

Linking rice fortification opportunities with nutrition objectives

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**SCALING UP
RICE FORTIFICATION
IN ASIA**

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Overview

1. Understanding the micronutrient situation

- Level of micronutrient deficiencies and population groups most affected
- Existing programmes to increase micronutrient intake

2. Extent to which rice fortification can potentially contribute to micronutrient intake among micronutrient deficient groups

- Potential contribution of the different delivery options

Why is it important to understand the micronutrient situation in a country?

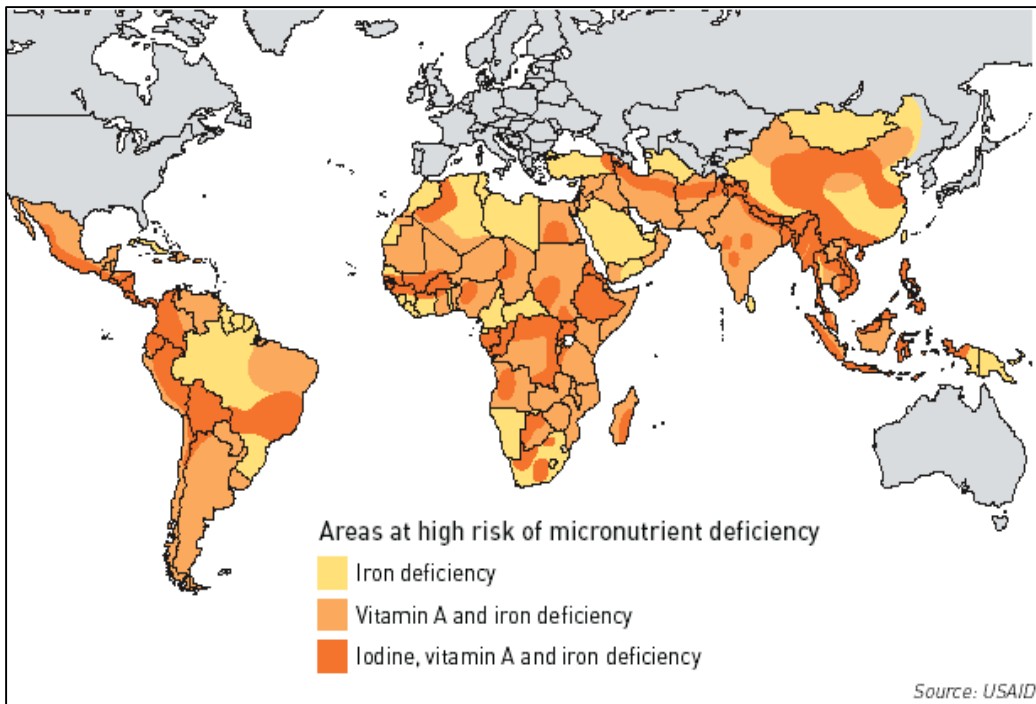
- Analysis of the micronutrient deficiency (MND) situation in a country is the first step to estimate the potential contribution of the different rice fortification delivery options to nutritional improvement and evaluate impact.
- Three main ways to obtain a picture of the situation, and a mix of all three will often be used :
 1. *Micronutrient deficiency surveys (bio-chemical data)*
 2. *Dietary intake of nutrients (usually 24-hour recall surveys)*
 3. *Proxy indicators (e.g. anemia, dietary diversity, stunting, neural tube defects)*

Importance of disaggregated data on MNDs and nutrient intake

- Quantitative MND prevalence
 - provide estimates of deficiencies of different MNs
 - provide baseline and impact data for fortification
- Food and nutrient intake data can:
 - inform decisions about which micronutrients to add to which foods and in what amounts.
- Disaggregated data by different population groups (e.g. *socioeconomic status, geographic location*) and from different age/physiological status groups (e.g. *children, women*) helps inform who to prioritize.
- **Complete set of MND and nutrient intake data NOT a pre-requisite for fortification initiatives**

Surveys on prevalence of deficiencies

Iron, iodine, and vitamin A most common deficiencies & most commonly assessed using biochemical status indicators



Need to also consider BURDEN: prevalence may be relatively lower, but large populations mean large numbers of people with MN deficiency.

As many as 2 billion people are affected worldwide with multiple micronutrient deficiencies, the majority residing in Asia.

Countries with recent micronutrient surveys:

- Philippines, Indonesia, Bangladesh, Nepal
- Cambodia, Myanmar and India in process/planned

Zinc deficiency

- Zinc deficiency makes substantial contribution to the global burden of disease.
 - Few bio-chemical data on prevalence; difficult to assess
- *Lancet* 2013 estimates that 17% of the world's population is at risk of zinc deficiency based on analysis of national diets. In Asia it is estimated at over 19% and in Africa 24%.

Bangladesh:

- National prevalence of 45% zinc deficiency in preschool children
 - 52% in the slums and 30% in the urban cluster.
- Prevalence among non-pregnant/non-lactating women: 57%.

Philippines:

- 22% among children 6-59 months
- 21% among adolescents
- 22% among pregnant women

Vitamin D, folate and vitamin B6 & B12 deficiency

Lancet 2013 estimated that a billion people might be Vitamin D insufficient or deficient.

Indonesia:

- 44% of children aged 6 months – 12 years **vitamin D** insufficient

Philippines:

- 63% of persons aged 13-45 years were found to suffer from **vitamin B6** deficiency in the national Capital Region
- 60% of persons aged 13-45 years were found to suffer from **folate** deficiency in the national Capital Region

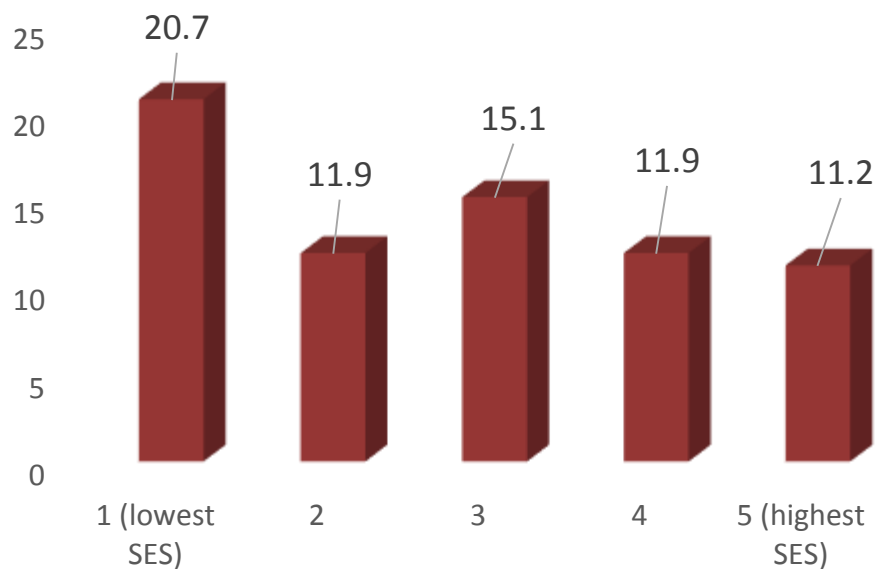
Bangladesh:

- 23% suffering from **vitamin B12** deficiency

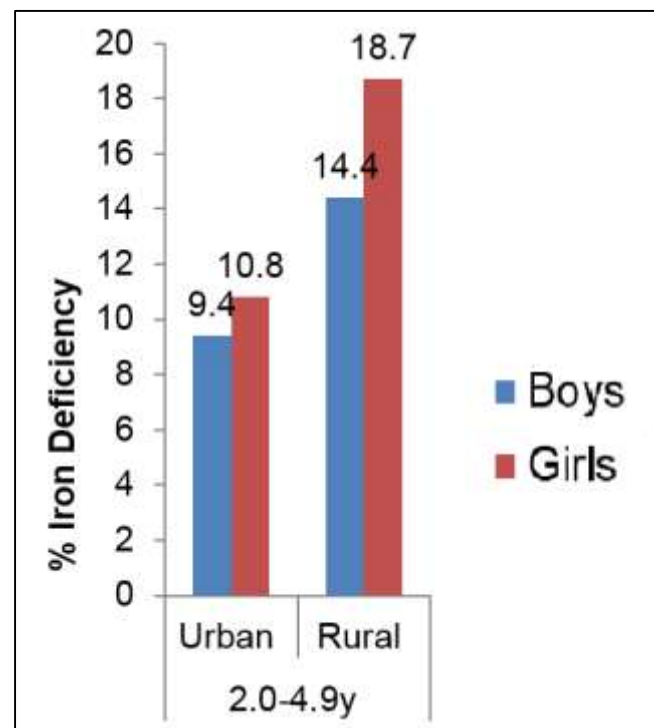
Sources: Sanjaja et al. Food consumption and nutritional and bio-chemical status of 6 month-12 year old Indonesian children: the SEANUTS study. British Journal of Nutrition 2013; Philippines, NNS 2008; Bangladesh national micronutrient survey 2011-12

Micronutrient deficiencies affect the poorest and rural populations most but all socioeconomic strata affected, and also urban populations

Percent of Non-pregnant Vietnamese Women (15-49 Years) with Iron Deficiency, by Socioeconomic Status (SES)



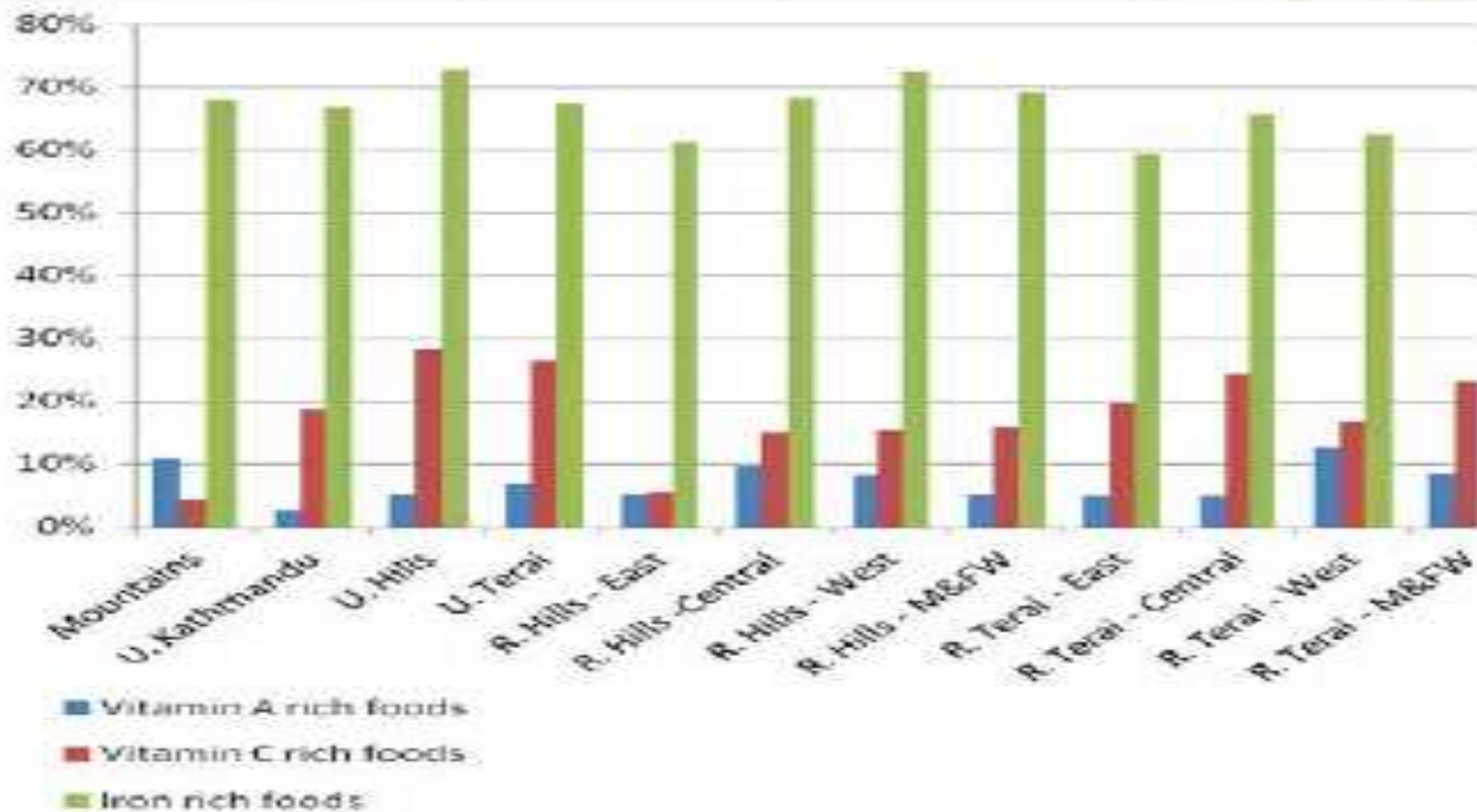
Prevalence of iron deficiency in Indonesian pre-school children (SEANUTS)



Nutrient intake - Example from Bangladesh: iron and zinc intakes

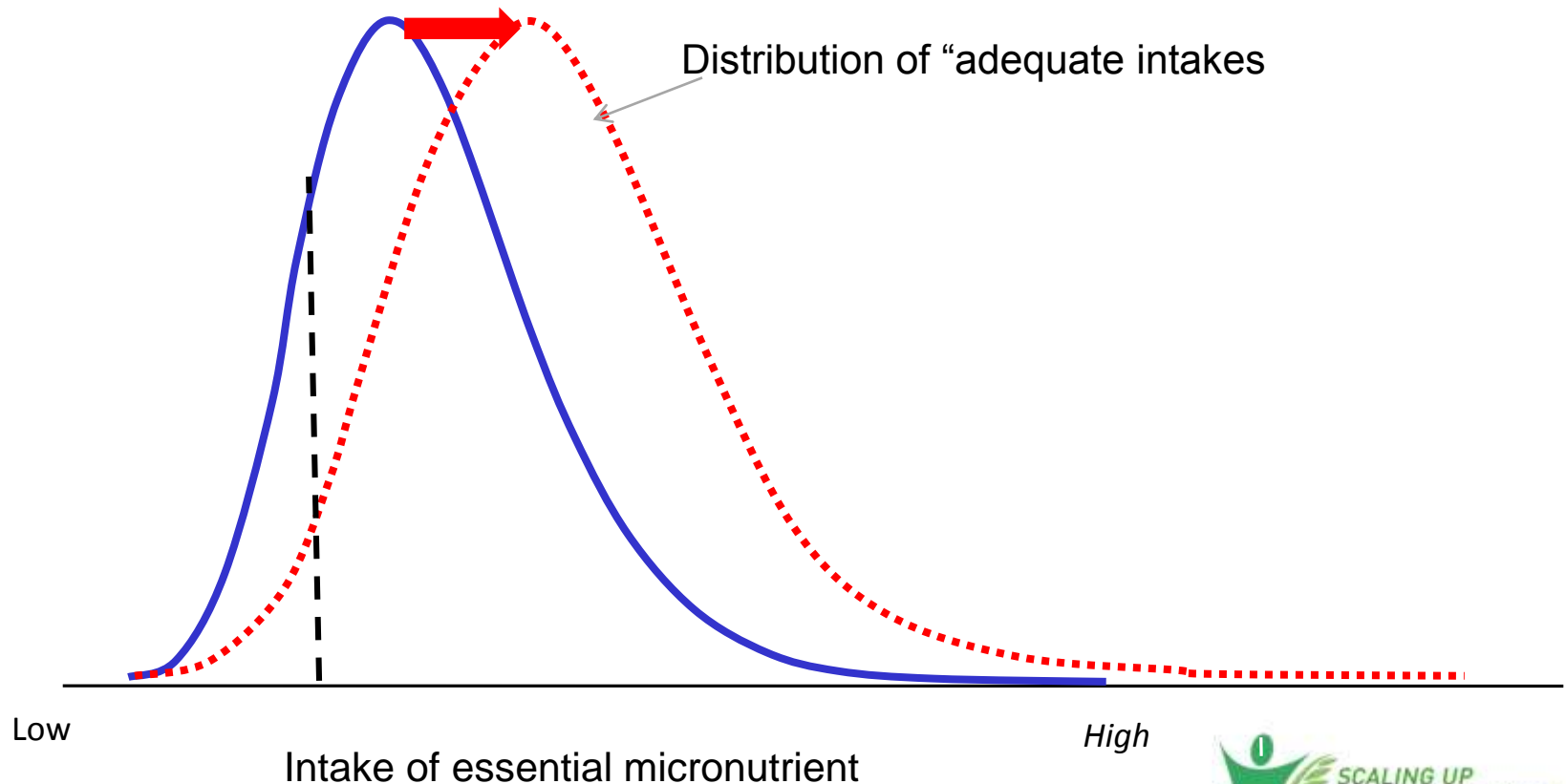
- Iron intake ranged from 41-82% across the 3 groups studied (pre-school, school age and non-pregnant/non-lactating women)
- Only 55% of urban non-pregnant/non-lactating women had adequate zinc intake (47% in slums)

Example from Nepal: % of HHs that did NOT consume various nutrient rich foods over 7 day recall period

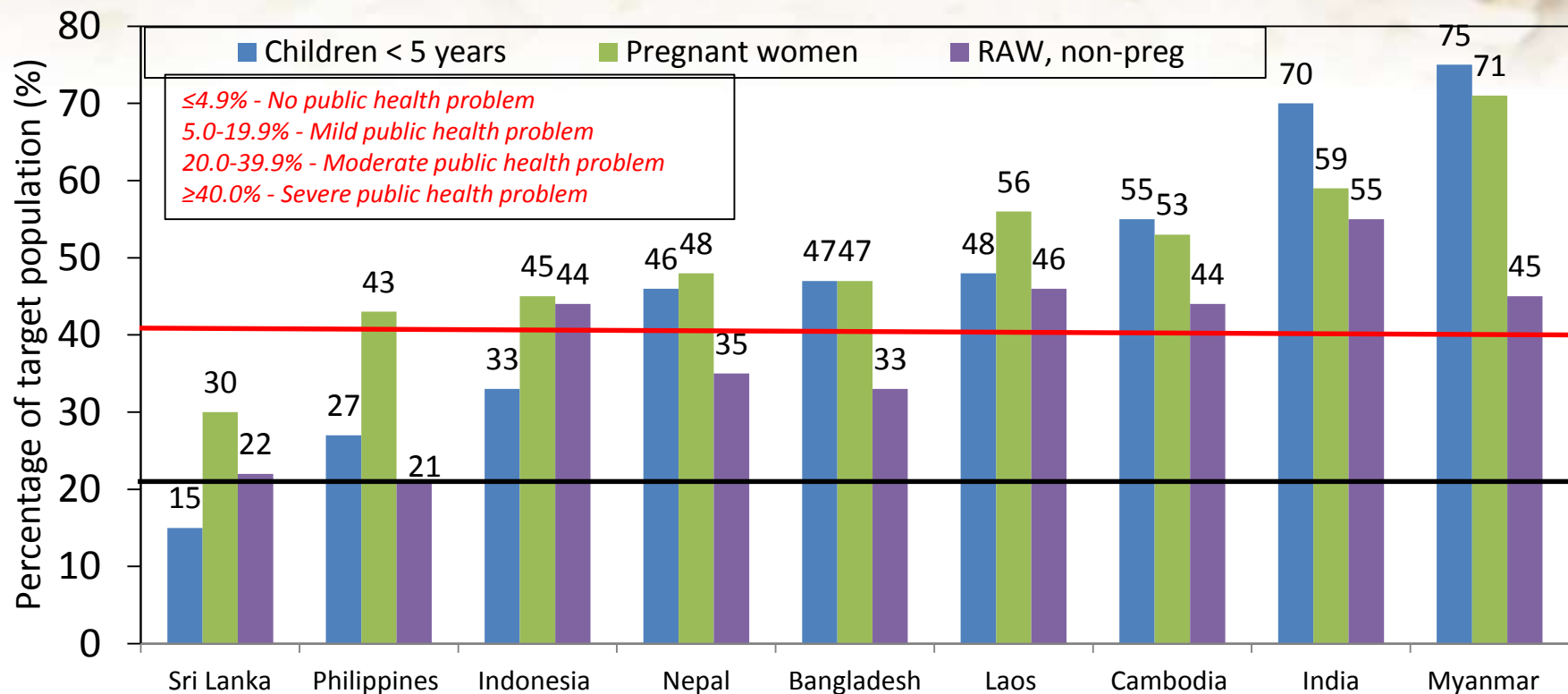


Dietary intake of nutrients

Many countries do not have national nutrient intake data.

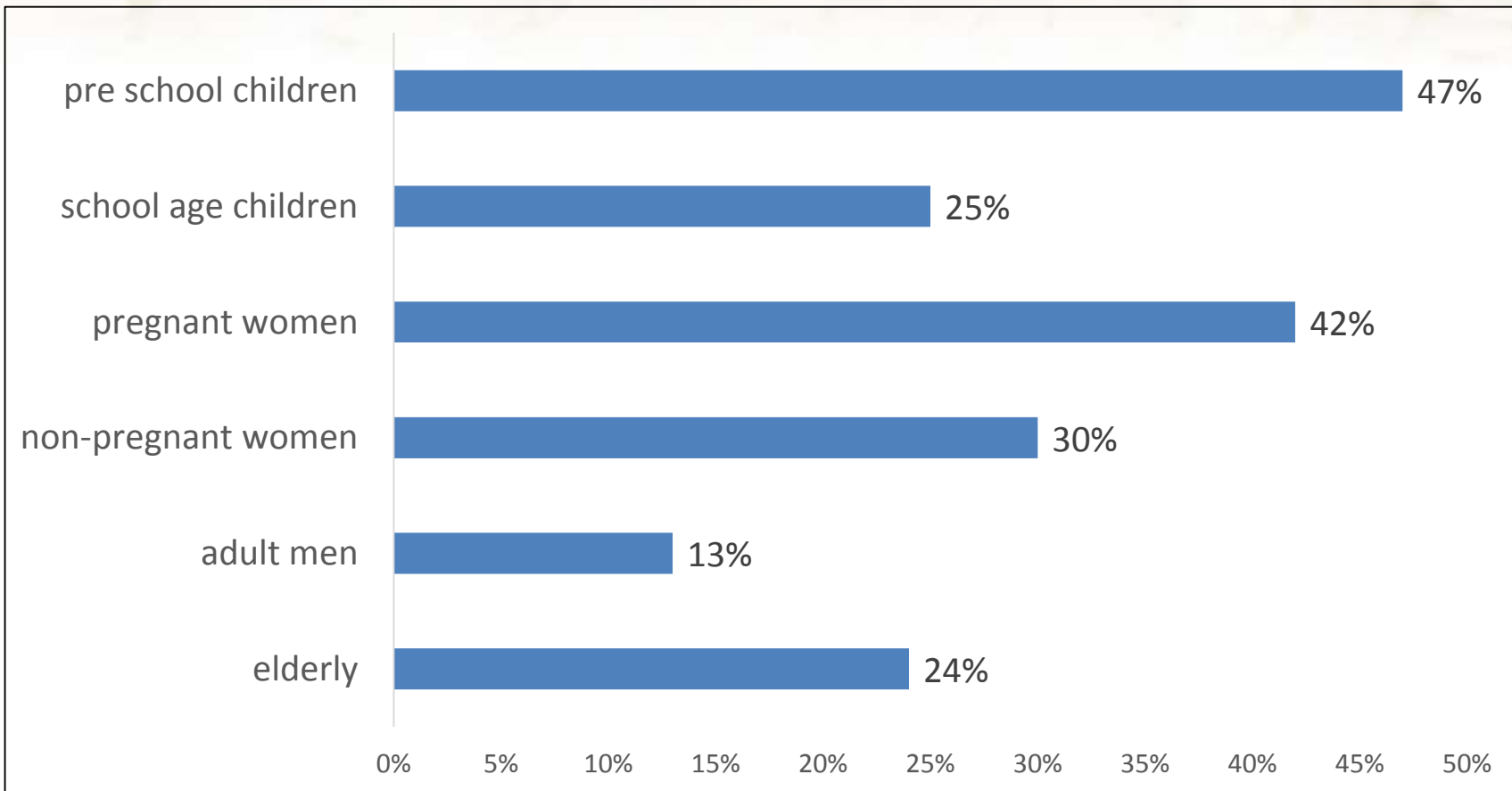


Proxy indicators: anemia in 3 vulnerable groups (sorted by children <5)

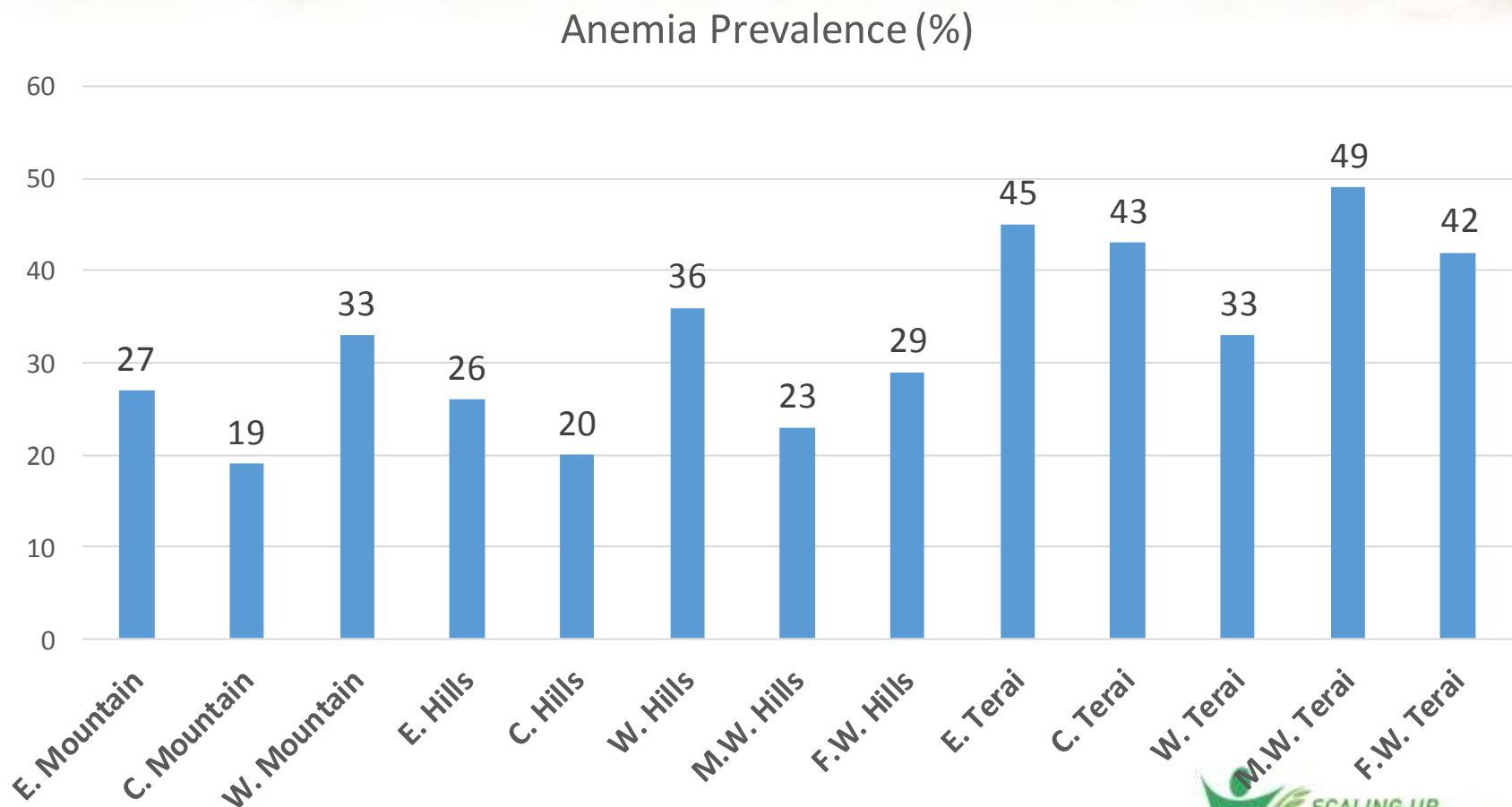


- Anemia is a proxy indicator as it is not an “MND” – it has multiple causes, not limited to inadequate iron and other MN intake.
- Other causes of anemia include worm infestation, malaria, other infections and genetic blood disorders.

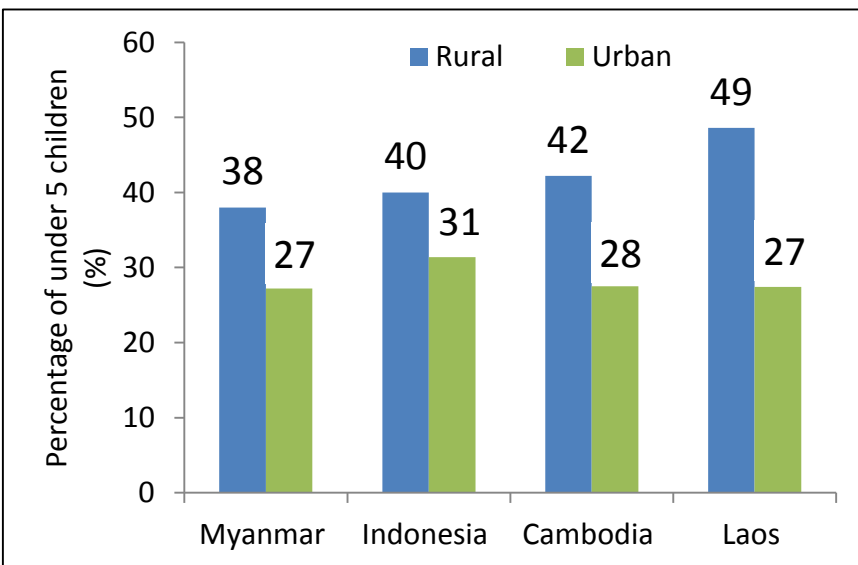
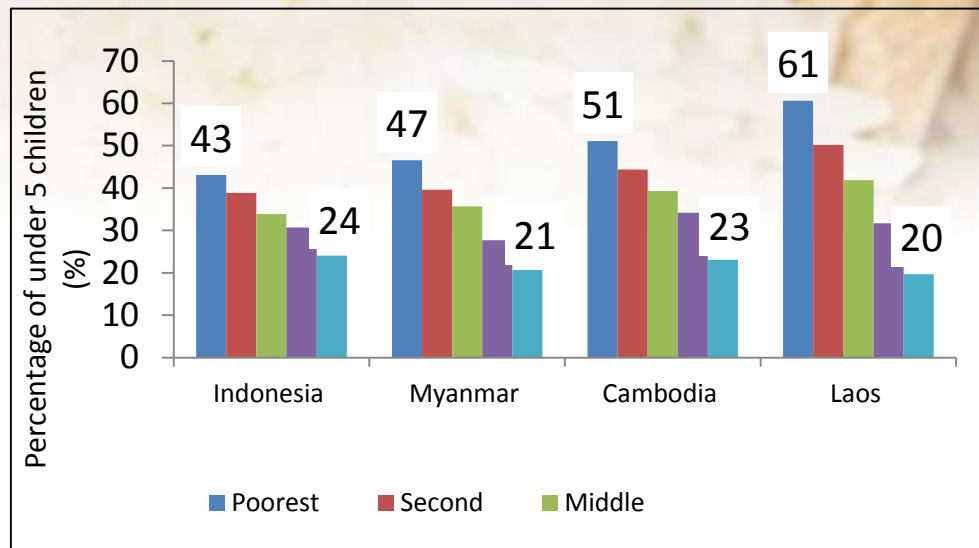
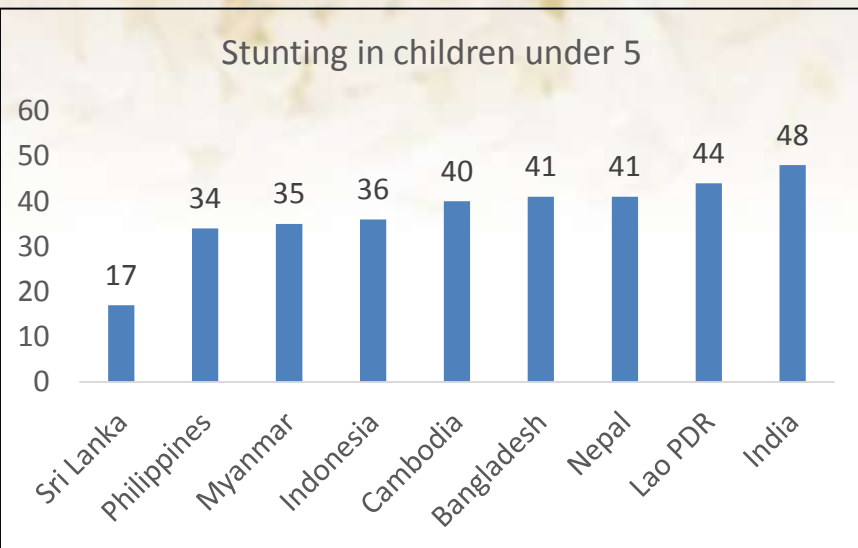
Prevalence of anemia in different age groups (WHO 2008)



Large geographical disparities in anemia: example of Nepal (women of child bearing age)

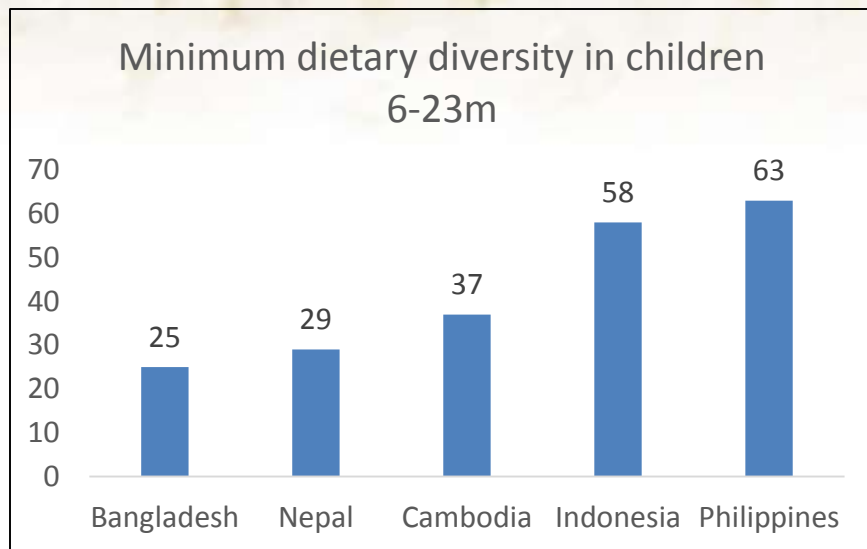


Stunting (children under 5)

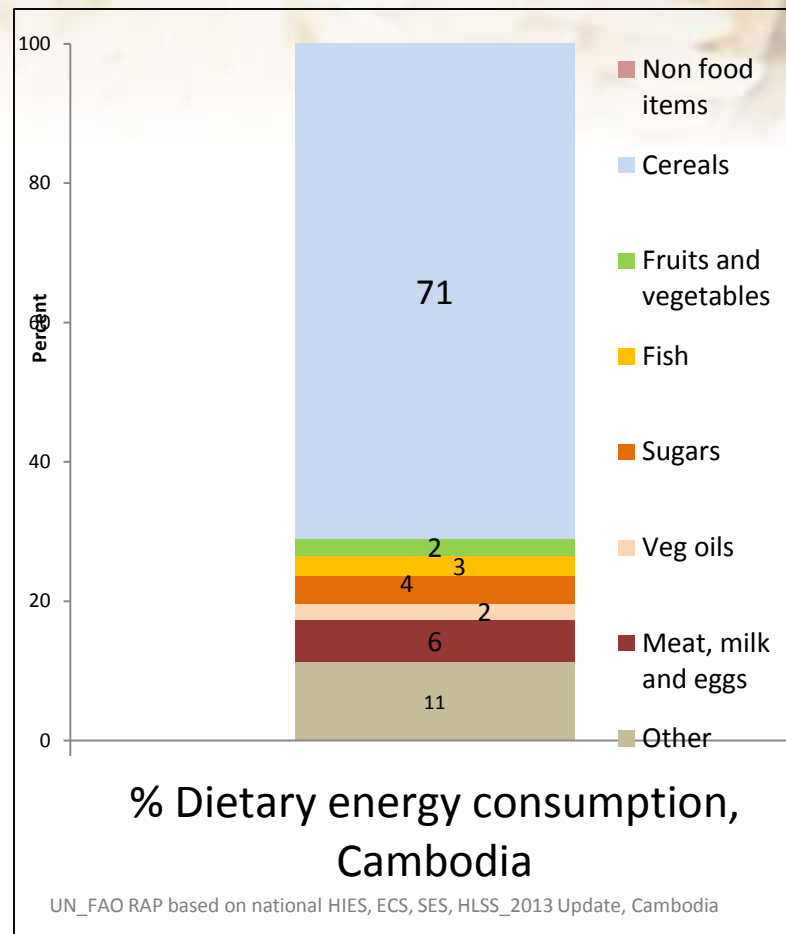


- Stunting, like anemia, has multiple causes, resulting not only from poor diets but also infection, inadequate feeding and care, low health service access, and poor sanitation, hygiene and water quality.
- Large disparities – but still significant rates in high income and urban
- Disparities expected to mirror disparities in MNDs
- Stunting - link with zinc deficiency

Proxy indicators: dietary diversity

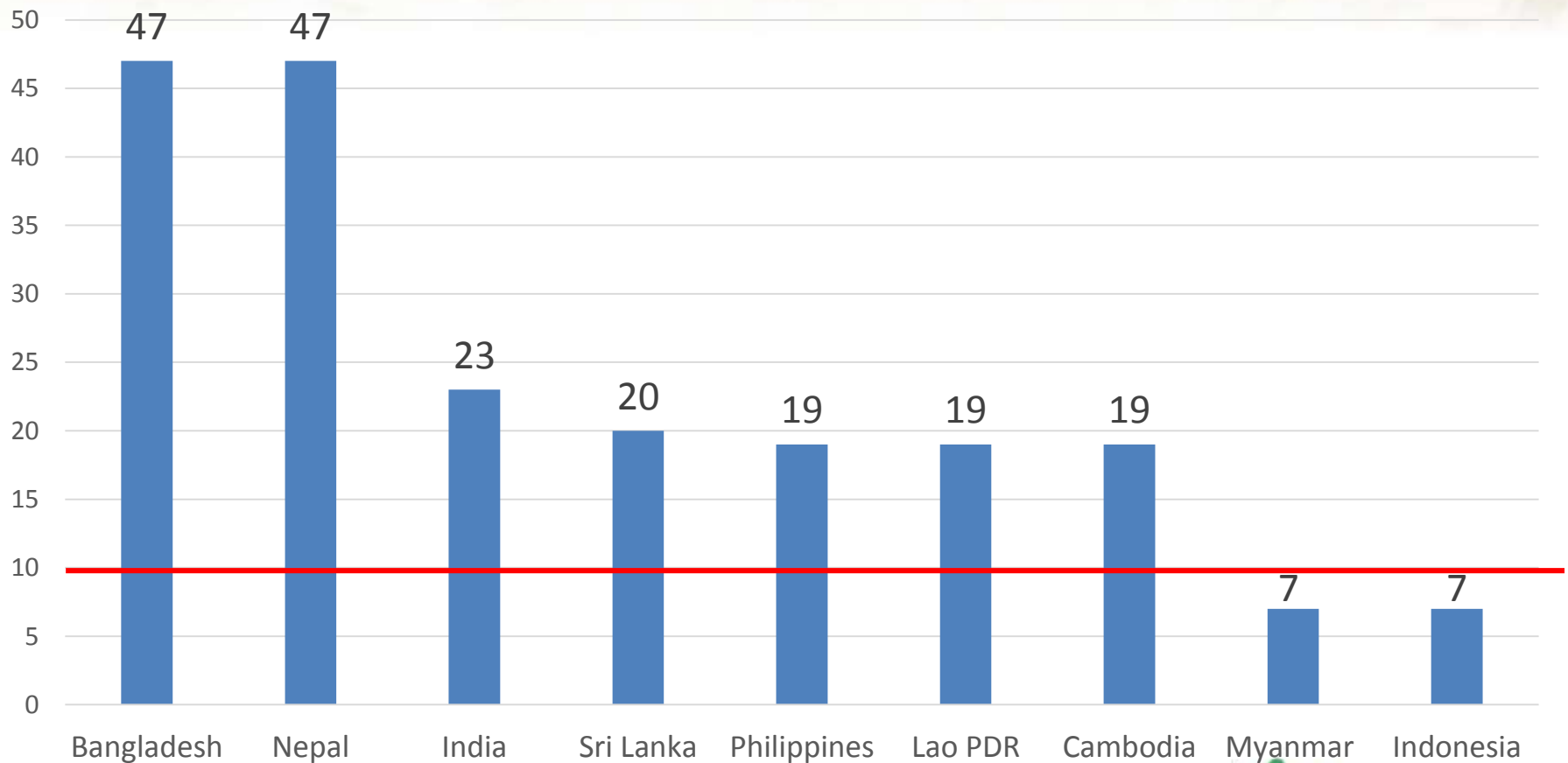


- Diets lacking diversity are indicative of MNDs.
- Multiple micronutrient deficiencies often coexist in a population that has a poor diet.
- Animal source foods are the major source of vitamins A and D, thiamin (vitamin B1), riboflavin (vitamin B2), iron, zinc and calcium, and are the *only* source of vitamin B12.



Proxy indicators: neural tube defects

Prevalence of neural tube defects per 10,000 births (modeled)



March of Dimes, 2012. Global Report on Birth Defects.

Other important proxy indicators

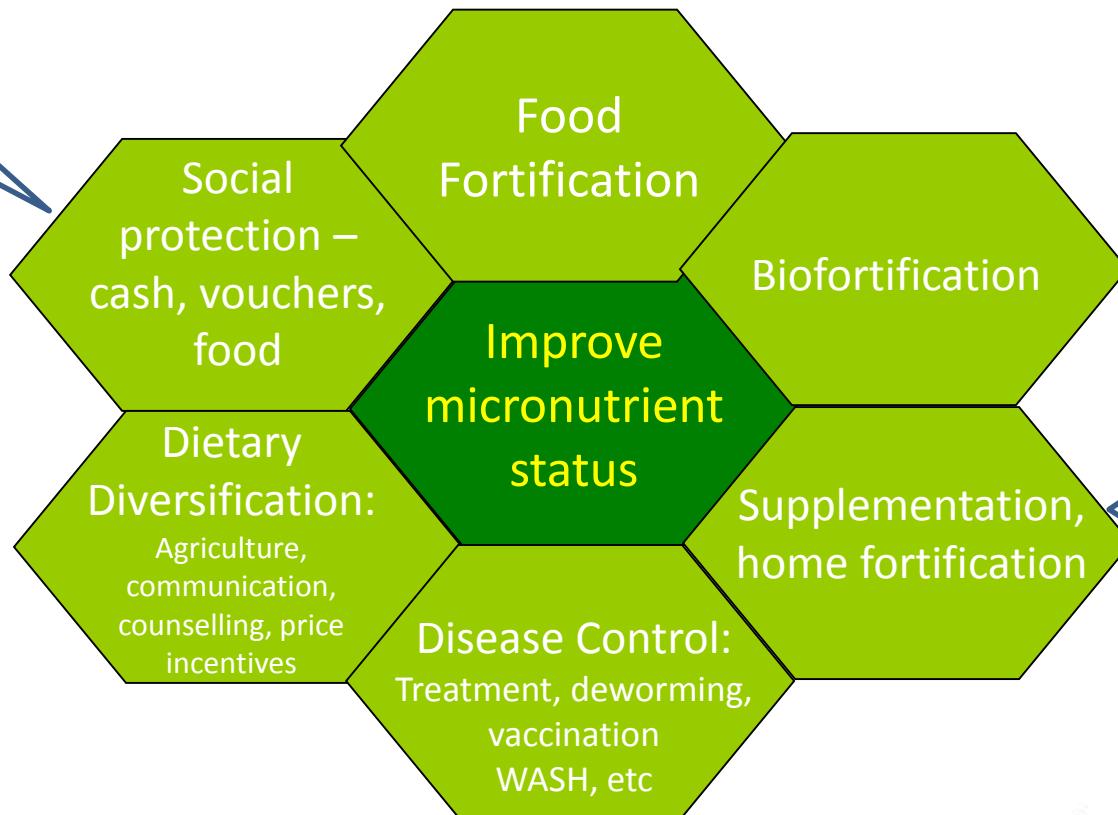
- High infection prevalence
- Low health service access/utilization
- Poor sanitation, hygiene and water quality
 - *“Environmental enteropathy”*
- High food insecurity
- Inadequate feeding and care

Which population groups are most affected by mnds?

- **Age/life-course:** pre-school children and pregnant and lactating women particularly vulnerable to MNDs; also adolescents
- **Gender:** girls and women of reproductive age biologically more vulnerable, especially to iron deficiency
- **Socio-economic:** poorer populations tend to have higher levels of deficiencies compared to wealthier groups, as diets lack diversity
- **Emergency-affected:** refugees and displaced persons tend to have poor dietary diversity
- Also need to consider **geographic location, ethnicity and religious beliefs.**

Rice fortification is part of an integrated approach to improve micronutrient status

Targeted to poor, emergency-affected,...



Targeted to pre-school, pregnant & lactating women, adolescents

Coverage of existing micronutrient programmes in the 9 countries

- **Home fortification with multiple micronutrient powders** initiated in all the countries, focused mainly on children 6-23 months and coverage still low (new programmes/pilots)
- **Iron folic-acid** supplementation focused on pregnant women and coverage ranges from 39-90% (any IFA)
- **Multiple micronutrient supplementation** only implemented in very few countries, focused on pregnant women, pilot stage
- **Adolescent iron-folic acid** supplementation implemented in Sri Lanka for girls & boys, reaching half of them nationwide, and the Weekly Iron Folate Supplementation programme in India targets 90 million boys and girls in 16 states

➤ *Targeted to vulnerable age groups with high needs and high levels of deficiencies*

Coverage of mandatory wheat flour fortification in the target countries

- Nepal (iron, folate, vit A): all large roller mills, 75% fortified, equivalent to 15% coverage of all flour
- Indonesia (iron, folate, B1, B2 & zinc): 100%
- The Philippines (iron & vit A): 100%

As a population based intervention, fortification must be safe for everyone in the population and should benefit those in need

Potential to benefit is determined by the combination of:

- **Need** – the dietary gaps to be filled and the deficiency patterns
- **Amount** of fortifiable food usually consumed
 - Total amount of food consumed
 - Types and sources of foods that can be fortified
- **Level** of fortification – for safety, set based on amount of food consumed by group which consumes the largest amount of food in the population (adult men)

So, potential to benefit will vary by several factors

Potential to benefit from food fortification varies across life cycle



	Pregnancy	Lactating mother	6-23m	2-5y	5-18 years	WRA (15-49)	Adult men	Elderly
<i>MN need</i>	very high	very high	very high	high	Moderate to high	Moderate to high	Low to moderate	Moderate to high
<i>Amount of food eaten</i>	moderate	moderate	low	low, increasing with age	Increases with age	moderate	high	moderate
<i>Potential to benefit</i>	high	high	low	low, increasing with age	Increases with age	high	high	high
<i>Potential to fully meet need</i>	low	low	no	low, increasing with age	Increases with age	high	high	high

To what extent can different delivery options for fortified rice potentially have a public health benefit among vulnerable socio-economic groups?

<i>Delivery option</i>	<i>Low income</i>	<i>High income</i>	<i>Rural</i>	<i>Urban</i>	<i>Low education</i>	<i>High education</i>
<i>Voluntary</i>	Low	High	Low	High	Low	High
<i>Mandatory</i>	High	High	High	High	High	High
<i>Social safety nets</i>	High	Low	High	High	High	Low

Other considerations: **geographic**, emergency affected, ethnic groups, religious groups, severe food insecurity and others

Conclusions

- Patterns of deficiency assessed through combination of available data on bio-chemical MND status, nutrient intake and various proxy indicators
- MN status and nutrient intakes are helpful to provide baseline and impact data for fortification & inform decisions about which micronutrients to add, but not a prerequisite
- Other micronutrient interventions (supplementation/home fortification) targeted to specific at-risk groups, and coverage is low, except for iron-folic acid for pregnant women in a few countries
- ***These patterns help with considerations of which nutrients to add and which groups most vulnerable and which delivery options to select***

Conclusions

- Varying potential of fortification to benefit and fully meet MN needs among different age-life-cycle groups
- Most vulnerable age/life-cycle groups need additional MN interventions
- Fortification is one intervention among a wider, multi-sectoral package of actions that contribute to reducing MNDs
- ***Mandatory universal fortification has strongest potential to benefit everyone, including the poor, pregnant women, children, the elderly and populations that can never be fully covered by social and health services.***
- Voluntary fortification benefits mainly those with the lowest MN needs and has poor potential to reach the most vulnerable population groups
- At-risk groups can benefit from social safety nets



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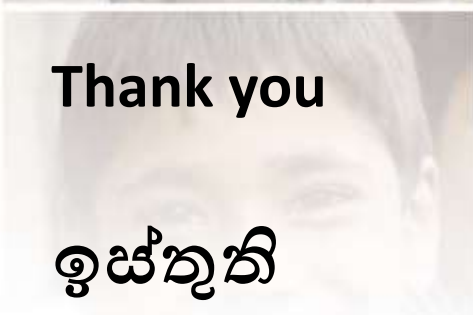
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Thank you

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Terima kasih

Salamat Po



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