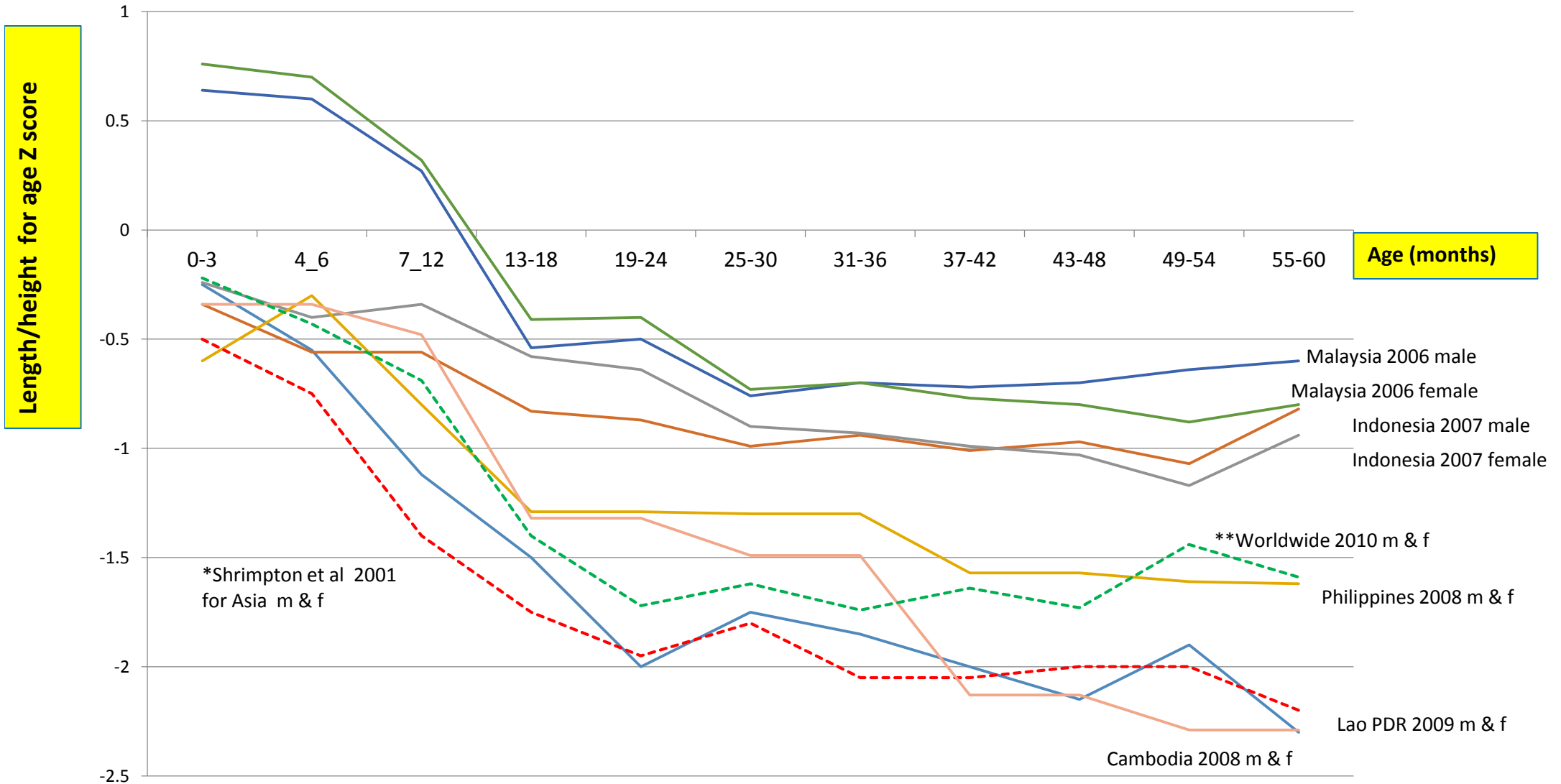
Key question posed by this Forum

Based on the study findings, what guidelines can be recommended for SEA to promote optimal feeding of breastfed and non-breastfed children?

Stunting and underweight remain the main forms of malnutrition in children below five years in Southeast Asia



Growth faltering patterns of children below 5 years (length/height for age Z score)



(* mostly South Asian countries eg. India, Bangladesh, Pakistan, Nepal, Sri Lanka plus Turkey and Thailand 1987-1996)

(** 54 countries out of which 30 AFRO Victoria de Onis et al 2010)

Indicators	Cambodia 2010 DHS	Indonesia 2012 DHS	Philippines 2008 DHS	Vietnam 2011 MICS	Malaysia 2014 N=300
Timely introduction of complementary foods	87.7	91.0	89	50.4	97.9
Minimum dietary diversity	36.9	58.2	78.7	-	78.0
Minimum meal frequency					
- breastfed	78.8	61.4	80.7	40.6	69.3
- Non breastfed	61.7	78.7	48.2	84.2	95.2
Minimum acceptable diet					
- breastfed	28.2	34.2	68.2	-	50.6
- Non breastfed	10.9	43.0	40.5	-	39.5
Consumption of iron-rich/iron-fortified foods	75.8	67.5	78.3	-	92.3

Acknowledgements

- **ILSI SEA Region for financial support**
- **Dr Tan Kok Leong and Dr Tan Seok Shin from IMU as co-researchers**
- **Chua Ee Ying from UPM for data analysis**
- **Several research assistants from UKM and IMU for data collection**
- **Ministry of Health, Malaysia for continued interest in the study**

THANK YOU