WFP
World Food Programme

SAVING LIVES
CHANGING LIVES

Micronutrient Landscape in Southeast Asia

Status, Strategies & Future Directions

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Contents

Executive Summary

Despite steady economic growth, agricultural advancement and reduction in poverty, the Southeast Asia region continues to grapple with malnutrition challenges encompassing both **undernutrition and overnutrition, with micronutrient deficiencies (MND)** running through both sides of the malnutrition spectrum. Evidence confirms that **MNDs can have a life-long debilitating impact on individuals**, affecting their health, education, and potential to work and earn, as well as hindering the countries' progress through loss of human capital.

The World Health Assembly Global Nutrition Targets for 2025 and Sustainable Development Goal 2, call for accelerated global action to end hunger, achieve food security and tackle high anaemia rates amongst women of reproductive age(1,2). Deficiencies of iron, vitamin A and zinc disproportionately affect children and women in the region. Even before the onset of the COVID-19 pandemic, nearly half of young children had at least one MND and **one in four children under 5 years and women of reproductive age in the region were anaemic**. The **pandemic has jolted the progress made in recent years** and exposed more individuals to the risk of developing MNDs as a result of the disruption of food, health, education, and social protection systems.

While Southeast Asian countries have been implementing a combination of recommended and evidence-based approaches to improve micronutrient status, comprehensive documentation of these approaches remains unavailable. The following landscape review by the World Food Programme Regional Bureau for Asia and the Pacific presents the overall burden of MNDs and the status of micronutrient interventions to guide programming and advocacy efforts in **Cambodia, Indonesia, Lao People's Democratic Republic, Myanmar, the Philippines, and Timor-Leste.** Looking at epidemiological aspects and programmatic interventions, the analysis also examines MNDs in the context of COVID-19 and explores the importance of a healthy diet that is central to improving nutrition, health, education, and other socioeconomic indicators.

46% **of Southeast Asians could not afford a healthy diet even before the COVID-19 pandemic**

1/4 **children under 5 and women of reproductive age are anaemic in the region**

The review found that the **governments in the region are committed to addressing MNDs using different approaches** such as dietary diversification, micronutrient supplementation, food fortification and biofortification through food, health, education, and social protection systems. Nutrition interventions complemented with actions from other relevant systems such as health, water, sanitation, and hygiene (WASH) play a vital role in addressing nutritional and non-nutritional drivers of MNDs. Implementing a context-based, quality intervention package on an appropriate scale with intensity and continuity is needed to achieve maximum benefits.

Children under 5 years and pregnant women are the main beneficiaries of large-scale micronutrient supplementation, specialised nutritious food, nutrition counselling and health services. Meanwhile, school-age children, adolescents, and women of reproductive age receive considerably less attention. In addition, national nutrition plans and actions largely overlooked vulnerable groups such as people with disabilities, the chronically ill, and the elderly who also face greater physical, financial, and social barriers to accessing nutritious diets.

In the micronutrient intervention landscape, **conventionally, large-scale micronutrient supplementation** has been adopted as an immediate strategy to address the severe levels of anaemia and vitamin A deficiency in children, adolescents, and women. While vitamin A supplementation programmes targeting children effectively brought down vitamin A deficiencies in the region, iron supplementation programmes across age groups had limited success due to coverage issues. Also, the **coverage of specialised nutritious foods** in managing children with acute malnutrition and those at risk of malnutrition remains very low. The patchy coverage of essential nutrition interventions stems from both supply- and demand-side barriers. The review highlights that actions should continue to improve the quality, reach, and utilisation of micronutrient supplements and specialised nutritious foods, especially targeting the most vulnerable population groups.

Despite growing recognition of investing **in the first 8,000 days** as key to building human capital, school children and adolescents (5-19 years) are largely overlooked in nutrition

surveys. Limited data impedes the planning and monitoring of micronutrient interventions. School meals are a crucial social safety net that ensures at least one nutritious meal daily. All countries reviewed, except for Indonesia, have an ongoing school meal programme mainly targeting children in areas with higher food insecurity. The scale of implementation varies, however, and programmes continue to strive for better quality, coverage, diversity, and food safety. Apart from school meals, Indonesia and the Philippines provide weekly iron supplements to adolescent girls.

Actions are needed to improve comprehensive **school-based health and nutrition package** with improvement required in quality, safety aspects along the value chain, and coverage of school meals, targeting out-of-school children and vulnerable populations, as well as complementing actions such as nutrition education, essential health, and WASH services. The success of school-based nutrition interventions requires robust political commitment reflected in policy framework, budget allocation, inter-ministerial coordination, implementation, and community and private sector engagement.

Over the past decade, **food fortification** has also caught policymakers' attention as an effective food-based intervention to improve nutrient intake of a target population and benefit people in settings where anaemia is a public health problem and where other MNDs are widespread. Given that Asia accounts for 90 percent of global rice consumption, rice fortification emerges as a vital strategy, in addition to other fortified staples, to fill micronutrient deficits and reduce equity gaps. Maximising coverage calls for an enabling environment and commitment to scaling up without compromising the quality of fortification and mass awareness-generating activities.

In the Southeast Asia region, governments have been adopting targeted modalities to supply fortified foods to vulnerable groups through social safety nets such as school meals (Cambodia, the Philippines, Lao People's Democratic Republic (PDR) and emergency assistance programmes (Myanmar). However, more opportunities and effective targeting mechanisms to link fortified foods with social safety nets need to be explored.

Evident from the data on diets and utilisation of nutrition services, current awareness generation efforts fell short in modifying dietary and health-seeking behaviour. This calls for designing **evidence-based, social behaviour change (SBC) strategies, with comprehensive monitoring systems**, to promote recommended behaviours towards the uptake of micronutrient-rich, diverse diets and micronutrient supplements. Prerequisite to designing effective nutrition programmes (including SBC) for addressing the nutritional needs of vulnerable groups is the need to bridge the existing data gaps through comprehensive surveys and secure those groups through responsive social safety nets.

In the short term, governments and partner organisations should collaborate to fill **the data gap on the current situation of micronutrient deficiencies** and their drivers. Furthermore, addressing the high levels of anaemia warrants improving quality, reach, and uptake of micronutrient supplementation programmes in targeted vulnerable groups. In the medium-to-long-term, governments must ensure more production and equitable accessibility of diverse foods to provide the nutrients for a population to live a healthy life without MNDs. **This calls for commitment and investment to reshaping the food systems and policies to increase the production and access to local, fresh, and diverse foods**. In this whole agenda of addressing MNDs, **ensuring no one is left behind** is paramount, calling for more inclusive, interconnected systems- food, health, education, and social protection - to provide better nutrition, especially to the most vulnerable groups.

Combating the MND epidemic calls for delivering micronutrient-rich diets and quality micronutrient interventions—and creating their demand—through commitment to establishing and harmonising policies across relevant sectors, coordination between government ministries, and partnership with the private sector, to bring Southeast Asian countries closer to better health, better education, and better lives.

Acknowledgements

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Acronyms

CoTD	Cost of the Diet
DHS	Demographic Health Surveys
FBF	Fortified Blended Food
FNG	Fill the Nutrient Gap
GHO	Global Health Observatory
IDD	Iodine Deficiency Disorders
IFA	Iron and Folic Acid
IYCF	Infant and Young Child Feeding
LNS	Lipid-based Nutrient Supplements
MAM	Moderate Acute Malnutrition
MNDs	Micronutrient deficiencies
MNP	Multiple Micronutrient Powders
MMT	Multiple Micronutrient Tablet
MUIC	Median Urinary Iodine Concentration
PLW	Pregnant and Lactating Women
RUSF	Ready-to-Use Supplementary Foods
RUTF	Ready-to-Use Therapeutic Foods
SAC	School-aged children
SAM	Severe Acute Malnutrition
SNF	Specialized Nutritious Foods
SNP	Supplementary Nutrition Program
SOFI	State of Food Security and Nutrition
UNICEF	United Nations Children's Fund
VAD	Vitamin A deficiency
VAS	Vitamin A supplementation
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme
WHO	World Health Organization
WIFS	Weekly Iron and Folic Acid Supplementation
WRA	Women of Reproductive Age

1. Introduction

Micronutrients are essential for growth, body and immune functions, cognitive development, and overall good health. Micronutrient deficiencies (MNDs) or **"hidden hunger"** are a global public health problem affecting 2 billion people. The Southeast Asia region presents a paradox: despite steady economic growth, agricultural advancement and reduction in poverty, the region grapples with malnutrition challenges encompassing both undernutrition and overweight and obesity, with the presence of micronutrient deficiencies running through both sides of the malnutrition spectrum. Deficiencies of iron, folate, vitamins A, B, D, and zinc are pervasive in the population, while, children, women, and poor and marginalised communities are at the greatest risk (3–5).

Poor diets, diseases, helminthic infections and higher physiological requirements during pregnancy, lactation, adolescence and childhood are the **common contributors to MNDs** (4). Micronutrient deficiencies can cause visible severe health conditions, including the risk of mortality, but as the term "hidden hunger" indicates, most often, the signs of MNDs are not visible in those affected by it. The coexistence of high rates of stunting and anaemia in the region prevent children from reaching their developmental potential (6,7). Even mild to moderate deficiencies of micronutrients can have **lifelong negative consequences** for growth, mental and cognitive development, health, school performance, working capacity, and economic productivity (8,9).

Micronutrient deficiencies add **substantial economic costs through loss of human capital** and increased burden on the healthcare system. The World Bank estimates that countries lose up to 5 percent of GDP to iron-deficiency anaemia, vitamin A and iodine deficiencies (8,10,11). The World Health Organisation (WHO) estimates that 19 percent of child deaths globally could be attributed to zinc, vitamin A, and iron deficiencies. Iron, vitamin A and zinc deficiencies also cause 6 percent of global disability-adjusted life years (DALY) (12).

Micronutrient interventions have been proven effective and are ranked among the most urgently needed interventions in the world. The Copenhagen Consensus conferences of 2004 and 2008 ranked micronutrient programmes as a top development priority (13). Improving nutrition is also critical in achieving Sustainable Development Goal (SDG) 2 which targets ending malnutrition in all its forms (1). Furthermore, the World Health Assembly (WHA) Global Nutrition Targets for 2025 call for accelerated global action to end hunger, achieve food security and reduce anaemia in women of reproductive age (WRA) by 50 percent (2).

To achieve these global targets, Southeast Asian countries have been extensively piloting and implementing nutrition interventions at varying scales to address MNDs. However, a comprehensive, up-to-date overview of the situation of micronutrient deficiencies and interventions remains unavailable.

This landscape review aims to gather information on the MND burden in Southeast Asia countries and compiles existing micronutrient policies and interventions by country and age group. The report also identifies gaps, bottlenecks in programmes addressing MNDs or improving micronutrient intake, explores opportunities, and provides broad recommendations to guide future programming and advocacy efforts in the region. The report also highlights the potential of relevant systems- food, health, education, social protection and water, sanitation, and hygiene (WASH) - to deliver healthy diets to all, with a particular focus on vulnerable age groups. The countries included in the review are **Cambodia, Indonesia, Lao People's Democratic Republic (PDR), Myanmar, the Philippines, and Timor-Leste.**

2. Methods

The review used two broad dimensions – epidemiological aspects and programmatic interventions - to build a comprehensive understanding of the MND situation in Southeast Asia. First, the epidemiological aspects are described, examining the current prevalence, trends, and drivers of MNDs among vulnerable groups.

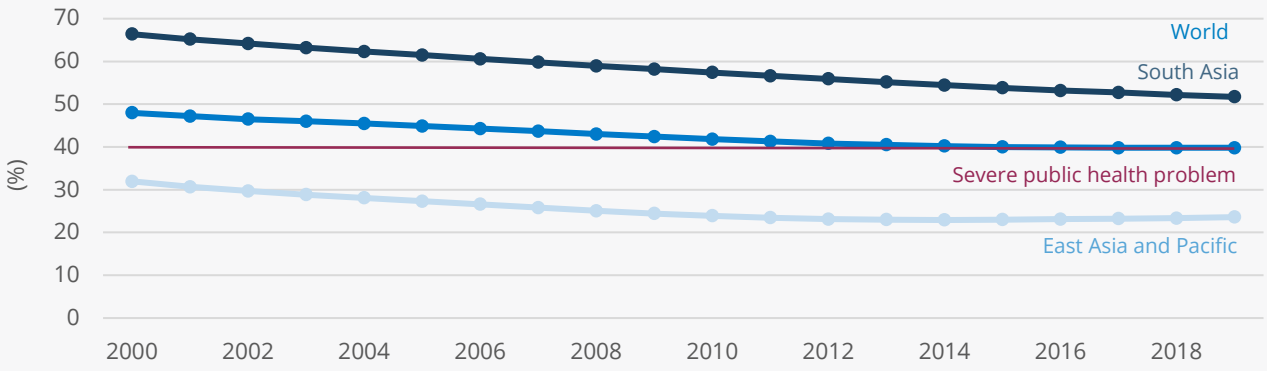
Second, the programmatic interventions are summarised through a review of existing policies and programmes, their coverage, utilisation, gaps and operational constraints towards delivering critical nutrition interventions. To examine these dimensions, publicly available national nutrition and health surveys, programme documents of government, UN agencies, other development partners and academic articles related to MNDs were reviewed.

3. Situation of Micronutrient Deficiencies

One in five infants and young children are not growing well in Southeast Asia and the Pacific region, and nearly half have at least one micronutrient deficiency. Anaemia affects a sizable proportion of the population in the region. The Global Health Observatory (GHO) estimates that **one in four children under 5 and women of reproductive age (WRA) are anaemic in East Asia and the Pacific**. Though the regional estimates are below the global and South Asia prevalence, the data indicate anaemia as a 'moderate' public health problem (prevalence >20 percent) in the region (Figures 1 and 2) (14).

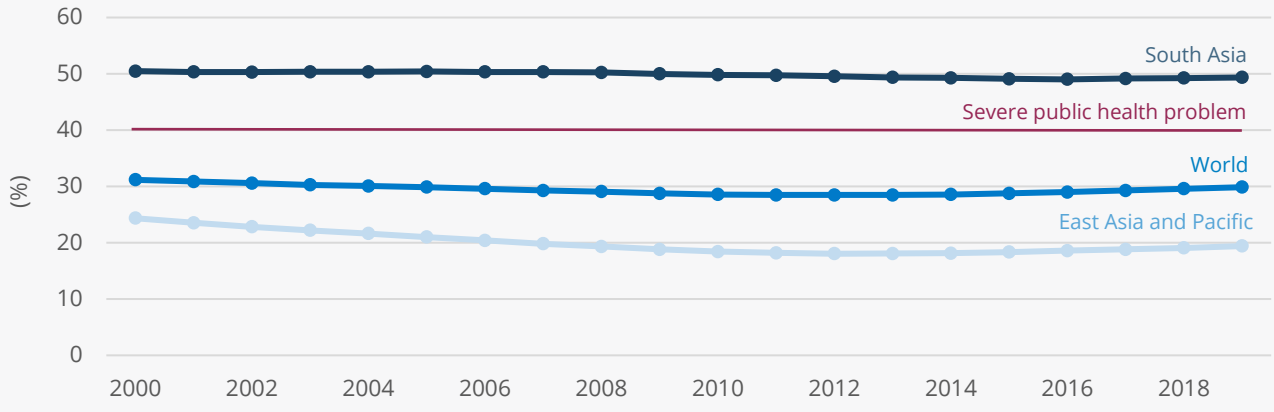
Regional estimates of deficiencies in micronutrients such as folate, vitamins A, B, C, and D, zinc, and calcium are unavailable. National data on the MNDs mentioned above were limited in all six countries- Cambodia, Indonesia, Lao PDR, Philippines, Myanmar, and Timor-Leste-especially for school-aged children, adolescents, and women. Evidence shows that single MNDs rarely happen in isolation; multiple MNDs co-exist (15). Despite data scarcity, the high levels of anaemia among children and women indicate the pervasiveness of other MNDs in the region.

FIGURE 1: PREVALENCE OF ANAEMIA IN CHILDREN UNDER 5 IN EAST ASIA, PACIFIC, AND THE WORLD



SOURCE: World Bank, ourworldindata.org/micronutrient-deficiency

FIGURE 2: PREVALENCE OF ANAEMIA IN WOMEN OF REPRODUCTIVE AGE IN EAST ASIA, PACIFIC AND THE WORLD



SOURCE: World Bank, ourworldindata.org/micronutrient-deficiency

The review found a major challenge with the micronutrient data as either the national estimates are not available or not current[1] for MNDs (excluding anaemia), posing difficulties in estimating the actual burden of hidden hunger. It is important to note that the data depicted in this document vary across time and type of survey.

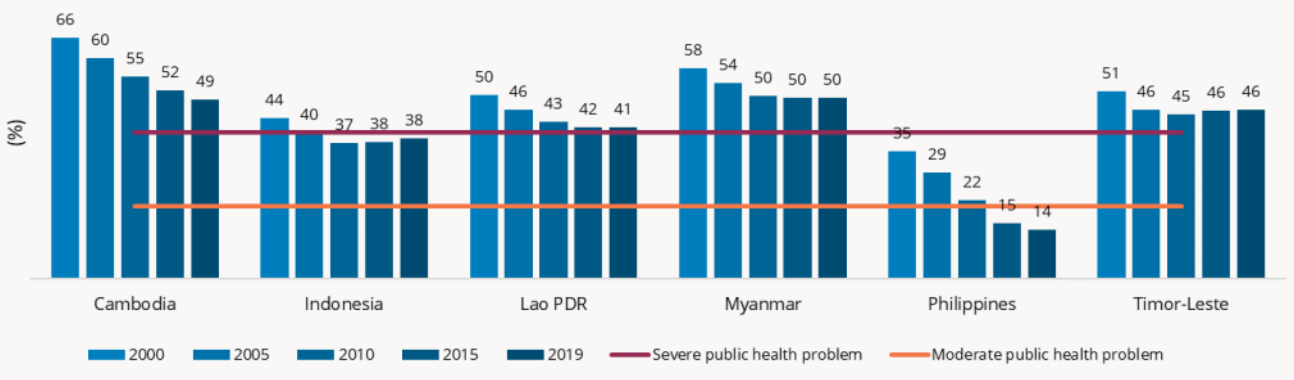
3.1 Prevalence of micronutrient deficiencies

3.1.1 PREVALENCE OF MICRONUTRIENT DEFICIENCIES IN CHILDREN UNDER 5

Nationally representative data on the prevalence of anaemia in children under 5 years is available in all six focus countries. In 2019, Global Health Observatory (GHO) reported anaemia as a 'severe' public health problem among children under 5 years in Cambodia, Lao PDR, Myanmar, and Timor-Leste, with a prevalence of over 40 percent (14). The rates of anaemia in Indonesia and the Philippines indicate anaemia as a 'moderate' public health problem, with over 20 percent prevalence.

Trend analyses of GHO data between 2000 and 2019 showed that the prevalence of childhood anaemia in Cambodia and the Philippines has declined steadily in recent years. By contrast, between 2010 and 2019, Indonesia, Lao PDR, Myanmar, and Timor-Leste showed almost no decrease in the anaemia rates (figure 3). It is worth noting that iron deficiency anaemia is quite low in Cambodia (<5 percent) despite the high rate of anaemia (49 percent) due to hemoglobinopathy that is estimated to affect one-third of the population, and zinc deficiency and helminthic infection (16,17).

FIGURE 3: TRENDS IN CHILDHOOD ANAEMIA IN CHILDREN UNDER 5 YEARS



SOURCE: Global Health Observatory data repository, WHO

Vitamin A deficiency (VAD) has significantly declined in Southeast Asia in the past two decades owing to improvements in general nutritional status and water and sanitation systems (for diarrhoea), vaccination for measles, and vitamin A supplementation (18). However, VAD prevalence varies within the region (18). VAD is a 'mild'[2] public health problem in Cambodia and Timor-Leste, a 'moderate'[3] public health problem in the Philippines and a 'severe'[4] public health problem in Lao PDR (16,19–21). Indonesia made significant progress in reducing VAD as it is no longer a public health problem among children aged 2-5 years (22). However, studies from Indonesia indicate that VAD is clustered (23,24). For instance, an evaluation study (2012) from West Java showed that VAD affected approximately 18 percent and 10 percent of children aged 6–11 months and 2–9 years, respectively (24).

Up-to-date data on folate, vitamins B and D, zinc, and iodine deficiencies among children under 5 years is scarce (Table 1). However, moderate to high levels of anaemia and stunting among children under 5 years in Southeast Asian countries suggest there is a high likelihood that other MNDs are also pervasive (7,25).

1 More than five years old for most of the countries
2 Mild: with a prevalence of ≥2percent-< 10percent
3 Moderate: with a prevalence of ≥10percent-< 20percent
4 Severe: with a prevalence of ≥20percent

While there is no national data available, it is generally presumed that deficiencies of vitamins B such as thiamine, riboflavin, and niacin affect vulnerable groups within countries. Thiamine deficiency is a known issue in Cambodia, Lao PDR, and Myanmar, and reports have highlighted the persistence of thiamine deficiency as a cause of infant mortality in South and Southeast Asia. Cases of infantile beriberi were consistently identified among infants in the health clinics of Cambodia. A nationally representative survey of under-5 mortality in Myanmar also reported beriberi as the second leading cause of death, accounting for 17 percent of deaths in infants aged 1–12 months. A survey of 22 villages in northern Lao PDR reported thiamine deficiency as a major cause of infant mortality among ethnic groups (26–28).

National nutrition surveys in Cambodia and Indonesia estimated the prevalence of vitamin D deficiency[5] to be an emerging micronutrient problem in children under 5. Over 15 percent and 30 percent of children in Cambodia and Indonesia were affected by vitamin D deficiency (<50 nmol/L), respectively (figure 4). Zinc deficiency in the Philippines and Timor-Leste affects more than a fifth of children under 5. None of the other countries, excluding Cambodia, captured comprehensive data on the prevalence of vitamin B, folate, iodine, and calcium deficiency. Notably, except for the Philippines, the data from the other five countries is outdated and thus, do not reveal the current situation, requiring cautious interpretation.

TABLE 1 : PREVALENCE OF VITAMIN A, D, AND ZINC DEFICIENCIES IN CHILDREN UNDER 5 YEARS (PERCENT)

	Vitamin A	Vitamin B12	Vitamin D	Zinc	Calcium	Folate
Cambodia	9.2	1.7	15.3 (50)	64.4	<1	8
Indonesia*	<1	-	34.9-42.8**	-	-	-
Lao PDR	30	-	-	-	-	-
Myanmar	38***	-	-	-	-	-
Philippines	16.9	-	-	21.6	-	-
Timor-Leste	8.1	-	-	34	-	-

Source: Cambodia DHS 2014, Indonesia SEANUT 2014, Lao PDR MICS 2006: UNSCN 2010, Myanmar NNC 2012, Philippines ENNS 2018, Timor-Leste Food and Nutrition Survey 2013

3.1.2 PREVALENCE OF MICRONUTRIENT DEFICIENCIES IN SCHOOL-AGED CHILDREN AND ADOLESCENTS

Table 2 shows that there is a massive information gap on the micronutrient situation of school-aged children (SAC) (6-9 years) and adolescents (10-19 years). The data on vitamins A, B, and D, folate, and zinc deficiency was largely unavailable in all six countries. Furthermore, different national surveys assessed different sub-sets of the broad age group (5-19 years) or focus only on adolescent girls or are outdated, making it difficult to determine the actual burden of MND in these countries and the region.

Available estimates of anaemia range from 8 percent in the Philippines to 51 percent in Myanmar, indicating mild to severe levels of anaemia within this population's sub-groups. Two countries - Cambodia and Timor-Leste - have no published national data on the micronutrient levels of SAC and adolescents.

A small survey in primary school in North Okkalapa Township (Yangon) in Myanmar showed 70 percent of children aged 5-10 years had zinc deficiency (29). A recent systematic review (2021) of available studies found that anaemia ranges from 8 percent in the Philippines to 99 percent in Indonesia (Table 3). The review also presented the proportion of SAC and adolescents affected by VAD (1-11 percent), vitamin D (15-100 percent) and zinc (22-70 percent) in the Southeast Asia and Pacific region (30).

5 Lack of global consensus on the cut-off values for serum vitamin D concentration, surveys in Cambodia and Indonesia used (<50 nmol/L) to estimate the burden on vitamin D

TABLE 2: PREVALANCE OF MICRONUTRIENT DEFICIENCIES IN SCHOOL-AGED CHILDREN (5-9 YEARS) AND ADOLESCENTS (10-19 YEARS) (PERCENT)

	Age (in years)	Anaemia	Iron	Vitamin A	Vitamin D	Iodine
Cambodia	-	-	-	-	-	-
Indonesia	5-12	12.9-11.7*	1.9-5.3*	0.6-1.1*	46.6-45.1*	
Lao PDR	-	-	-	-	-	
Myanmar	5-9	51.1	-	-	-	2***
	10-14**	29.8	-	-	-	
Philippines	6-10	12-24	-	-	-	11-14.5
	13-19	8.1 (All) 5.2 (Male) 11.1 (Female)	-	-	-	
Timor-Leste	-	-	-	-	-	-

*Prevalence of MNDs by areas of residence (Urban-Rural), **only adolescent girl, ***6-11 years (2006)

TABLE 3: SUMMARY OF AVAILABLE STUDIES DESCRIBING THE PREVALENCE OF ANAEMIA, IRON DEFICIENCY ANAEMIA IN SCHOOL-AGED CHILDREN AND ADOLESCENTS

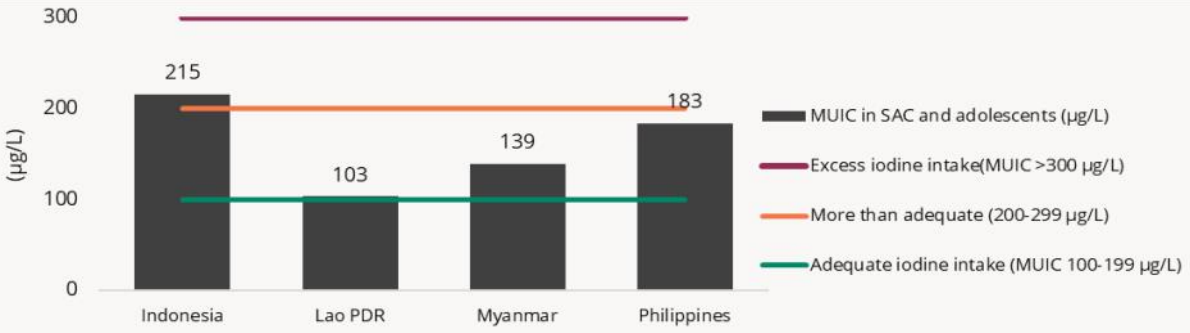
	Studies included (multi-country)	Anaemia	Iron deficiency anaemia
Cambodia	4 (1)	15.1-49.4	-
Indonesia	7(1)	14.0-98.5	6.0-13.5
Lao PDR	1(1)	42.5	-
Myanmar	2(1)	45.4-59.1 (girls)	35.5
Philippines	5(1)	7.7-12.5	-
Timor-Leste	1(1)	19.5 (boys)-20.9 (girls)	-

Source: The nutritional status of children and adolescents in East Asia and the Pacific and successful interventions to reduce malnutrition: a scoping review, 2020

The Global Scorecard of Iodine Nutrition (2021) reported that four countries - Indonesia, Lao PDR, Myanmar and the Philippines - had optimal[6] iodine intake based on median urinary iodine concentration (MUIC) data from surveys of SAC (Figure 4) (31).

While most children and adolescents have normal iodine levels, a few studies have reported iodine deficiency disorders (IDD) in pockets within countries. For instance, a study in Tuguegarao, Philippines (2014) indicated that about 4 percent of high school children had iodine deficiency (MUIC <100 µg/dL) while 38 percent had an excessive intake of iodine with MUIC ≥300 µg/dL (32). Another study (2012) in three elementary schools in Brebes district (in Indonesia) estimated 53 percent of children with goitre (33). However, the lack of recent survey data on iodine deficiency, disaggregated based on region/provinces, is a problem in determining areas endemic in IDDs.

FIGURE 4: MEDIAN URINARY IODINE CONCENTRATION IN SCHOOL-AGED CHILDREN AND ADOLESCENTS (µG/L)



Source: Global scorecard of iodine nutrition (2021)

6 Adequate iodine intake in school-age children corresponds to median UIC values in the range 100-299 µg/L, and includes categories previously referred to as "Adequate" (100-199 µg/L) and "More than adequate" (200-299 µg/L)

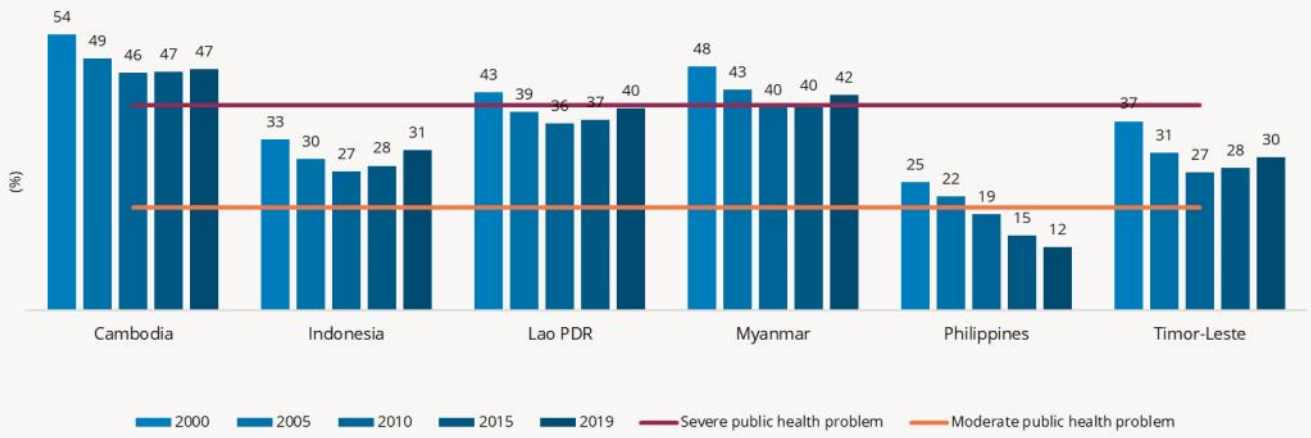
3.1.3 PREVALENCE OF MICRONUTRIENT DEFICIENCIES IN WOMEN OF REPRODUCTIVE AGE AND PREGNANT WOMEN

Maternal anaemia is linked with higher morbidity and mortality during delivery and poor birth outcomes, including spontaneous abortion, prematurity, low birth weight, and low iron stores in newborns and infants.

Anaemia levels have stagnated among WRA and pregnant women in Southeast Asia (34). Anaemia[7] is deemed a moderate[8] to severe[9] public health problem among WRA in the region (14). The range of anaemia prevalence in six countries is quite wide—from 12 percent of WRA in the Philippines to roughly three times higher in Cambodia, Lao PDR, and Myanmar. The 2019 data of all six countries showed that the prevalence of anaemia among pregnant women—who have significantly higher iron requirements—was higher than the WRA who were neither pregnant nor lactating.

Between 2010 and 2019, five countries-Cambodia, Indonesia, Lao PDR, Myanmar, Timor-Leste - showed an increase in anaemia by 1-4 points in WRA, while the Philippines documented a small but consistent reduction in anaemia by 7 points. During the same period, trend analyses of GHO data indicated five countries showing either a plateau (Cambodia and Lao PDR) or deterioration (Indonesia, Myanmar, and Timor-Leste) in anaemia status among pregnant women (Figure 5,6). Based on the current reduction rates, five countries, except the Philippines, may miss the Global Nutrition target of 50 percent reduction of anaemia in WRA by 2025, from the baseline indicator set in 2012.

FIGURE 5: ANAEMIA TRENDS AMONG WOMEN OF REPRODUCTIVE AGE (PERCENT)



SOURCE: Global Health Observatory data repository, WHO

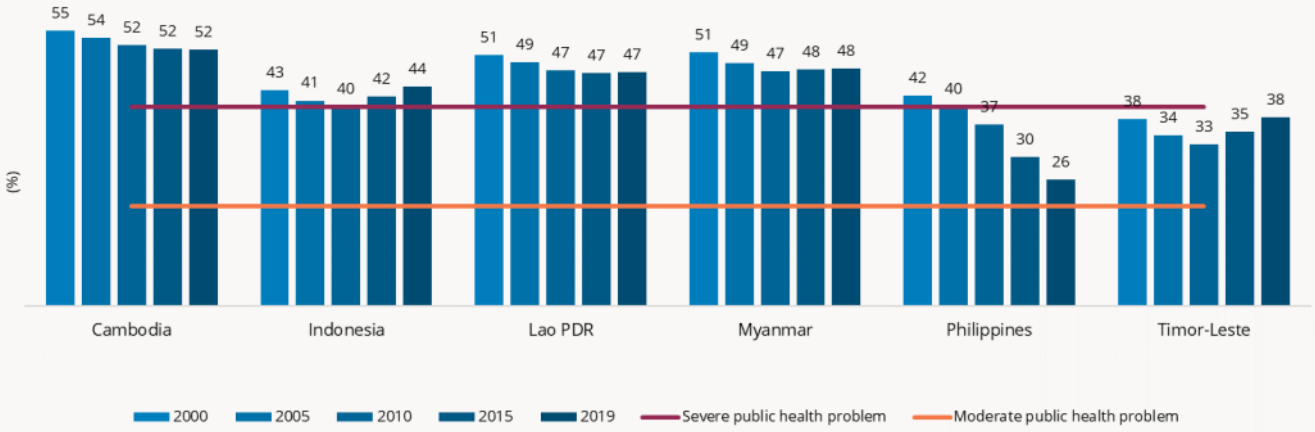
Apart from anaemia, data on other micronutrient deficiencies among women is scarce. Three countries estimated VAD, ranging from 1 percent in the Philippines to 14 percent in Timor-Leste (20,35). Data on vitamins B and D, folate, calcium was largely unavailable. Only Cambodia reported on other MNDs. About 19 percent and 31 percent of WRA are deficient in folate and vitamin D, respectively. It is essential to consider the impact of nutritional factors and staying indoors that restricts exposure to sunshine, limiting vitamin D metabolism. Iodine deficiency affects one in ten WRA in the Philippines and one in four WRA in Timor-Leste. In the Philippines, zinc deficiency affects 14 percent and 25 percent of pregnant and lactating women. A small proportion of pregnant (3 percent) and lactating (2 percent) women also are deficient in vitamin A (16,20,21,35) (Table 4).

7 It is estimated that 50percent of anaemia in the South Asian population is due to low dietary intake of iron and other causes of anaemia include malaria, other nutritional deficiencies (especially folate and vitamins B12, A and C), and genetic conditions (including sickle cell disease, thalassemia – an inherited blood disorder) and chronic inflammation.

8 Prevalence of anaemia: 20.0–39.9: Moderate public health problem

9 Prevalence of anaemia: ≥ 40.0: Severe public health problem

FIGURE 6: ANAEMIA TRENDS AMONG PREGNANT WOMEN (PERCENT)



SOURCE: Global Health Observatory data repository, WHO

TABLE 4: PREVALENCE OF VITAMIN A, D, AND ZINC DEFICIENCIES IN WOMEN OF REPRODUCTIVE AGE (PERCENT)

	Vitamin A	Vitamin B1	Vitamin B12	Vitamin D	Calcium	Folate	Iodine
Cambodia	3.2		1.1	30.9	<1	19.2	-
Indonesia	-		-	-	-	-	-
Lao PDR	-		-	-	-	-	-
Myanmar	-	6.8* 4.4**	-	-	-	-	-
Philippines	1.3	-	-	-	-	-	11.3
Timor-Leste	13.5	-	-	-	-	-	26.7

Source: Cambodia Demographic Health Survey (DHS) 2014, Myanmar NNC 2009, Philippines ENNS 2018, Timor- Leste Food and Nutrition Survey (TLFNS) 2013. *Pregnant women, ** Lactating women

3.1.4 PREVALENCE OF MICRONUTRIENT DEFICIENCIES IN THE ELDERLY POPULATION

Population ageing is a global phenomenon and has been fastest in Southeast Asia. Between 2019 and 2050, the proportion of older persons is projected to double in four regions, including Southeast Asia (36). The elderly population is often at a greater risk of MNDs, yet they are not prioritised in national nutrition surveys (37). Except for Indonesia and the Philippines, no country has national-level data on anthropometry and MNDs in the elderly group. In Indonesia, more than a quarter of the elderly aged 55-64 (25 percent), 65-74 (32 percent), and >75 (42 percent) are anaemic (38). In the Philippines, a fifth of those aged 60 and above are anaemic and iodine deficient (20).

3.1.5 DISPARITIES IN THE PREVALENCE OF MICRONUTRIENT DEFICIENCIES BASED ON THE GEOGRAPHIC LOCATION, AREA OF RESIDENCE, INCOME, ETHNICITY WITHIN COUNTRIES

The differences in the prevalence of micronutrient deficiencies based on region, area of residence, wealth index, and ethnicity are evident.

Patterns in the prevalence of MNDs by geographic location

In Cambodia, the prevalence of anaemia among children and women varies between provinces. Among children, the rates of childhood anaemia range from 40 percent in Banteay Meanchey to 69 percent among children in Preah Vihear/Stung Treng. Among women, anaemia rates range from 31 percent in Banteay Meanchey to 54 percent in Preah Vihear/Stung Treng (16).

In the Philippines, children aged 6-12 years living in NCR island (30 percent) are more deficient in vitamin D (<50 nmol/L) than those living in Mindanao (6.9 percent), Luzon (6.6 percent) and Visayas (5 percent). A significantly higher prevalence of vitamin D deficiency in NCR can be attributed to urbanisation associated with children spending more time indoors playing computer games or watching television (39).

In Myanmar, a wide disparity in childhood anaemia rates is evident. Anaemia affects a three times higher proportion of children in the Rakhine state (52 percent) than those living in Chin (17 percent). SAC (5-9 years) from Tanintharyi region (67 percent) have higher anaemia rates followed by Rakhine state (65 percent) and Mon state (64 percent) while lowest was reported among those living in Kayah state. Likewise, the Rakhine state (51 percent) and the Kayah state (12 percent) reported the highest and the lowest prevalence of anaemia among adolescent girls, respectively. Among WRA and pregnant and lactating women, higher anaemia rates are observed in Rakhine (49 percent), Nay Pyi Taw (54 percent) and Taninthayi (54 percent), respectively, than in Chin (17 percent) for WRA and Kayah for pregnant (21 percent) and lactating women (7 percent) (40). In Timor-Leste, anaemia affects a higher proportion of children (74 percent) and WRA (51 percent) in Bobonaro than children (52 percent) and WRA (26 percent) living in Aileu and Manufahi, respectively (20).

Region-wise segregated data on MNDs from Indonesia and Lao PDR is not available. However, studies show regional disparities in the prevalence of MNDs. In Indonesia, though VAD is no longer a public health concern, an evaluation study (2012) on fortified vegetable oil in West Java found that VAD affected 18 percent and 10 percent of children aged 6–11 months and 2–9 years, respectively (24). Even though the evaluation was conducted in only 24 villages, it demonstrated that the national VAD estimates might mask sub-national variations. In Lao PDR, anaemia disproportionately affects more children and WRA in central and southern provinces than in northern provinces (41,42). Furthermore, deficiencies of vitamin B1 (Beri Beri) are commonly observed in the Lao's northern highlands (43).

Patterns in the prevalence of MNDs by rural-urban areas

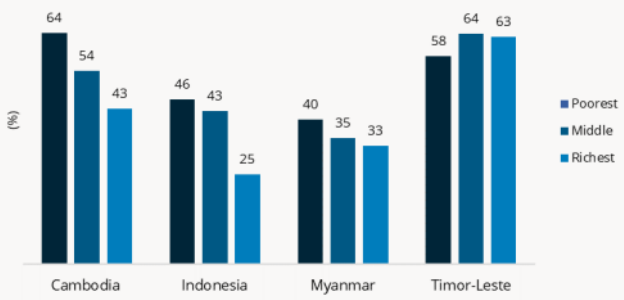
Anaemia is a pervasive problem affecting both rural and urban populations; however, a common trend towards a higher prevalence is observed in rural areas. In Cambodia, anaemia disproportionately affects a higher proportion of children (57 percent vs 43 percent) and women (47 percent vs 39 percent) living in rural areas compared to their counterparts living in urban areas. On the contrary, deficiencies of vitamin-A (14 percent vs 9 percent) and folic acid (18 percent vs 7 percent) are more prevalent among children in urban areas than rural areas (16).

In Myanmar, anaemia affects an almost equal proportion of children (36 percent vs 34 percent), SAC (53 percent vs 48 percent), adolescent girls (29 percent versus 31 percent), and WRA (31 percent vs 29 percent) living in rural areas than those in urban areas. Rural and urban disparities in anaemia rates are more evident among pregnant (42 percent vs 35 percent) and lactating women (38 percent vs 28 percent)(40). In Indonesia, anaemia rates do not differ significantly among children residing in rural areas (19 percent) than urban areas (18 percent) (22). Similarly, in the Philippines, there is no rural-urban (12 percent vs 11 percent) difference in rates of anaemia among WRA (20). As an exception, in Timor-Leste, anaemia disproportionately affects children (65 percent vs 62 percent) and WRA (47 percent vs 36 percent) in urban areas than rural areas (21).

Patterns in the prevalence of MNDs by wealth index

In Cambodia, Indonesia, Myanmar and the Philippines, children and WRA living in rural areas and those belonging to low-income households are disproportionately affected by anaemia, vitamin A and zinc deficiency, compared to their counterparts living in urban areas and those from high-income families (20,40,44–46). As an exception, Timor-Leste reveals higher rates of anaemia among children with increasing household wealth than those from the poorest households (21)(Figure 7).

FIGURE 7: DISPARITIES IN ANAEMIA RATES IN CHILDREN UNDER 5 YEARS BASED ON WEALTH QUINTILE (PERCENT)



Source: Cambodia DHS 2014, Indonesia SEANUTS 2011, Myanmar Micronutrient and Food Consumption Survey (2017-18), TLFNS 2013

Patterns in the prevalence of MNDs by ethnicity

Segregated MND data based on ethnicity is scarce in the region. However, a few studies from Lao PDR unveiled existing disparities in the anaemia rates in different ethnic groups. In Lao PDR, children aged 6-59 months from Hmong-Mien ethnicity have reduced odds of developing anaemia than children from Mon-Khmer ethnic group (41). Similarly, WRA from Hmong-Mien ethnicity had reduced odds of anaemia than the Lao-Tai group (42).

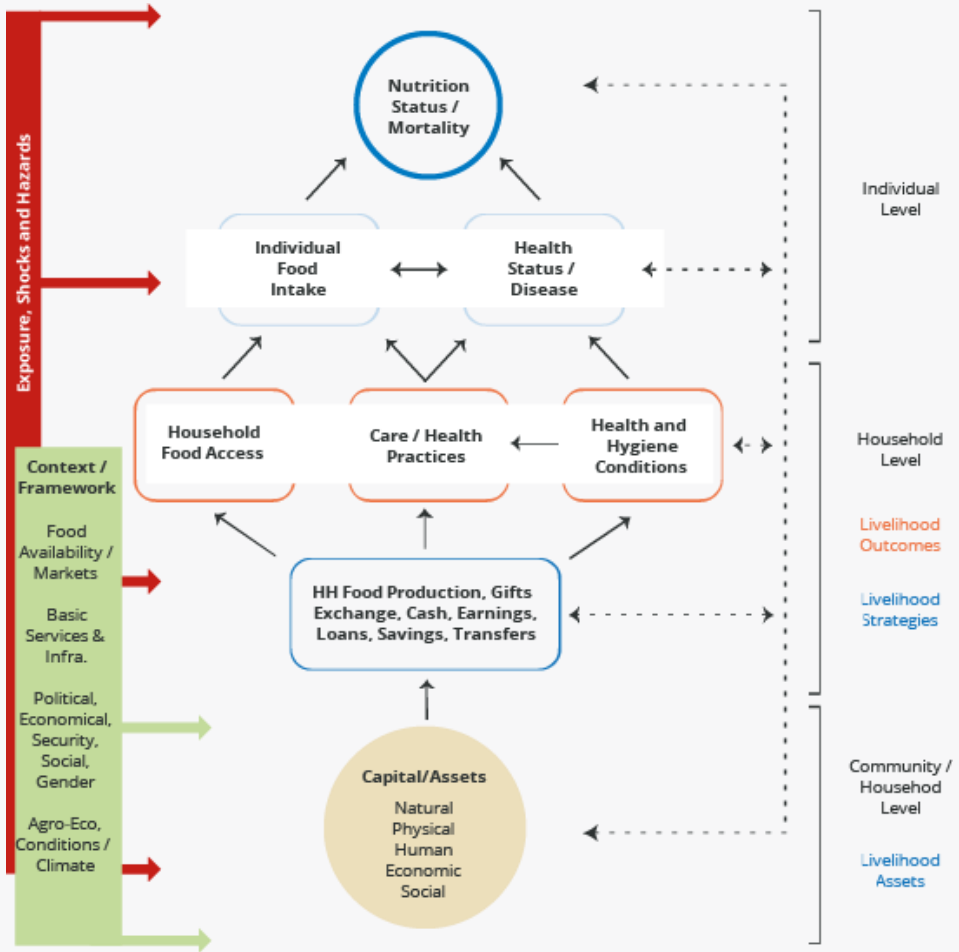
Relevant data from different aid agencies and healthcare providers have captured the MND situation of the Rohingya ethnic population in Myanmar and adjacent host countries. However, it is challenging to build a comprehensive overview of the nutrition among the Rohingya people in Myanmar due to the absence of vital registry data or census data. In 2017-18, nearly half of children (47.9 percent) were anaemic in informal settlements in Cox's Bazar district, Bangladesh (47). The malnutrition crisis is presented in the United Nations' documentation of more than 200 cases of beriberi among all Rohingya arriving in Malaysia since 2014 (48).

3.2 Drivers of micronutrient deficiencies in Southeast Asia

Identifying the potential causes of MNDs is critical for a thorough understanding of the region's MND situation and designing appropriate interventions to tackle the problem. In Southeast Asia, while a relatively higher number of studies looked at the risk factors of anaemia, the body of evidence on drivers of other MNDs remains scarce, underlining the need for more studies to fill the information gap. Based on the global literature and the available studies from the region, this section discusses plausible drivers of MNDs in the context of Southeast Asia.

Figure 8 presents a conceptual framework[10] on food and nutrition security that identifies possible causes of MNDs (49). At the individual level, inadequate dietary intake and diseases are the two immediate causes of malnutrition (including MNDs). These immediate causes, in turn, are

FIGURE 8: CONCEPTUAL FRAMEWORK ON FOOD AND NUTRITION SECURITY



10 Expanded version of the UNICEF conceptual framework on the causes of malnutrition.

influenced by underlying household-level factors such as the household's ability to access food, healthcare and WASH services and the status of the care environment. Broad factors such as geopolitical, socioeconomic, cultural, environmental scenario and institutional infrastructure impact the immediate and underlying factors. This section further elaborates on the immediate causes of malnutrition and its contributing drivers.

3.2.1 FOOD INSECURITY, INADEQUATE FOOD INTAKE AND POOR DIETS

In 2019, the State of Food Security and Nutrition in the World (SOFI) report indicated that about one in five Southeast Asians were exposed to food insecurity.[11] Food insecurity regional estimates have shown fluctuations between 2015 and 2019; it initially rose from 15 percent in 2015 to 20 percent in 2017 and dropped by 1 point in 2019. The global crisis induced by the COVID-19 pandemic will certainly worsen these figures. Food insecurity affects what people eat. Individuals and families experiencing food insecurity due to unavailability of food or lack of resources tend to choose poorer, less diverse diets, increasing their risk of developing micronutrient deficiencies (50).

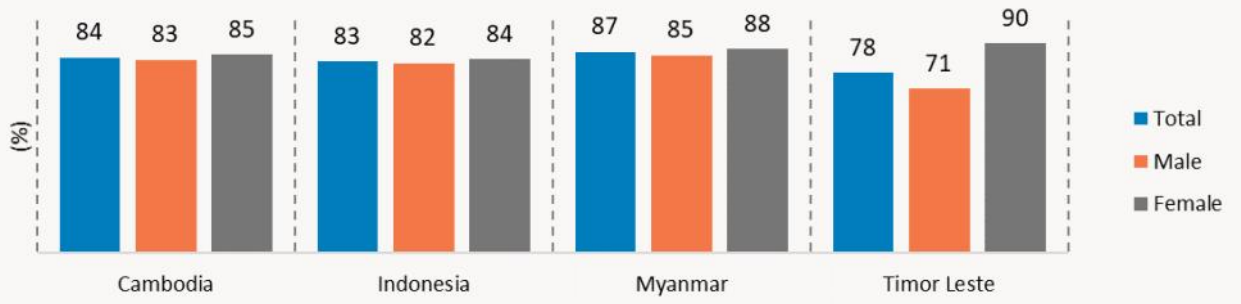
To a significant extent, micronutrient deficiencies can be attributed to low dietary diversity or nutrient density. A large share of the Southeast Asian diet comprises staples, mainly rice, while the consumption of other micronutrient-rich foods, such as fruits, vegetables, pulses and animal-source protein remains low (50–59). Staple foods are a good source of dietary energy and may meet an individual's caloric requirements but usually lack essential nutrients necessary to prevent various MNDs. Limited access to and affordability of diverse and healthy diets[12] due to poverty or poor dietary choices resulting from limited knowledge, socio-cultural norms, preferences, or convenience can contribute to MND burden across various life stages (60,61).

High nutritional needs of women

Women and adolescent girls are particularly vulnerable to MNDs due to increased nutritional requirements caused by the physiological changes during puberty and to make up for the nutrient losses during menstruation. Pregnant and lactating women have additional nutrient needs to carry the foetus to term, replenish the blood loss during delivery, and produce breastmilk for infants. However, often these increased nutritional requirements of women remain unmet due to diets lacking diversity and nutrient-rich foods.

More than 80 percent of adults in Cambodia, Indonesia, Myanmar, and Timor-Leste consume less than the WHO recommended servings (five per day) fruits and vegetables. In general, there is a marginal difference in daily recommended consumption of fruits and vegetables among men and women in Cambodia, Indonesia, Myanmar. In contrast, the difference was significant in Timor-Leste, with females consuming far fewer fruits and vegetables than men (Figure 9). More than 50 percent of WRA and pregnant women in Lao PDR do not meet the minimum dietary diversity (MDD-W)[13] (58). In Timor-Leste, about 65 percent of women met minimum dietary diversity, with a higher proportion in urban areas (67 percent) than in rural areas (50 percent) (62).

FIGURE 9: ADULTS WHO ATE LESS THAN FIVE SERVINGS OF FRUITS AND VEGETABLES PER DAY (PERCENT)



Source: Cambodia WHO STEPwise Approach to NCD Risk Factor Surveillance (STEPS) 2010, Indonesia STEPS 2006, Myanmar STEPS 2014 and Timor Leste STEPS 2014

11 A person is food insecure when they lack regular access to enough safe and nutritious food for normal growth and development and healthy life. This may be due to unavailability of food and/or lack of resources to obtain food

12 This diet provides adequate calories and nutrients (per the energy sufficient and nutrient adequate diets above), but also includes a more diverse intake of foods from several different food groups

13 Women aged 15-49 years who consume at least five out of ten defined food groups the previous day or night

Socio-cultural and economic inequalities further worsen the nutritional vulnerabilities of women. Studies from Southeast Asian countries have documented that cultural practices of restricting nutritious foods in pregnancy and postpartum can exacerbate MNDs in women and their babies (58,63,64). In addition, unequal workload and the added responsibility as primary carers of children and families sit exclusively on a woman's shoulders, depriving women of the time to take care of their child and themselves.

Culturally, in Cambodia, men eat first and receive the most nutritious food at mealtimes, while women eat last (63,65,66). This cultural tendency to prioritize men in food allocation is based on men having greater control over land and assets, access to technology, and training in farming and foraging, and has a detrimental impact on maternal and child nutrition (65–67).

Adolescent mothers and their babies face a higher risk of mortality and malnutrition (68). Within the Asian continent, the adolescent birth rate is higher in Southeast Asia than in South Asia and East Asia (68). Between 1995 and 2015, data show that the prevalence of adolescent births has been stagnant or increasing in Cambodia, Indonesia and the Philippines (69). Child marriage/union prevalence rates range from 14 percent in Indonesia to 35 percent in Lao PDR.

High nutritional needs of young children

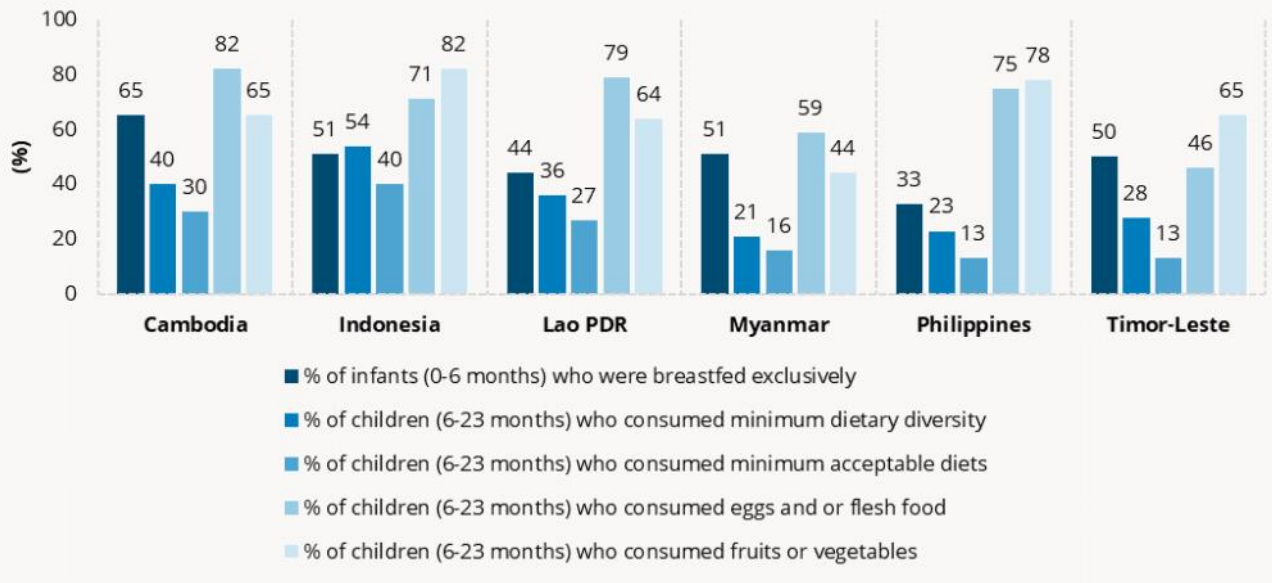
While good nutrition is essential at all stages of life, the diets of infants and young children have a profound and long-lasting impact on their survival, growth, and overall development. Breastfeeding alone provides all vital nutrients and antibodies to infants to survive and thrive in the first six months of life. Yet, rates of early initiation of breastfeeding and exclusive breastfeeding are sub-optimal. Breastfeeding initiation within an hour of birth varies widely across the region, from 25 percent in the Philippines to 50 percent in Lao PDR. Furthermore, only 44 percent of infants in the region receive exclusive breastfeeding in the first six months of life, ranging from 33 percent in the Philippines to 65 percent in Cambodia (70).
From 6 months onwards, breastmilk alone does not meet the infant's energy and nutrient requirements. Hence, it is essential to introduce age-appropriate, diverse, and safe complementary foods while continuing with breastfeeding at least until the age of 24 months. However, the adequacy and quality of young children's diet remain sub-optimal in the region.

Even though a high proportion (75 percent) of children aged 6-23 months are meeting minimum meal frequency requirements, nutrient quality and diversity of diets remain a common issue in all the countries reviewed. The proportion of Southeast Asian infants who meet minimum dietary diversity (MDD) ranges from 21 percent in Myanmar to 54 percent in Indonesia. The proportion of children consuming fruits and vegetables is highest in Indonesia (82 percent) and lowest in Myanmar (44 percent). The indicator on any consumption of eggs or flesh foods is encouraging. More than 70 percent of young children's diet in Cambodia, Indonesia, Lao PDR, and the Philippines include eggs and flesh foods rich in haem iron, zinc, and B vitamins. The minimum acceptable diet (MAD)[14] is alarmingly low in the whole Southeast Asian region (41 percent), ranging from 13 percent in the Philippines and Timor-Leste to 40 percent in Indonesia (Figure 10) (20,70).

The common reasons that prevent mothers and caregivers from feeding children diverse and nutritious diets include cost constraints, limited knowledge about complementary feeding, reliance on processed, packaged foods, and traditional beliefs about consuming certain food items during infancy (65,66,71,72). Furthermore, with increasing urbanisation and participation of women in the workforce, there is a negative shift from traditional diets towards breastmilk substitutes and convenient ultra-processed foods that are usually higher in salt, sugar and fat, and low in micronutrients.

14 Proportion of children 6–23 months of age who receive a minimum acceptable diet (apart from breast milk)

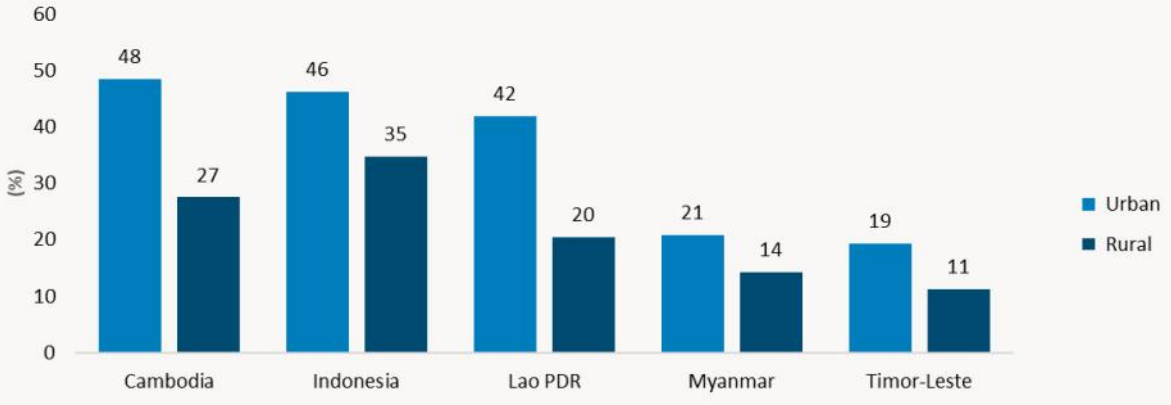
FIGURE 10: STATUS OF INFANT AND YOUNG CHILD FEEDING IN INFANTS AND YOUNG CHILDREN (0-23 MONTHS) (PERCENT)



Source: UNICEF SOFI database 2020

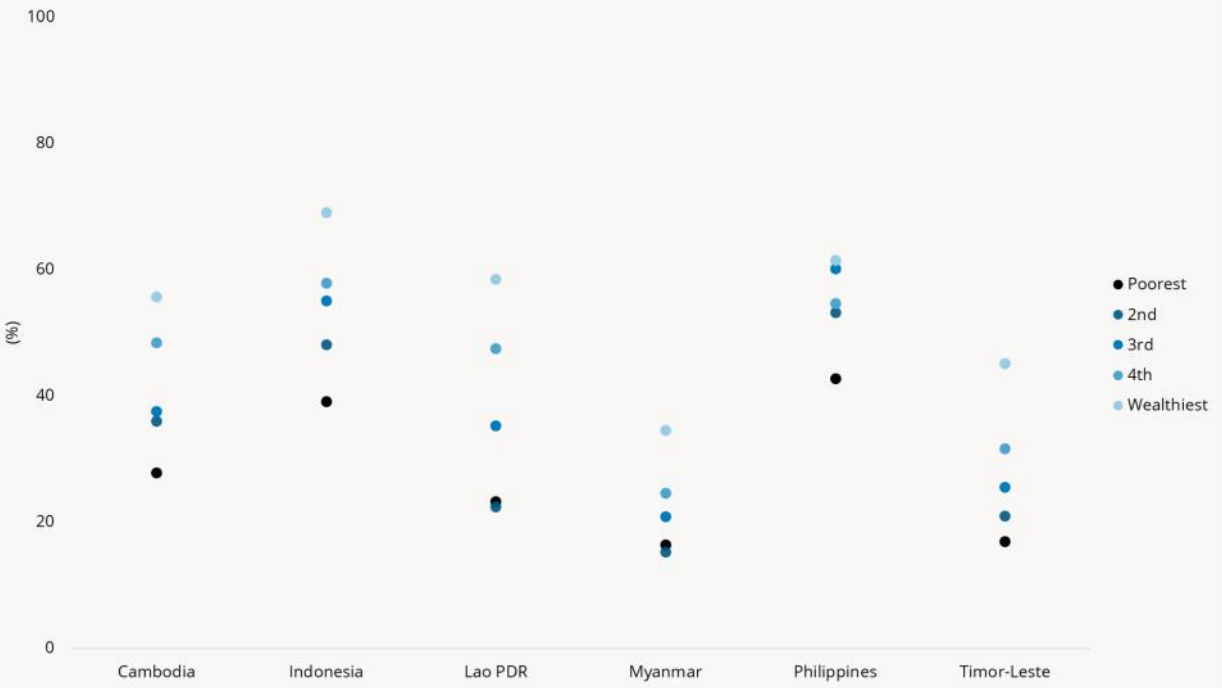
Dietary diversity is lower in children living in poor households and rural areas than those from wealthier families and living in urban areas (Figure 11 and 12). This reflects findings from low-and-middle-income countries broadly, suggesting that socio-economic status is positively associated with consuming nutritious foods such as fruit, vegetables, milk, and fish (73). A recent study that analysed micronutrients in young children's complementary diets indicates significant multiple micronutrient gaps in young children's diets–particularly for iron, zinc, and B vitamins. In contrast, vitamins A and D and calcium gaps remain in specific countries and sub-populations for other micronutrients (74–76).

FIGURE 11: YOUNG CHILDREN (6-23 MONTHS) WHO MET MINIMUM DIETARY DIVERSITY BY URBAN AND RURAL AREAS (PERCENT)



Source: UNICEF SOFI Database 2020

FIGURE 12: YOUNG CHILDREN (6-23 MONTHS) WHO MET MINIMUM DIETARY DIVERSITY BASED ON WEALTH QUINTILE (PERCENT)



Source: UNICEF SOFI Database 2020

Barriers to a healthy diet

Lack of access to nutritious foods is often a result of a combination of the following: limited food availability due to the shortfall in agricultural production; seasonality; climate -related shocks; market inaccessibility; limited affordability; and, in some circumstances, limited social access to food in marginalised ethnic groups. Altogether, these factors may lead to food insecurity and encourage negative coping behaviours, such as cutting down on quantity and diversity of food or buying cheaper and less nutritious food, which in turn could further contribute to macro and micronutrient deficiencies.

Unaffordability of a healthy diet

Nutritious diets remain unaffordable for millions in Southeast Asia. Even before the pandemic, an estimated 46 percent of the population -approximately 325 million people - could not afford a healthy diet[15] (77). One of the key drivers of affordability to a healthy diet is the cost of fruits, vegetables, and animal-source foods that cost substantially more than starchy staples and fats. Therefore, households living on meagre incomes predominantly consume staples and exhibit reduced demand for nutritious foods such as animal source foods, eggs, legumes, vegetables, and fruits, which are relatively expensive and harder to store.

Socioeconomic status has a major influence on dietary intake. Low socioeconomic households across the region experience higher levels of food insecurity and reduced access to nutritious foods (73). The Cost of the Diet (CotD) and Fill the Nutrient Gap (FNG)[16] analyses from Cambodia, Lao PDR, Myanmar, and the Philippines found that unaffordability to nutritious diet[17] varies amongst and within Southeast Asian countries, ranging from 21 percent in Cambodia to 60 percent in Myanmar (figure 13). Analyses showed that meeting the nutritional needs of an adolescent girl and lactating and pregnant woman are the most expensive at the household level (65,66,71,72,78).

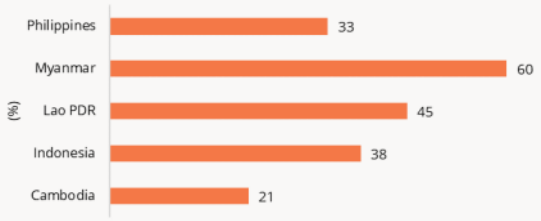
Furthermore, disaggregating fish consumption based on wealth quintiles shows huge inequalities in consumption of aquaculture products between rich and poor, where average consumption per capita is around six times higher among those wealthiest households than those in the poorest. This trend in consumption emphasizes the nutritional risk of vulnerable populations (79).

15 This diet provides adequate calories and nutrients (per the energy sufficient and nutrient adequate diets above), but also includes a more diverse intake of foods from several different food groups. This diet is intended to meet all nutrient intake requirements and to help prevent malnutrition in all its forms, including diet related NCDs

16 FNG- Cambodia (2017), Indonesia (2017), Lao PDR (2017), Myanmar (2019), Philippines (2018)

17 This is the least expensive diet that meets the individual specific WHO/FAO recommended intakes of energy, protein, fat, 9 vitamins and 4 minerals

FIGURE 13: PROPORTION OF HOUSEHOLDS THAT CANNOT AFFORD A NUTRITIOUS DIET (PERCENT)



Source: CotD and FNG report- Cambodia (2017), Indonesia (2017), Lao PDR (2017), Myanmar (2019), Philippines (2018)

Lack of physical access to healthy diets

Aside from economical access, low market access, geographically isolated areas, security restrictions, seasonal fluctuations, discriminatory socio-cultural practices, and the current COVID-19 pandemic can significantly limit people's physical access to markets and compromise their affordability to buy food (65,66,72,80). Women, children, people with illnesses and disabilities, elderly and marginalised communities are often most vulnerable due to challenges they face in accessing safe, healthy, and affordable diets. For example, the Rohingya living in the Rakhine state of Myanmar are subject to movement restrictions, and women of the Muslim faith also have restricted access to hospitals and markets (81).

Natural hazards, extreme weather-related events, and conflicts

Southeast Asian countries are vulnerable to a range of natural hazards, including flash floods, storms, typhoons, landslides, droughts, earthquakes, volcanic eruptions, and tsunamis. This situation will be further exacerbated due to climate change. Expected consequences of weather-related changes include an overall decrease in agricultural production, crop failure, increase in pest infestations, and disruption of markets, and can limit economic access, either through destruction of livelihoods and assets or increased food prices (82–86).

These hazards have significant implications for household food security and peoples' access to nutritious, diverse diets . Smallholder farmers, poverty-stricken families, people with disabilities or chronic illnesses, and those affected by conflict are likely to face the greatest brunt of natural hazards. In the aftermath of catastrophic events, with limited access to a nutritious diet and compromised WASH services , MNDs are bound to aggravate.

Urbanisation, rapidly changing food environment and poor food choices

Urbanisation and rapid economic growth have a significant impact on people's diets and lifestyles in the region (87,88). The current complex and fast-paced changes in the food environment present a unique scenario with both opportunities and challenges in ensuring access to healthy diets. On one side, the opportunities include the availability and access to diverse food markets, small retail shops, street vendors and hawkers, wet markets, and supermarkets to buy food. On the other, the challenges include the abundance of highly processed foods high in fat, salt, and sugar, along with quality and safety concerns (73).

Increased purchasing power, greater participation of women in the workforce, and insufficient time has led to a greater reliance on convenient, 'ready-to-cook/eat' ultra-processed foods as they are often cheap, readily available, and preferred for taste. Studies show that despite higher consumption of diverse foods by individuals living in urban cities than rural areas, urban diets often contain ultra-processed foods high in salt, fat, and sugar and low in essential micronutrients (22,73).

Region-wide analyses showed that the price of unhealthy food (foods that include fatty meat, energy-dense beverages, savory ready-to-eat snacks and meals, sweet snacks, and sugars and other caloric sweeteners) had risen more slowly than healthier foods in Asia. In particular, Southeast Asia showed the sharpest decline in the pricing of unhealthy foods. In the early 2000s, unhealthy foods were more expensive than staples and healthy foods and became the cheapest post-2016 (89). Even the staple form is changing, and consumption of highly polished rice and refined wheat flour is on the rise across the region (89).

Changing food environments, with the arrival of fast-food joints, widespread availability of cheap, unhealthy foods and beverages, even in remote areas, due to a solid supply chain and aggressive advertisements influences both urban and rural populations. In particular, children and adolescents are particularly receptive to the rapidly changing food environment and aggressive marketing (90).

Nutrition surveys mostly fail to capture complete and quality data on the consumption of unhealthy foods and consumer behaviour. Global school-based health surveys shed some light on the rampant consumption of unhealthy sugary beverages among adolescents. It is estimated one in three adolescents (13-17 years) are consuming carbonated sugary drinks daily in the Southeast Asian countries ranging from 27 percent in Indonesia to 50 percent in Lao PDR (91–96). These transformations in consumption patterns and dietary choices can potentially drive MNDs further up in the region.

3.2.2. ILLNESSES, INADEQUATE ACCESS TO HEALTH, AND WASH SERVICES

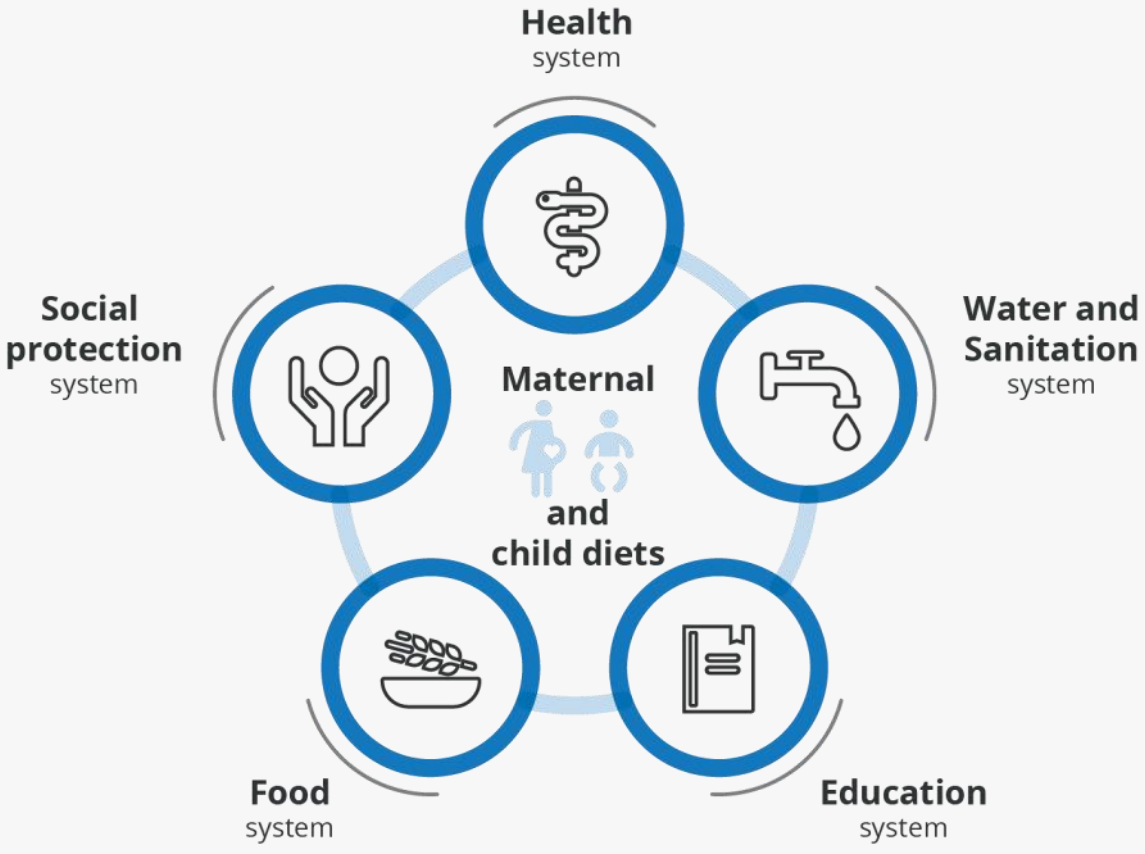
Nutritional deficiencies, diseases and genetic disorders contribute to high levels of anaemia. Deficiencies of micronutrients are mainly attributable to diets deficient in iron, folate, and vitamins A and B12. The non-nutritional factors include malaria, chronic illnesses, worm infestation resulting from inadequate healthcare utilisation and poor WASH conditions. Iron deficiency is believed to be the most important cause of anaemia in the South Asian population affecting nearly half of the people. Other factors include excessive blood loss during menstruation and child birth and widely prevalent genetic disorders/ haemoglobinopathy associated with ethnicity in Southeast Asia (71)(97,98). However, the lack of countrywide data on the prevalence of haemoglobinopathies remains a limitation to devising effective measures (99).

Reductions in malnutrition are impeded by lack of availability, access to or utilization of health services. In many areas, healthcare facilities may not exist or require travelling long distances, and where they exist, often they are under-resourced, lacking supplies and equipment, and the cost associated with seeking healthcare can make health services inaccessible to a certain segment of the population. In addition, the use of unsafe water and sub-standard sanitation and hygiene practices compound the risk of water and food borne diseases (73,100).

3.2.3 IMPACT OF COVID-19 PANDEMIC ON HEALTHY DIETS AND NUTRITION

Before the COVID-19 pandemic, one in five infants and young children were not growing well, and nearly half had at least one micronutrient deficiency in Southeast Asia and the Pacific region. Furthermore, approximately 50 percent of the region's population could not afford a healthy diet (50). COVID-19 has further exacerbated the situation and posed grave threats to the nutritional wellbeing of the people. The pandemic is an additional shock that undermines the vulnerable people's already precarious nutrition situation by disrupting closely knitted food, health, education, social protection, and WASH systems critical in achieving healthy diets for all (Figure 14).

FIGURE 14: SYSTEMS APPROACH TO MATERNAL AND CHILD DIETS



Source: UNICEF, 2019, Maternal and Child Nutrition UNICEF Strategy 2020-2030.

Predictions suggest that the COVID-19 pandemic would push an additional 75 to 80 million in developing Asia into extreme poverty (101). The pandemic triggered financial and physical challenges to access food through dramatic loss of incomes, lockdowns, movement restrictions, supply chain disruptions and price shocks, disproportionately affecting the poor populations and those with prior vulnerabilities.

The crisis also created unprecedented challenges, vulnerabilities, and disparities for the urban poor, pushing them further into hunger and poverty. For instance, hunger in the Philippines rose sharply to the highest levels recorded in more than 20 years, following the start of the pandemic (4). Populations living in slums in extreme poverty were the most severely impacted by COVID-19 compared to other income groups, as measured by loss of income, increased use of loans to buy food, and resorting to emergency livelihood-based coping strategies (90).

Shrunken household incomes altered consumer behaviour towards food. In Phnom Penh, Cambodia, 30 percent of women's diets failed to reach minimum diversity in August 2020 and increased to 50 percent by November 2020 (2). Food expenditure shifted from relatively more expensive food groups to cheaper but less nutritious foods during the pandemic. In Indonesia, unhealthy food consumption increased due to limited household purchasing power, and in the Philippines, both nutritious and unhealthy food consumption decreased for women (90).

The COVID-19 pandemic disrupted 30-40 percent of routine maternal and child health and nutrition services across the region (102). Access to antenatal, postnatal check-ups and delivery care for pregnant women and treatment for diarrhoea, pneumonia, and malnutrition for children was constrained. Routine immunization services was also delayed or cancelled (90,103). Communities were also hesitant to use essential health services due to fears of COVID 19 transmission. Furthermore, the existing social safety net programmes with limited coverage, insufficient cash transfer, and/or disruption during the pandemic, such as halting school meals due to school closures, exacerbated access to food and nutrition services in vulnerable groups. Although the economic recession at the macro level may be relatively short-lived, the negative impact of poor diets will potentially be long-lasting, especially for pregnant women and young children.

4. Interventions to Address Micronutrient Deficiencies

Addressing widespread MNDs require a combination of interventions and concerted actions of nutrition, health, education, social protection, and WASH systems. The nutrition ecosystem recommends a gamut of evidence-based nutrition-specific and sensitive interventions to improve diets and reduce MNDs in children, SAC, adolescents, and women through a life-cycle approach (Figure 15).

Table 5 summarises evidence-based guidance by WHO, the LANCET and programmatic actions endorsed by UNICEF, WFP and other relevant agencies that have shown promising results in overall improving maternal and child nutrition by enhancing micronutrient intake and reducing the burden of infections.

FIGURE 15: INTERVENTIONS TO ADDRESS MICRONUTRIENT DEFICIENCIES

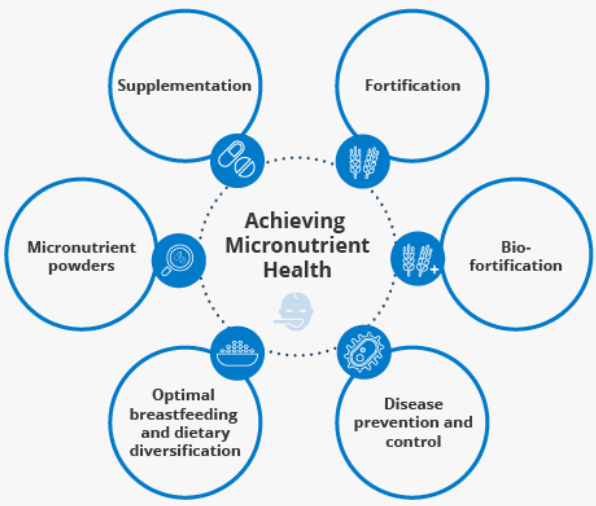


TABLE 5: PROVEN NUTRITION STRATEGIES TO IMPROVE MICRONUTRIENT LEVELS AND IN THE POPULATION

Target groups	Interventions
Newborn babies	Early initiation of breastfeeding within an hour of birth and promotion of colostrum feeding, and optimal breastfeeding practices
	Delayed cord clamping*[18]
Infants and Children	Promotion of Infant and Young Child Feeding (IYCF): exclusive breastfeeding for first 6 months, timely introduction of complementary feeding at 6 months, promotion of safe, adequate, and diverse complementary feeding among young children 6-23 months through individual and group counselling along with continued breastfeeding up to two years
	Multiple micronutrient powders for point-of-use fortification of foods consumed by children aged 6-23 months and children 2-12 years where anaemia is 20 percent or higher[19]
	Vitamin A supplementation where VAD is a public health problem[20]
	Iron fortification and supplementation programmes where anaemia is 40 percent or higher[21]
	Zinc supplementation for 10-14 days in the management of diarrhoea[22]
	Universal salt iodisation
	Treatment of severe and moderate acute malnutrition
	Provision of age-specific specialised nutritious food supplements for the prevention of moderate acute malnutrition in settings of food insecurity or emergencies
	Deworming[23]
	Handwashing and hygiene, sanitation intervention
School-age children and adolescents	Weekly iron and folic acid supplementation[24]
	Provision of diverse and nutritious school meals
	Promotion of dietary diversification through health and nutrition education, school gardens (104)
	Deworming[25]
Pregnant, Lactating Women and Women of Reproductive Age (WRA)	Iron folate supplementation during pregnancy where anaemia is 40 percent or higher; intermittent iron folate supplementation for WRA where anaemia is 20 percent or higher[26]
	Maternal calcium supplementation during pregnancy[27]
	Maternal iodine through iodisation of salt
	Deworming during pregnancy and for WRA[28]
	Periconceptional folic acid supplementation to prevent neural tube defects[29]
	Vitamin A supplementation during pregnancy where VAD is a severe public health problem[30]
	Provision of specialised nutritious food supplements to maintain nutritional requirements during pregnancy[31]
	Promotion of nutritious, diversified diets through nutrition counselling during pregnancy
General population and vulnerable groups	Promotion of dietary diversity, improving agri-value chain and sustainable agriculture
	Nutrition sensitive transfers through social safety net, emergency assistance programmes
	Scaling up availability and enhancing consumption of fortified staples
	Handwashing and hygiene, sanitation intervention

Source: What works? Interventions for maternal and child undernutrition and survival(105), Lancet Maternal and Child Nutrition series 2013(106), WHO e-Library of Evidence for Nutrition Actions (eLENA)(107), Ten proven nutrition interventions(108), A chance for every schoolchild Partnering to scale up School Health and Nutrition for Human Capital(109), Scaling up proven interventions, Power of Nutrition(110)

18 Delayed umbilical cord clamping (not earlier than 1 min after birth) is recommended for improved maternal and infant health and nutrition outcomes
19 In settings where anaemia is a public health problem-prevalence of anaemia is 20percent or higher in children 6-23 months of age and 2-12 years
20 Where VAD is a public health problem-prevalence of night blindness is>= 1percent in children (24–59 months) or prevalence of VAD is >=20percent in infants and children (6–59 months)
21 Daily iron supplementation is recommended as a public health intervention in infants and young children aged 6–23 months, and for 24-59 months living in settings where the prevalence of anaemia is 40percent or higher in this age group*, for preventing iron deficiency and anaemia
22 Mothers, other caregivers, and health workers should provide children with 20 mg per day of zinc supplementation for 10-14 days (10 mg per day for infants <6 months)
23 Single dose albendazole (400 mg) or mebendazole (500 mg), for pregnant women, after the first trimester, living in areas where baseline prevalence of hookworm and/or T. Trichiura infection is 20 percent or more among pregnant women, and where anaemia is a severe public health problem, with a prevalence of 40percent or higher among pregnant women
24 Where anaemia is a public health problem-prevalence of anaemia is 20percent or higher
25 Annual or biannual* single-dose albendazole (400 mg) or mebendazole (500 mg) for all non-pregnant adolescent girls in areas where the baseline prevalence of any soil-transmitted helminth infection is 20percent or more; Biannual administration is recommended where the baseline prevalence is more than 50percent.
26 In population where prevalence of anaemia is a severe public health problem (40percent or higher), daily IFA recommended for pregnant women; intermittent (once a week) IFA supplementation is recommended for WRA living in settings where the prevalence of anaemia is 20 percent or higher
27 In populations with low dietary calcium intake, daily calcium supplementation (1.5g–2.0g) oral elemental calcium) is recommended in pregnancy to reduce the risk of pre-eclampsia
28 Same as 14
29 All women, from the moment they begin trying to conceive until 12 weeks of gestation, should take a folic acid supplement (400 µg folic acid daily)
30 ≥5percent of women in a population have a history of night blindness in their most recent pregnancy or if ≥20percent of pregnant women have a serum retinol level <0.70 µmol/L
31 Settings where 20percent or more of pregnant women are underweight (low BMI) and in food insecure population

5. Status of National Policies and Strategies in the Region to Address Micronutrient Deficiencies

Availability and focus of policies: All six countries in the region have existing policies or strategic plans[32] that recognize the widespread problem of micronutrient deficiencies. The national nutrition policies and actions lay greater emphasis on reducing MNDs among children, and women, with lesser focus on adolescents. Micronutrient actions targeting people with disabilities, chronic illnesses, and the elderly, marginalised communities are largely missing in national nutrition action plans (111–117).

Interventions covered by policies: These strategic nutrition policies or strategies aim to reduce micronutrient deficiencies by identifying several interventions for relevant sectors: health, agriculture, education, WASH, social protection and commerce and industry. The policies stipulate multi-sectoral coordination efforts to deliver context-specific package of micronutrient interventions such as diet diversification, improving quality of complementary foods, micronutrient supplementation, specialised nutritious foods, food fortification, school meals, deworming, nutrition education in schools and nutrition counselling targeting first 1,000 days (111,113–115,117).

The strategies also highlight the role of the agriculture sector in the strengthening of value chains for nutritious foods, including food safety and quality, and social protection programmes in enhancing the ability of the household to produce, access and afford nutritious foods. They also highlight the role that the health and WASH sector plays in improving uptake of health and nutrition services and in reducing water, food and vector-borne diseases. A prominent area of focus in all national policies is improving the production and consumption of nutritious and diverse foods by promoting home gardening, small scale livestock and fish farming, and income generation efforts (111,113–115,117).

Strategic approaches: The main strategic approaches in achieving the above-mentioned and increasing coverage of evidence-based interventions include strengthening of the health system, mainstreaming nutrition into all health and social sector programs, community mobilisation, strengthening multisector linkages, and improving collaboration between government, development partners, civil society organisations, academia and private sector (111–117). Furthermore, governments of Indonesia, Lao PDR (in 2011), Myanmar, the Philippines (in 2013), Cambodia (in 2014) and Timor-Leste (in 2020) joined the Scaling Up Nutrition (SUN) Movement as part of their commitment to ramping up efforts to address all forms of malnutrition including MNDs, through collaborative efforts of diverse partners (118). The following section presents programmes targeting MNDs in vulnerable age groups in the region.

5.1 Status and coverage of micronutrient interventions by population group

5.1.1 CHILDREN UNDER 5 YEARS

Enhancing iron stores at birth through cord clamping

At the time of birth, healthcare systems play a crucial role in ensuring delayed clamping (>1min) of the umbilical cord to boost iron levels in newborn babies and prevent anaemia in infants and the need for blood transfusion in preterm babies (119). Currently, delayed cord clamping is mentioned as part of essential newborn care strategies only in Cambodia, Lao PDR, and the Philippines. While some hospitals in the region routinely collect data on the practice, the national-level data on the prevalence of delayed cord clamping is not available (120–122).

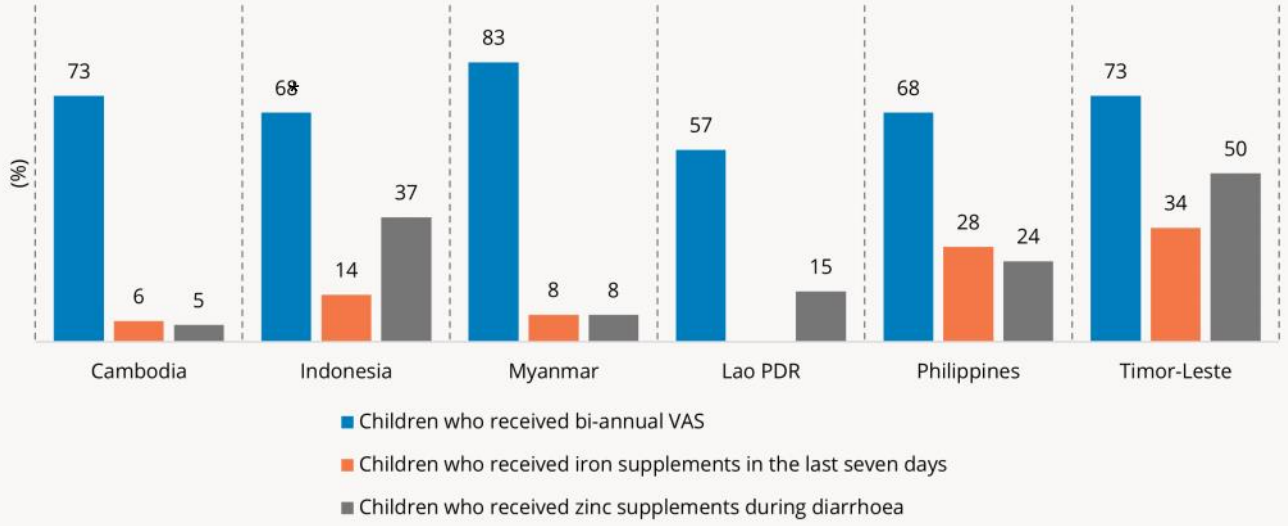
32 Cambodia National Strategy for Food Security and Nutrition (2019-2023), Cambodia Fast Track Roadmap for Improving Nutrition 2014 – 2020, Indonesia Food and Nutrition Strategy Policy-Kebijakan Strategi Pangan dan Gizi (2017-19), Food and Nutrition National Action Plan (Rencana Aksi Nasional – Pangan dan Gizi/RAN-PG), Lao PDR National Nutrition Strategy to 2025 and Plan of Action 2016-2022, Myanmar Multi-sectoral National Plan of Action on Nutrition2018-19/2022-23, Philippine Plan of Action for Nutrition 2017-2022, Timor-Leste National Nutrition Strategy 2014-2019

Large scale micronutrient supplementation programmes

As a prophylaxis strategy, micronutrient supplementation is widely implemented where levels of anaemia and VAD among children under 5 years are a public health concern. All six countries administer mega, bi-annual vitamin A supplementation (VAS) doses to children aged 6-59 months.

Only Myanmar reported high VAS coverages[33], over 80 percent, while Cambodia, the Philippines and Timor-Leste reported over 70 percent (123). In Indonesia and Lao PDR, VAS reaches approximately 60 percent of children under 5 years (Figure 16).

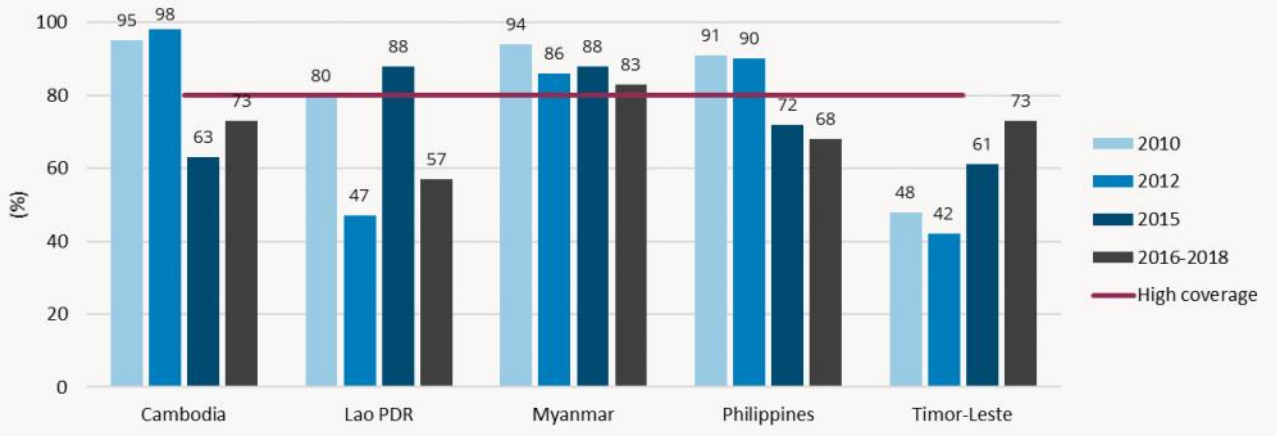
FIGURE 16: COVERAGES OF MICRONUTRIENT SUPPLEMENTATION AMONG CHILDREN <5YEARS (PERCENT)



*Children given VAS sin the last six months
Source: UNICEF VAS coverage database, Cambodia DHS 2014, Indonesia DHS 2017, Lao PDR Global Nutrition Report 2017, Myanmar DHS 2015-16 and Myanmar Micronutrient Survey 2017-18, Lao PDR Global Nutrition Report 2017, Philippines DHS 2017, and Timor Leste DHS 2016

UNICEF VAS coverage databases reported wide fluctuations in supplementation coverage between 2010 and 2018. Cambodia, Lao PDR, and the Philippines had high VAS coverage (>80 percent) in 2010 but could not sustain it (123). Myanmar is the only country in the region that has sustained high VAS coverage (>80 percent), since 2010, with some moderate fluctuation (Figure 17). Consistently meeting high VAS coverage reflects a sustainable VAS programme, and sustainability is influenced by existing policy, stable funding, effective partnerships, and demand (108). The COVID-19 pandemic was a shock when mass campaigns of VAS were suspended in the early months of 2020.

FIGURE 17: TREND IN VITAMIN A SUPPLEMENTATION COVERAGE BETWEEN 2010 AND 2018 (PERCENT)



Source: UNICEF VAS Coverage database- Cambodia 2017, Lao PDR 2017, Myanmar 2018, the Philippines 2016, Timor-Leste 2018

33 Cambodia 2017, Indonesia 2017, Myanmar 2018, Lao PDR 2017, the Philippines 2016, Timor-Leste 2018

With regards to iron supplementation[34] to children under 5 years, Cambodia, Indonesia, Myanmar, Philippines, and Timor-Leste presents population-level coverage of iron supplements. In all five countries, the coverage of iron supplementation is quite low, ranging from 6 percent in Cambodia to 34 percent in Timor-Leste. Zinc supplementation for the treatment of diarrhoea exists in all six countries; however, the coverage ranges from 5 percent in Cambodia to 50 percent in Timor-Leste (Figure 16).

The common reasons identified behind low or patchy coverage of large-scale micronutrient supplementation programmes are: weak health system;, bottlenecks in the supply chain; insufficient human resources; poor targeting of remote or geographically isolated areas; and lack of knowledge and prevailing fears among mothers and caregivers, in particular concerning iron supplements, limiting the utilisation of nutrition services (46,124–126).

Improving macro and micronutrient intake through the provision of specialised nutritious food among acutely malnourished children and those at risk of developing malnutrition

Wasting[35] affects approximately one in ten children in Southeast Asia. This precarious form of undernutrition exposes children to mortality from illness, infections, and MNDs (95)(96). Furthermore, evidence suggests that deficiencies of essential micronutrients, such as iron, magnesium, and zinc, contribute to anorexia, resulting in growth retardation indirectly reducing the intake of energy and protein. Also, several micronutrients, including iron, vitamin A and zinc, are associated with immune function and risk of morbidity (127). Therefore, wasted children have special needs for both macro and micronutrients for recovery.

Various tailormade Specialised Nutritious Foods (SNF)-Lipid -based Nutrient Supplements (LNS)[36] and Fortified Blended Foods (FBF) - are available to address acute malnutrition, stunting, and micronutrient deficiencies by enhancing both macro-nutrient (like protein) and micro-nutrient adequacy of nutritional intake.

WHO recommends Ready-to-Use Therapeutic Food (RUTF) [37] to meet the nutritional needs of children with Severe Acute Malnutrition (SAM) and facilitate recovery, while Ready-to-Use Supplementary Food (RUSF)[38] or FBF[39] such as corn or wheat soya blend can be used to treat children with Moderate Acute Malnutrition (MAM). The guidance also stipulates optimal use of locally available nutrient-dense foods through dietary diversification and fortification of staple foods for children with MAM. Similarly, medium quantity LNS and FBF can be used to prevent acute malnutrition and stunting, particularly in humanitarian contexts (97).

At present, all six countries have an existing policy and programme for treating children with SAM; however, not all country programmes are aligned with 2013 WHO recommendations, including the provision of RUTF (128). Currently, Cambodia, Lao PDR, Myanmar, the Philippines, and Timor-Leste provide RUTF to children with SAM. While all countries use standard milk-based RUTF formulation, Cambodia innovated local RUTF (NumTrey and Nutrix) using small fish powder (35,71,129–133). Cambodia and Timor-Leste are the only two countries that have incorporated RUTF in the essential medicines list (134).

Despite progress on developing policies and guidelines, the regional coverage of SAM treatment among children under 5 years remains very low (<2 percent) (35,128,133,135). The major reasons for low coverage include poor integration of treatment services into the health system, bottlenecks in the LNS supply chain, untrained health personnel, insufficient community sensitisation and limited and unstable funding (35,134–136). However, countries use targeted approaches to provide treatment and prevention services to manage acute malnutrition in a vulnerable population.

During crises, Cambodia, Lao PDR, Myanmar, the Philippines and Timor-Leste have targeted supplementary feeding programmes (SFP) that provisions RUSF or fortified blended foods for children with MAM and/or prevent malnutrition during crises (35,137–139). In 2018, specialised nutritious food was supplied to 1,744 children aged 6 - 59 months in seven southern Lao PDR villages affected by floods due to a dam collapse (137). In Myanmar, the blanket supplementary feeding programme targets all children aged 6-59 months in Rakhine state. In Rakhine and Yangon peri-urban areas, children with MAM are targeted with RUSF (140).

For infants less than 6 months of age, no survey provides information on the prevalence of wasting and MNDs even

34 Children aged 6-59 months who received iron tablets/syrup/sprinkles in the seven days preceding the survey

35 Wasting is defined as low weight-for-height. It often indicates recent and severe weight loss, although it can also persist for a long time. It usually occurs when a person has not had food of adequate quality and quantity and/or they have had frequent or prolonged illnesses

36 Ready-to-Use Therapeutic Foods (RUTF) and Ready-to-Use Supplementary Foods

37 Brand names- PlumpyNut, eeZee paste

38 Brand names- eeZeeRUSF, AchaMum, PlumpySup

39 Brand names- Super Cereal Plus (SC+) Super Cereal (SC)

though they have a greater risk of mortality than older infants (>6 months) (141–143). Though the existing programmes integrate care of low-birth-weight infants into neonatal services and provide inpatient treatment to wasted infants less than 6 months of age, community-based management protocols of nutritionally at-risk infants and their mothers are missing across the region (139, 144).

Improving the nutrient density of complementary foods among young children through micronutrient powders

Adding micronutrient powder (MNP) to complementary foods of young children ensures adequate micronutrient intake (box 1). Cambodia, Indonesia, Lao PDR, Myanmar, Philippines and Timor-Leste have targeted young children aged 6-23 months with MNP; however, the implementation scale varies (21,145–149).

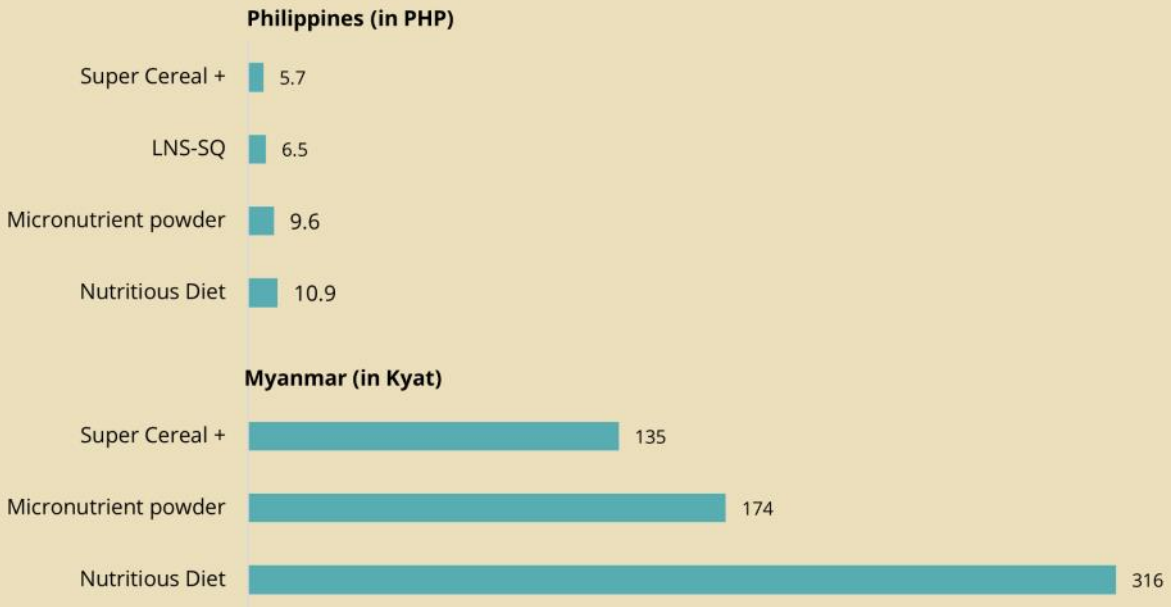
For instance, in 2012, the Philippines government allocated funding to procure MNP intending to achieve nationwide coverage, while Timor-Leste supplied MNP only in the Aileau district in 2013 (21,150). Furthermore, during emergencies, Indonesia, Myanmar, and the Philippines have targeted young children with MNP to address and prevent MNDs (145,150,151). Sustaining at-scale coverage and adherence to MNP are the key challenges in MNP programming (152–154).

Box 1: Impact of food-based interventions on the daily cost of the diet for young children

The Cost of the Diet (CotD) and Fill the Nutrient Gap (FNG) analyses from Myanmar and the Philippines concluded that voucher or in-kind provision of specialised nutritious foods could reduce the overall cost of a nutritious diet for young children under 2 years.

In Myanmar and the Philippines, provisioning of fortified blended foods substantially reduced the daily cost of a nutritious diet by half. Furthermore, provisioning of MNPs reduced the daily costs of nutritious diet by 45 percent and 12 percent in Myanmar and the Philippines, respectively. These estimates of cost reduction eases off caretaker's financial burden in ensuring infants and young children are consuming a nutritious diet.

AVERAGE DAILY COST OF DIET FOR A CHILD <2 YEARS IN MYANMAR AND THE PHILIPPINES



Promotion of appropriate IYCF practices

Countries have national programmes to promote, support and protect optimal IYCF practices[40] (155). Strategies to support positive behaviours toward IYCF include expanding paid maternity leave (Lao PDR, Myanmar, Philippines, and Indonesia), legislation on childcare centres (Myanmar) and breastfeeding breaks and spaces (Philippines), and institutionalising workplace lactation support (Cambodia, Lao PDR), revitalizing baby-friendly hospitals and social behaviour change (SBC)(156,157).

The promotion of appropriate IYCF practices primarily targets pregnant and lactating women through counselling embedded in antenatal and postnatal services delivered by the health sector. Countries are capitalising on other platforms to improve the quality of diets of young children. For instance, cooking demonstrations using Timor-Vita are performed as a behaviour change strategy under targeted supplementary feeding programmes in Timor-Leste. It uses cooking demonstrations to educate mothers and caregivers of children on the nutritional advantages of fortified foods (158).

Despite programmatic focus, the current nutrition education often falls short in quality and scale. The counselling is often too generic, not tailor-made to address wide-ranging barriers such as mothers' time and cost constraints, insufficient knowledge, or cultural practices- that hinder uptake of appropriate IYCF practices. Also, nutrition programming misses addressing those household dynamics adequately where mothers-in-law and husbands often dictate feeding practices and control food expenditure (126).

Leverage social safety nets for improving access to a nutritious diet

Another strategy to improve access to a nutritious diet is providing the poorest households with cash-based transfers (or vouchers), accompanied by nutrition education, to increase the likelihood that the assistance would be spent on nutritious foods. Targeted cash-based transfer programmes, such as Maternal and Child Cash Transfer (MCCT) in Myanmar, Pantawid Pamilyang Pilipino Program (4Ps) in the Philippines, Bolsa da Mãe in Timor-Leste, and in Cambodia, target vulnerable children and pregnant and lactating women (PLW) with small cash grants to increase economic access and desire of nutritious foods (65–67,159). However, low transfer amounts and inadequate scale of behaviour change intervention often limit programmes' potential to achieve a greater impact (67).

GAPS IN NUTRITION PROGRAMMING TARGETING MICRONUTRIENT DEFICIENCIES IN CHILDREN < 5 YEARS

- **Regular, comprehensive and up-to-date data** on micronutrient situation is limited
- Data gap on **coverage of micronutrient powders, delayed cord clamping**
- Enhancing diets of **young children** though **provision of specialised nutritious foods, fortified staples** not fully capitalised
- Limited national technical and financial capacity to **locally produce specialised nutritious foods** for prevention and management of malnutrition, largely donor driven
- Nutrition programmes do not target **fathers and grandmothers** strategically on promotion of **IYCF** practices, and missing at-scale BCC to generate demand for healthy diets, fortified foods, and utilisation nutrition services
- **Social safety nets** are often not nutrition sensitive (not linked to vouchers for nutritious foods, small cash transfer, inadequate nutrition education) to deliver positive nutrition outcomes.

5.1.2 SCHOOL-AGE CHILDREN AND ADOLESCENTS

Evidence shows that investments in nutrition and health in the first 8,000 days leverage education outcomes, and investments in education leverage nutrition. Improving the nutrition of school children provides compounding benefits throughout their lifetime, for their future children, and for society. Good nutrition in the growing years plays a significant role in nourishing children, improving their access to education and learning outcomes (160,161).

40 Early initiation of breastfeeding, exclusive breastfeeding for the first six months, timely initiation of complementary feeding after six months and consumption of complementary foods in age-appropriate quantity, nutrient-quality, and safety along with the continuation of breastfeeding upto two years

School-aged children (SAC) and adolescents, as a whole group (5-19 years), receive fragmented focus in large-scale nutrition surveys and programming targeting MNDs as there is no immediate risk of mortality linked to this age group. Though the exact magnitude of MNDs in this age group is unknown, persistent underweight, growing rates of overweight and obesity and consumption of unhealthy foods indicate that MND could be widely prevalent in this age group (91–96,162).

Weekly iron and folic acid supplementation

In 2011, WHO recommended intermittent iron supplementation[41] for school-age children (5-12 years) and adolescent girls in countries where anaemia is a public health problem-prevalence of anaemia is 20 percent or higher (163,164). Currently, only two countries- Indonesia and the Philippines - have a national programme on weekly iron and folic acid supplementation (WIFS), at scale for adolescent girls (115,165). Lao PDR plans to initiate WIFS as indicated in the National Nutrition Action Plan for Nutrition (2020-2025), focusing on high-risk areas (113).

In Indonesia, the MITRA Youth project aims to reduce anaemia among adolescent girls aged 15-18 years by building on previous experience and providing impetus to the overall delivery of WIFS strategy. Although it is mainly school-based, the project also advocates supplying iron and folic acid (IFA) tablets to reach out-of-school adolescent girls through existing community health platforms (165,166). In the Philippines, WIFS targets adolescent girls studying in grade 7 to grade 10 of public secondary schools and the alternative education system (167).

Improving diets of school children through school meal programme and with fortified foods

School meals are the most cost-effective interventions to support school-going children during critical growth periods (5-18 years)(168). School meals act as safety nets in ensuring at least one nutritious meal to school children, particularly those living in food-insecure areas and from poor households, along with other complementary actions such as health and nutrition education, IFA supplementation, deworming, school-gardening, and improved WASH services.

Cambodia, Lao PDR, Myanmar, the Philippines, and Timor-Leste have a school meal programme implemented through the education sector, targeting school children in areas with higher food insecurity and poor educational statistics. In Cambodia and Lao PDR, school feeding is majorly financed by international agencies; however, the governments are committed to increasing their investments. Each country is at a different implementation stage (169–174).

In Cambodia, the school meal programme (SMP) delivers freshly prepared nutritious meals to pre-primary and primary school children through different modalities such as in-school meals, take-home rations, and food-based or cash-based scholarships (169,175,176). In the traditional in -kind model, school meals consist of rice, of which about 50 percent are fortified with micronutrients, fortified vegetable oil, canned fish, yellow split peas and iodized salt. However, from January 2020 onwards, the government has initiated a transition towards the Home Grown School Feeding (HGSF) model, aiming to procure 80 percent of fresh and micronutrient-rich foods -vegetables and animal protein- from the local sources to diversify the school meals (177,178).

In Lao PDR, about 25 percent of pre-primary and primary school children receive cooked lunch prepared using rice, lentils, canned fish, and vegetable oil. In 2022, Lao PDR plans to include fortified rice in SMP through the McGovern-Dole project. Initially, the fortified rice will be procured internationally; however, the long-term vision of the government is to use locally produced fortified rice (137,171). Similarly, the Philippines' SMP provisions in-school meals to pre-primary and primary school children (173,179).

41 Where anaemia is a public health problem-prevalence of anaemia is 20percent or higher

In Myanmar, SMP targets schools in 11 out of the 14 states based on food security and vulnerability indicators. In 2019, the programme supplied high energy biscuits in 84 townships and cooked meals prepared using local ingredients in 44 townships (140,172). In 2019, Maguindanao province in the Philippines piloted the inclusion of iron-fortified rice in school meals by enabling smallholder farmers' engagement as rice suppliers. The pilot generated promising results that further encouraged the regional government to scale up in five additional provinces (179).

Timor-Leste's SMP reaches out to pre-primary and primary school children in all municipalities. To further advance the efforts to improve the micronutrient quality of school meals, the government plans to pilot the inclusion of fortified rice in selected schools(174,180). Indonesia provisioned in-school meals to children aged 6-12 years until 2019. However, the programme was suspended in 2020 due to the lack of funding and conflict of priorities (174). In addition, targeted emergency school feeding projects were also implemented during emergencies. In the Philippines, an emergency school feeding programme provided meals in municipalities of Marawi City, Lanao del Sur, and Lanao del Norte- affected by the armed conflict (179).

Promotion of dietary diversification and health through school health and nutrition education

Delivering school health and nutrition education (SHN) through schools from an impressionable age can have long-lasting health and nutritional gains for the children and their families and the communities (181,182).

All countries in the region have health and nutrition education components in existing nutrition and/or school health policies and programmes (162). However, there are some disjoints between the intended and actual implementation of SHN. Implementation is an issue due to inadequate funding/resources or accentuated by the fact that either the school staff are not trained or not aware of their role in health promotion or are overstretched due to increasing workloads (162,183). Another significant issue is with the data. The large-scale national surveys and school-based nutrition programmes lack monitoring indicators: the coverage, quality, regularity, and effectiveness of SHN remain largely unknown.

Innovative approaches and platforms are being tried and tested to nudge healthy behaviours among SAC and adolescents. In 2016, a pilot-tested social media interventions in Indonesia to reach and engage adolescent girls on nutrition content and improve WIFS compliance (184). In 2019, another pilot promoted healthy and balanced diets, emphasizing fruit and vegetable consumption, using a social behaviour change communication approach in primary school in West Java, Indonesia, through private sector funding (185).

GAPS IN NUTRITION PROGRAMMING TARGETING MICRONUTRIENT DEFICIENCIES (MNDs) IN SCHOOL-AGED CHILDREN AND ADOLESCENTS

- Extensive data gap to estimate **exact burden of MNDs in the whole age group (5-19 years) at regional and national level;** no data on anaemia from Cambodia, Lao PDR, and Timor-Leste
- Limited data is a barrier in designing appropriate intervention for SAC and adolescents
- **Unstable and inadequate allocation of budget**; dependence on foreign funds (Cambodia, Lao PDR, and Timor-Leste)
- Programmes are not adequately designed to reach **out-of-school children and adolescents**
- Limited integration of **micronutrient-rich fortified staples, fresh produces from local farmers into school meal** programmes
- No **standardised indicators** to capture **diets of school children**, and school-based information systems are often not integrated with **nutrition/health information systems**
- Insufficient engagement and mobilisation of **private sector** in production and promotion of healthy foods

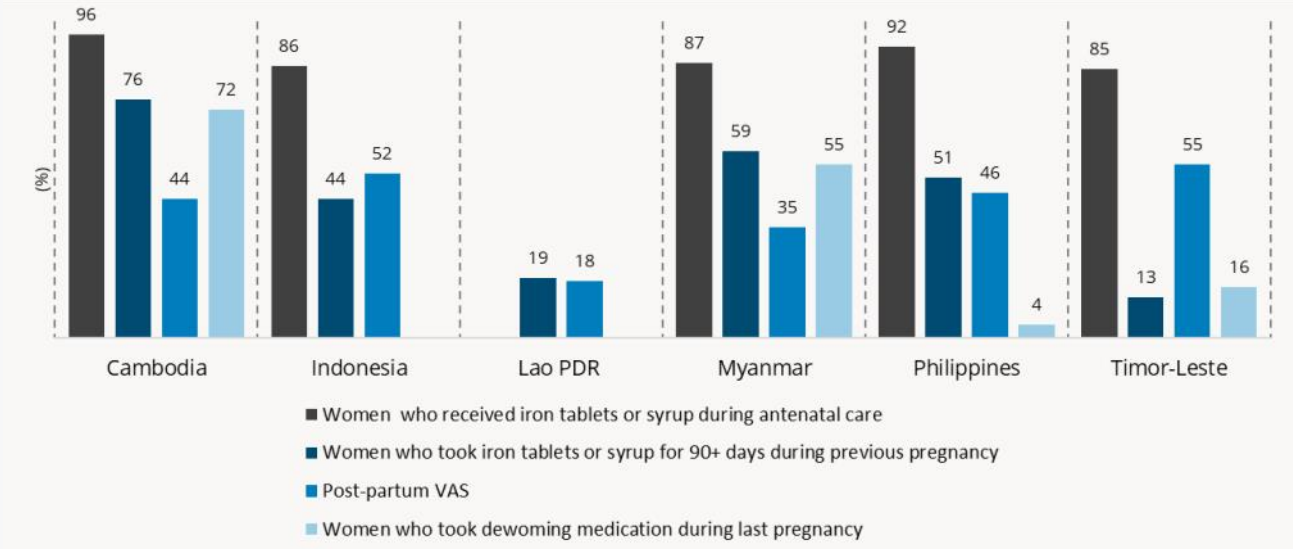
5.1.3 WOMEN OF REPRODUCTIVE AGE AND PREGNANT, LACTATING WOMEN

Large scale supplementation programmes

Micronutrient supplementation during pregnancy and post -partum is key to ensuring that women and their infants receive essential micronutrients. Recommended guidance on large-scale supplementation of iron and vitamin-A target reduction of high levels of anaemia and VAD in PLW and anaemia in women of reproductive age (WRA). The large-scale supplementation programmes mainly focus on pregnant women to improve pregnancy outcomes and avert delivery-related complications, while with a relatively lesser focus on improving micronutrient requirements of WRA.

All six countries have a policy and/or programme guidance on daily IFA supplementation for pregnant and post-partum women through antenatal and postnatal visits at health facilities and health outreach services. Dosage IFA were consistent with WHO's recommendation[42]. The coverage data shows that while more than 80 percent of pregnant women receive any IFA supplements in all the countries, the consumption data of IFA is quite low (Figure 18). Furthermore, both Cambodia and Lao PDR provide intermittent IFA supplements to WRA, and distribution is inconsistent.

FIGURE 18: COVERAGES OF MICRONUTRIENT INTERVENTIONS AMONG WOMEN (PERCENT)



Source: Cambodia DHS 2014, Indonesia DHS 2017, Lao PDR Global Nutrition Report 2017 and MICS-DHS 2017, Myanmar DHS 2015-16 and Myanmar Micronutrient Survey 2017-18, Philippines DHS 2017, and Timor Leste DHS 2016

The consumption of IFA tablets for 90+ days among pregnant women ranges from 13 percent in Timor-Leste to 76 percent in Cambodia (figure 18). The consumption significantly varies based on region, area of residence (urban-rural) and wealth index. The proportion of women who consume at least 90 IFA tablets is lower among those living in rural areas and those from poor households (186–188). To address anaemia, Indonesia and the Philippines also targeted the women workforce in factories; however, not at-scale (189,190)

Studies show that low coverage results from a combination of both supply and/ or demand-side factors. Inadequacy/stock out of IFA tablet supplies, inadequate coun selling and community mobilization, non-compliance to regimen due to side-effects (nausea, stomach pain), distaste to supplement, change in stool colour, low perceived health benefits of IFA, unappealing generic IFA tablets, fear of having a big baby, and forgetfulness are some of the reasons for low coverage and adherence (186–188,191–193). The WHO recommends multiple micronutrient supplements during pregnancy in the context of rigorous operations research. Currently, the daily provision of Multiple Micronutrient Tablets (MMT) during pregnancy is included in Indonesia and Myanmar's national policies/ clinical guidelines. However, only Myanmar supplies MMT during pregnancy.

All six countries administer VAS post-partum (19,45,115,194–198). The VAS coverage among post-

42 Daily provision of 30-60mg iron and 0.4mg folic acid through IFA

partum women ranges from 18 percent in Lao PDR to 55 percent in Timor-Leste (Figure 18). Indonesia and the Philippines have introduced calcium supplementation to routine antenatal services. Myanmar provisions vitamin B1 supplementation for PLW. Lao PDR also plans to procure and distribute vitamin B1 supplements in 18 provinces (113). However, there is no data on population coverage to inform calcium and vitamin B1 supplementation coverage.

Provision of specialised nutritious foods

WHO and LANCET 2013 recommend dietary energy-protein supplements to improve the nutrition of pregnant women in undernourished populations or those with little access to a variety of foods (199). All six countries have experience in targeted provisioning of specialised nutritious foods to PLW based on social, nutritional and climate vulnerabilities through health, social protection and food assistance programmes (137,140,179,194,196,198,200).

For instance, in Indonesia, the maternal and child nutrition programme reached out to PLW with food rations fortified with micronutrients in 17 sub-districts of Timor Tengah Selatan district through local health systems (200). In Lao PDR, during the 2018 floods, the food assistance programme supplied SNF to PLW in seven villages in Southern Lao PDR (137). Timor-Leste also provisions locally produced, fortified corn-soya blend- *Timor-Vita* to pregnant women. However, the national nutrition survey (2013) showed that more than 55 percent of pregnant women either did not receive or consume *Timor-Vita* (21).

Promotion of diverse and nutritious, fortified foods and micronutrient supplementation

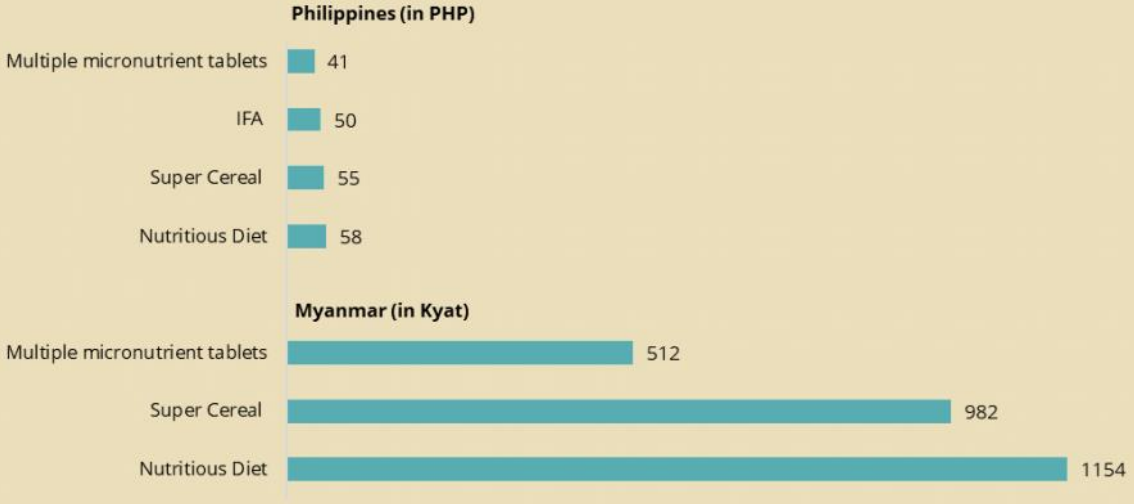
Meeting the nutritional needs of pregnant and lactating women cost households the largest share of expenditure as their micronutrient needs are higher. However, this is generally not considered in household food allocation, putting PLW and their infants at greater risk of developing micronutrient deficiencies. Evidence shows that cash transfer (or vouchers), in-kind provisioning of nutritious foods, micronutrient supplements and home gardening interventions can reduce the cost of a nutritious diet among PLW (65,66,71,72). However, ensuring uptake of micronutrient intervention and adherence calls for accompanied behaviour change interventions.

In all countries, pregnant and lactating women receive targeted nutrition counselling on the benefits of a balanced diet and micronutrient supplementation as part of antenatal care (ANC) and post-natal care (PNC) services. However, data on diets and micronutrient profiles during this period reflect shortfalls in nutrition counselling- lacking quality, coverage, and intensity- to address barriers to accessing nutritious diets.

Box 2: Potential strategies to reduce cost of a nutritious diets among lactating women

The Cost of the Diet (CotD) analyses from Myanmar the and Philippines showed that the provisioning of fortified blended foods and supplementation of IFA and multiple micronutrient tablets could reduce the cost of a nutritious diet for lactating women significantly, by up to 30 percent and 55 percent respectively.

AVERAGE DAILY COST OF DIET FOR LACTATING WOMEN IN MYANMAR AND PHILIPPINES



Linking social safety nets with nutrition for improving the nutrition of most disadvantaged groups

In terms of improving access to and affordability of nutritious diets in women, countries are exploring diverse platforms and targeted interventions to improve access to, particularly those belonging to disadvantaged families. For instance, the cash-based social safety net programme in Cambodia and MCCT in Myanmar targets pregnant women and children up to 2 years old from vulnerable families with cash-based transfers and nutrition education to enhance access to nutritious foods (65,159). In Lao PDR, the government is engaging with the private sector to improve the nutrition status of women in the workforce through four main areas: healthy food at work; nutrition education; health checks; and breastfeeding support, which includes the promotion of breastfeeding-friendly workplaces (201).

GAPS IN NUTRITION PROGRAMMING TARGETING MICRONUTRIENT DEFICIENCIES IN WOMEN OF REPRODUCTIVE AGE (WRA) AND PREGNANT AND LACTATING WOMEN (PLW)

- **WRA are neglected age group** as the appropriate platform to reach them is not exclusive and straightforward
- Regular monitoring mechanisms do not capture quality **data on diets, consumption of micronutrient supplements, specialised nutritious foods and on counselling** for corrective actions
- Countries without a **social safety net** is a missed opportunity to target vulnerable women (from poor and/or food insecure households) with cash (or voucher) transfers, specialised nutritious foods
- Insufficient **technical and infrastructural capacity** to produce local quality specialised nutritious foods
- **Participation of husbands** is not targeted through antenatal and postnatal care/visits or community visits to address barriers to improve access to healthy diets and adherence to supplementation regime by PLW

5.1.4 IMPROVING DIETS OF THE GENERAL POPULATION WITH A FOCUS ON VULNERABLE POPULATION GROUPS

Improving diet quality of general population and vulnerable groups through fortified staples

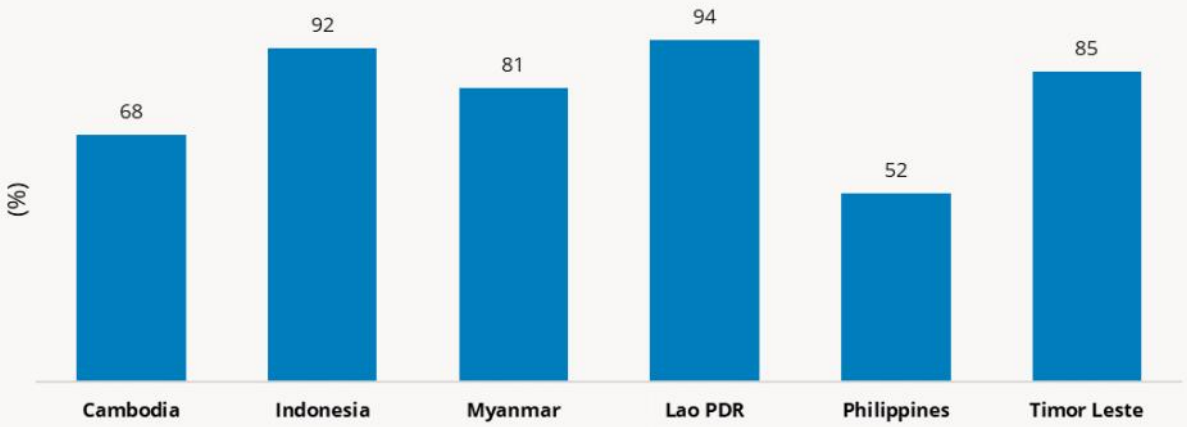
Fortification of staple foods is a proven, cost-effective, and sustainable way of reaching masses with vital micronutrients. Large-scale fortification involves adding small amounts of vitamins and minerals to widely consumed staples (rice, wheat flour, maize) and condiments (salt, soy sauce). For example, fortifying salt with iodine can prevent stillbirth in pregnant women and irreversible brain damage in young children, while fortifying flour with iron and folic acid prevents iron deficiency anaemia and neural tube defects.

Salt iodisation remains the most striking success story that effectively combated the severe forms of iodine deficiencies globally and in the region. All six countries have mandatory legislation[43] on salt iodisation. Cambodia, Lao PDR, Myanmar, the Philippines and Timor-Leste have committed to universal salt iodisation[44] (USI), while Indonesia has not[45] (202,203).

The coverage of iodised salt at the household level was highest in Lao PDR (94 percent) and lowest in the Philippines (52 percent) (figure 19). Several countries have salt iodisation standards significantly more elevated than WHO guidelines; levels in Cambodia, Lao PDR, Myanmar, and the Philippines stand out in particular. Hence, if or when high coverage of iodised salt is achieved in these countries, it will be important to review urinary iodine levels regularly to ensure iodine intake is not in excess (203). The success of salt iodisation established fortification as a proven and cost-effective solution to enhance nutrient intakes and reduce equity gaps (127).

43 Draft legislation (Decree-Law No.___/2010 of June 30, 2010, Iodisation of Salt Law
44 Iodisation of all human and livestock salt, including salt used in the food industry
45 Excludes food industry

FIGURE 19: HOUSEHOLD COVERAGE OF IODISED SALT (PERCENT)



Source: Cambodia DHS 2014, Indonesia Global Nutrition Report (2013), Myanmar DHS 2015-16, Lao PDR Global Nutrition Report (2017), Philippines Global Nutrition Report (2013), Timor- Leste DHS 2016

Fortification of staples has garnered increasing interest and commitment as an important micronutrient intervention both globally and in Southeast Asia. Countries are exploring and mainstreaming ***f*ortified staples and condiments,** like rice, wheat flour, oil, milk and fish, soy sauce, sugar, and salt, through different channels across sectors including education, social safety nets, emergency assistance programmes and open markets. In addition, in light of the COVID-19 pandemic, staple fortification can play a crucial role in delivering essential micronutrients especially for vulnerable individuals and their families who cannot access or afford a nutritious diet.

Fortification can be **mandatory or voluntary**,[46] depending on the public health significance of the problem and the country's context. Mandatory fortification can target enriching rice and wheat flour, with iron (usually together with restoration of vitamins B1, B2 and niacin), folic acid, zinc and vitamin B12, and milk and edible oil with vitamins A and D. When supported by proper enforcement, mandatory fortification is more likely to deliver a sustained source of fortified foods to large proportion of the population and distribute health benefits more equitably than voluntary fortification (204,205).

Countries have passed mandatory legislation on certain staples based on country context (Table 6). Only the Philippines has mandatory legislation on the fortification of rice with iron. Yet, only 2 percent of the national rice supply is fortified (206)(66). Despite strong legislation, fortification efforts are fragmented mainly due to the diffuse nature of the rice milling industry, the low capacity of small millers to fortify and the non-compliance of private industries (66). Myanmar has voluntary legislation on rice fortification, where only 1 percent of industrially milled rice is fortified (207). Indonesia and the Philippines have mandatory wheat flour fortification legislation, where 87 percent and 100 percent of wheat flour is fortified in industries, respectively (206,208).

Mandatory fortification standards for fortified edible oil with vitamin A exist in Indonesia and the Philippines. The Philippines also has legislation on fortified sugar with vitamin A (209). Cambodia has mandatory fortification standards for fish and soy sauce with iron, but the enforcement and compliance are weak. At the moment, only a few small and medium-size enterprises fortify soy and fish sauce (210). Lao PDR[47] and Timor-Leste[48] are in the process of drafting foods' standards for fortification.

The major challenges countries face in ensuring high coverage and utilisation of fortified foods include the absence of mandatory legislation, weak enforcement and quality control, non-compliance of private industry, lack of awareness, and demand at the consumer level (211,212).

46 In countries where small mills produce a large proportion of staple flour, enforcement of mandatory fortification might be challenging. Under such circumstances, a feasible option is to allow small mills to fortify their product voluntarily but following specified standards

47 Drafting standards for rice fortification

48 Drafting food fortification decree law are rice, wheat flour, salt, and edible oil.

TABLE 6: COUNTRIES WITH MANDATORY LEGISLATION ON FORTIFIED STAPLES AND CONDIMENTS (GREEN)

	Rice	Wheat flour	Salt	Edible oil	Sugar	Fish sauce	Soy sauce
Cambodia			x			x	x
Indonesia		x	x	x			
Lao PDR			x				
Myanmar			x				
Philippines	x	x	x	x	x		
Timor-Leste			x				

Fortification has great potential in achieving public health impact in vulnerable populations through alternate platforms, like -**social safety nets, health systems, and emergency assistance programmes** (213). Governments in the region have been exploring ways to link the poorest and the most vulnerable segment of the population to micronutrient-rich fortified foods through **social safety nets**. For instance, the RASKIN subsidized rice program for the poor in Indonesia implemented a pilot program to fortify rice distributed in a limited area (213,214).

In Myanmar, fortified rice is integrated into social safety nets targeting people living with disabilities, vulnerable women, and children under the Department of Social Welfare and hospitals and training institutes under the Ministry of Health and Sports (215). In the Philippines, government-supplied subsidised fortified rice to make it more affordable for the lowest socioeconomic classes. However, lower retail prices did not improve sales, as consumers reportedly viewed the product as lower quality, and it stigmatised purchasers as poor (212).

Governments have also introduced fortified staples in **open markets**, aiming to expand the benefits of fortified foods in the general population. For instance, fortified staples are available in retail shops in Cambodia (fortified fish and soy sauce), Myanmar (fortified rice) and the Philippines (fortified rice, edible oil) (212,215). The government and private-sector rice millers and retailers collaborated to engage with consumers to generate demand for fortified rice through various media channels (216).

As part of **relief assistance**, in the central Rakhine province of Myanmar under the cash-plus-rice initiative in 2020, internally displaced people and other identified vulnerable people received a ration of fortified rice (for six months) and cash-based transfers (140). Likewise, as part of disaster response assistance, the government of the Philippines has a general food distribution policy- Family Food Pack - to support families affected by emergencies. Under this scheme, families are entitled to receive fortified rice, canned meat, and multi-nutrient mix (217).

Improving diet quality through biofortified staples

Adoption of **staple biofortification** complements existing nutrition approaches by offering a low cost and sustainable approach to reach people with limited access through social safety nets, health systems or retail markets. The majority of the Southeast Asian population predominantly relies on rice, which lacks essential micronutrients (218). Biofortified crops can deliver crucial micronutrients, such as iron, zinc and vitamin A, that are most limited in the population's diet.

Currently, in the Philippines, the commercially available biofortified crops for production are iron biofortified rice (NSIC Rc172), zinc biofortified rice (NSIC Rc460) and golden rice enriched with vitamin A. Indonesia has also released zinc fortified rice (Inapari Nutri zinc) for cultivation. Cambodia and Myanmar are testing several promising high-zinc varieties (218–220).

Improving dietary diversification through homestead farming, aquaculture, and fortified foods

Improving dietary diversity is the cornerstone to combat widespread anaemia and other micronutrient deficiencies. National nutrition policies and strategic plans across Southeast Asian countries highlight the importance of a diverse, nutritious diet through multi-sectoral and multi-ministerial partnerships. Government and development partners have shown commitment to expanding efforts to improve access and uptake of diverse diets through food security and nutrition education.

Countries are trying to boost food security, especially among vulnerable groups, by promoting home and school gardens, small livestock, aquaculture, cash transfers, food-for-asset, food for training programmes, and supporting micro and small group enterprises to diversify available food and generate income (19,194,196,198). Evidence from FNG analyses shows that homestead gardening and fishpond intervention can substantially reduce the cost of nutritious diets (65,71).

On a small scale, a variety of interventions have been piloted in Southeast Asian countries to improve the availability of and access to diverse and nutritious diets and instil positive dietary behaviours. For example, Lao PDR's Agriculture for Nutrition programme established farmer nutrition schools to deliver nutrition education to farmers, focusing on the production of nutritious food, storage, and preservation techniques. In 2020, women farmers received small grants to improve household dietary diversity by establishing home gardens and raising small livestock (137,221).

As part of emergency assistance in 27 townships of Myanmar, conditional cash-based transfers supported vulnerable populations for asset creation and livelihood activities, combined with nutrition awareness activities. These projects delivered nutrition-sensitive outputs such as kitchen gardens and fishpond construction, enhancing access to diverse diets (140). Likewise, in the Philippines, in 2019, conditional cash assistance for asset creation targeted crisis-affected communities. The project targeted single-headed and female-headed households in Lanao del Sur, Maguindanao, North Cotabato, and Sulu to engage in vegetable gardening of high-value crops, corn and rice production, urban gardening and establishment of fishponds (179).

The majority of the population in Southeast Asia is predominately dependent on agriculture, fishing, and livestock rearing, which are prone to climate change impacts. Innovative and low-cost climate-smart agriculture generates higher incomes for poor households, especially in rural and remote areas, while increasing the availability of fresh and diverse foods in families and local markets. For example, rice-fish and frog farming in Lao PDR and integrated 'rice, fish and duck' farming in the Philippines increase incomes through diverse food production and improve physical and economic access to protein and micronutrients through dietary diversification (222–224).

Apart from availability and affordability, knowledge and diet-related misconceptions and cultural preferences add significant obstacles in achieving good nutrition. Typical diets in the region are limiting in essential nutrients such as iron, vitamin B1, B2, B12, calcium, and zinc. These nutrients are contributed by relatively expensive sources of food items (meat, milk, pulses) and are challenging to meet recommended daily intake requirement of an individual (225,226). Furthermore, both urban and rural populations are exposed to one or the other form of malnutrition (stunting, wasting, overweight and MNDs) and/or are at risk of developing nutrition-related chronic diseases due to poor diets due to lack of knowledge and poor dietary behaviours.

Yet, current programming predominantly focuses on PLW, caregivers of young children and, to some extent-school children with health and nutrition education. Furthermore, nutrition counselling activities vary in coverage, quality, and intensity and often fall short in addressing physical, economic, and socio-cultural barriers to diverse diets. The lack of standardised indicators on nutrition education and consumer behaviour is a gap to monitor trends and improve programming. Furthermore, at-scale, long term social behaviour change (SBC) strategy backed by evidence to promote recommended behaviours towards the uptake of micronutrient-rich diets is missing.

GAPS IN NUTRITION PROGRAMMING TARGETING MICRONUTRIENT DEFICIENCIES IN OVERALL

- **SBC**, at scale, has not been used to promote and improve diets through diverse, nutritious foods and fortified staples
- Data gap in MNDs among **elderly and people with disabilities** to design appropriate micronutrient intervention
- Limited or no **nutrition-sensitive social safety nets** (inadequate targeting, small cash transfers, not linked to vouchers for nutritious foods) targeting vulnerable groups and regions to deliver positive nutrition outcomes
- **Coverage and utilisation of fortified staples** remains unknown, including in those countries with mandatory legislations
- Limited efforts on improving immediate **food environment- quality, safety of food sold** by street vendors, school, colleges, and hospital, canteens) and creating **nutrition labels literacy**
- Negligible focus on **generating demand for nutritious foods**, especially among **low-income families** living in rural areas and urban slums

5.2 Bottlenecks and actions required

Table 7 presents common bottlenecks identified in implementing interventions to prevent and reduce MNDs; and actions required to improve the coverage of nutrition programmes equitably. Furthermore, these bottlenecks could have various underlying determinants depending on the country context — identifying them can improve interventions' scale and quality by taking corrective actions.

TABLE 7: BOTTLENECKS IN IMPLEMENTATION OF CURRENT MICRONUTRIENT PROGRAMMES, INTERVENTION-WISE

BOTTLENECKS	ACTIONS REQUIRED
Large-scale micronutrient supplementation	
• Inadequate supplies and stock-outs due to inaccurate forecasting, supply chain issues and budgetary constraints • Irregular distribution of supplements to beneficiaries • Non-compliance of private doctors with national guidelines • Inadequate training and supervision of health staff • Programmatic focus more on pregnant women than lactating women • Incongruity in survey data and regular monitoring (HMIS) data • Low compliance due to lack of knowledge, misconceptions, fear of side-effects, forgetfulness, and low perceived benefits • Insufficient counselling and weak follow-up on supplementation regimen	• Improve the reach of supplementation programmes, especially for the supplementation of IFA in all targeted age groups and supplementation of zinc among children with special planning focus on low coverage areas • Engage with private-sector to ensure compliance with country-specific national guidelines • Bolster social behaviour change activities addressing misconceptions and fears using multiple channels, innovative methods and participation of varied stakeholders
Delayed cord clamping	
• Lack of data on national coverage of delayed cord clamping practice	• Inclusion of indicator-delayed cord clamping at birth in HMIS
Specialised nutritious food (SNF) for management and prevention of malnutrition	
• Low coverage of SNF to improve the nutritional status of children and address acute malnutrition in children • Weak integration of treatment services into the health system and bottlenecks in SNF supply chain, insufficient health staff, lack of trained health personnel, low community sensitisation and unstable national funding • Inadequate technical and financial capacity to produce local SNF, and dependence on imported ingredients for local production • Lack of knowledge among caregivers, intra-household sharing of SNF	• Update and align in-country policies and guidelines on the management of children with acute malnutrition with WHO guidelines • Advocate and/or ensure the inclusion of RUTF for SAM in the national list of essential drugs. • Build technical capacity of countries to develop SNF to treat and prevent acute malnutrition, meeting international standards, and also identify opportunities for local production • Strengthen health systems to detect early and manage children with acute malnutrition, with emphasis on correcting MNDs as well • Raising awareness among families on the importance of SNF in treating children with malnutrition and MNDs

BOTTLENECKS	ACTIONS REQUIRED
Large-scale fortification	
• Absence of mandatory legislation and national standards on fortification of staples • Weak enforcement and regulation of mandatory legislation • Insufficient resources (systems, laboratory, trained personnel, budgets) for regulatory monitoring of product samples • Challenges in external monitoring due to lack of clarity on roles and responsibilities between different government agencies • Fragmented industry with small millers with limited technical and operational capacity and resources to undertake fortification (for example, production of high quality and enough quantity of fortified rice kernels in Myanmar) • Non-compliance of private sector on fortification • Limited consumer awareness and demand for fortified food	• Build institutional capacities to develop country-specific fortification standards • Ensure stricter enforcements in countries with mandatory legislation on staple fortification and assist countries with developing mandatory legislation • Explore and identify platforms-social safety nets, hospitals, educational institutions, the workforce in industries for inclusion of fortified staples • Implement pilot projects and test different modalities in countries with relatively lesser experience with large-scale fortification programmes and encourage cross-borders learning to build credibility • Build awareness and generate demand for fortified staples through public, private and civil society organisations' support
Improving diets through school-based interventions -school feeding, health and nutrition education, school gardens	
• Implementation and financial constraints of countries to implement nationally owned school meal programmes with high coverage • Slow progress in implementing and scaling home-grown school feeding programme at scale • Fragmented implementation of school gardens • Quality and safety issues with hot-cooked school meals • School closures disrupt school meal programmes and affect children' access to other health and nutrition services • Weak inclusion of children with disabilities, working children and children from the poorest families and remotest areas into school meal programme • Inadequate human and financial capacity to deliver quality, regular health, and nutrition education with high coverage • Integration between school and health information databases is missing • Lack of regular monitoring data on school meals, dietary behaviours, and nutritional status of school children	• Advocate and/or scale-up homegrown school model to ensure inclusion of local, seasonal, and diverse foods to school meals and/or addition of fortified staples • Harness schools as a platform to promote healthy behaviours among children through health, nutrition and WASH education, school kitchen gardens • Inclusion of tested biofortified varieties of foods to improve the nutritional value of school meals • Build infrastructure to ensure hygiene and food safety in schools and strengthen regulations on the marketing of unhealthy foods inside premises • Expand access to comprehensive school meals to children with disabilities, those who are working, living in remote areas and from the poorest families • Develop school-based monitoring systems to capture regular data on diets of school children and advocate for the inclusion of indicators that capture the MND status of SAC and adolescents as part of national nutrition and health surveys
Dietary diversification	
• Food and trade policies support and favour staple (rice, maize) production • Current systems not aligned to produce affordable and climate-resilient diets • Limited knowledge in climate-smart agriculture • Slow progress in scaling up climate-resilient agriculture and integrated homestead, aquaculture interventions improving both nutrition and incomes of vulnerable groups • Awareness raising about diet diversity primarily target pregnant women, mothers of young children; men are least targeted even though they control income and expenditure • BCC activities do not address barriers in accessing a healthy and affordable nutrient-rich diet to facilitate positive behaviour change across age-groups	• Promote and align policies and initiatives to improve optimal IYCF practices and access and consumption of diversified foods, especially for vulnerable groups • Support local production through provisioning of quality seeds, fertilizers, storage to minimise losses • Invest in climate-resilient agriculture to deliver nutritious and sustainable foods to the most vulnerable • Conduct formative research for the implementation of national social and behaviour change plans • Advocate, design, and budget for evidence-based SBC strategies to promote recommended behaviours towards the uptake of micronutrient-rich diets

6. Discussion and Conclusion

The **Southeast Asian region is experiencing a triple burden of malnutrition where micronutrient deficiencies coexist across the spectrum** of malnutrition, both under and overnutrition. Though micronutrient deficiencies affect all age groups in varying magnitude and severity, children, women, and those affected by poverty, disabilities, chronic diseases, conflict, and extreme weather events bear the greatest brunt. Before the COVID-19 pandemic, about one in four children under 5 years and WRA were affected by MNDs, and one in two Southeast Asians could not afford healthy diets. With the ongoing pandemic, the situation will further worsen due to loss of jobs, income and disruption of systems-food, health, education, social protection-critical in delivering healthy diets and improving micronutrient status.

Addressing micronutrient deficiencies is a priority for the region, and countries have been proactively implementing a combination of recommended and evidence-based approaches. These approaches include promoting diet diversification, breastfeeding and quality of complementary feeds in young children, micronutrient supplementation, food fortification, school meals, and nutrition education through various platforms of various systems: food, health, education, and social protection**. Each system plays a vital role in ensuring the delivery of quality micronutrient interventions**. For instance, the health sector lays greater focus on the first 1,000 days[49] and children up to five years. The education sector holds responsibility for school-aged children and adolescents' education, health, nutrition, and overall well-being. While the food systems provide food for the whole population, the social safety nets are responsible for safeguarding the most vulnerable and food-insecure groups from slipping into hunger and malnutrition.

At scale, coordinated **efforts of these different systems are crucial** in delivering nutritious diets and addressing the nutritional and non-nutritional contributors of MNDs. For instance, malaria and haemoglobinopathy also significantly contribute to anaemia in Southeast Asian countries. Coordinated actions between health and WASH are crucial in addressing anaemia linked with non-nutritional factors. Similarly, quality healthcare delivery can prevent postpartum haemorrhage and associated anaemia in postpartum women. In newborns, delayed umbilical cord clamping can boost iron stores. Furthermore, ensuring food quality and food safety measures at home, in markets (street, wet, and super-market), and institutions (schools, hospitals, workplace canteens) can prevent illnesses and related nutrient loss. Therefore, improving access to good nutrition coupled with quality healthcare, food, education, and WASH systems' actions can break the vicious cycle of diseases, poor immunity, malnutrition and micronutrient deficiencies.

In the region, **national nutrition policies and interventions commonly target** children under 5 years and PLW with the promotion of dietary diversification, large scale micronutrient supplementation, distribution of specialised nutritious foods, and nutrition counselling, with a relatively lesser focus on SAC, adolescents and WRA. Furthermore, national nutrition plans and actions **overlooked other nutritionally vulnerable groups** such as people with disabilities, chronic illnesses, and the elderly.

Large-scale supplementation programmes have been adopted as a short-term strategy to fill micronutrient gaps from whom diets (including fortification) are not sufficient and to combat severe levels of anaemia and VAD in children under 5 years and PLW. The **supplementation programmes have shown limited success**. Despite the severe levels of anaemia in children and pregnant women in four countries, coverage and utilisation of iron supplements remain low. Cambodia, Indonesia and Timor-Leste have shown progress in reducing VAD; however, except for Myanmar, these countries have been unsuccessful in sustaining high VAS coverage.

The common **reasons for low or patchy coverage of large-scale micronutrient supplementation** programmes are weak health systems, poor targeting of geographically isolated areas and vulnerable communities, supply chain issues, inadequate skills of health staff and ineffective counselling of beneficiaries to garner compliance and poor utilisation. Countries should accelerate efforts to identify

49 From pregnancy to birth and until infant reaches 2 years of age

and address bottlenecks in supplementation programmes and alternate platforms to deliver higher coverage, continuity, intensity, and quality services. For example, Indonesia and the Philippines provided IFA supplements to the women workforce in industries. Indonesia capitalized on social media platforms to send nutrition messages and reminders to adolescent girls to improve WIFS demand and compliance. Sustaining high coverage of large-scale micronutrient interventions warrant policy support, stable allocation of national funds, effective public-private partnerships, and demand generation for services.

With the support of partners, governments have also been making **efforts to enhance the diets of children and PLW** through targeted provisioning of specialised nutritious foods through micronutrient powder, fortified blended foods, and lipid-based nutrient supplements for malnourished children in vulnerable groups or during emergencies. Evidence from CotD and FNG informs that in-kind (or through vouchers) provisioning specialised nutritious foods through social safety nets, or the health sector can effectively reduce the cost of nutritious diets and increase vulnerable groups' access to better nutrition. The major barriers in achieving high coverage and uptake are weak integration of services into the health systems inadequate budgets, supply chain issues, lack of trained health staff and insufficient community sensitisation. In addition, as these programmes are largely donor-driven, coverage and long-term sustainability remain an issue. Sustainability requires supportive government policy, full integration of services into the national system, and adequate domestic budget allocation.

Among school children, **school meals are a crucial social safety** net that ensures at least one nutritious meal daily, especially for children from more vulnerable communities, and promotes equitable access to education. Except for Indonesia, countries have an ongoing school meal programme mainly targeting children in areas with higher food insecurity and poor educational statistics. Countries are aiming to improve the nutrient quality of school meals by adopting the HGSF model (Cambodia, Lao PDR) to source fresh and diverse foods from local farmers and integrating fortified rice (Cambodia) into the school meal programme. Apart from school meals, Indonesia and the Philippines provide weekly iron supplements to adolescent girls.

Further actions are needed to **improve school-based nutrition interventions** including improvement in quality, safety, and coverage of school meals, ensuring healthy school environments (controlled marketing, prohibition on sales of unhealthy snacks and beverages) targeting out-of-school children and vulnerable populations, coupled with the delivery of basic intervention package (nutrition education, deworming and iron supplementation). Governments are committed to increasing their funding share for school meal programmes; however, most countries still rely on donors and partners for technical and financial support. In the long-term, the success of school-based nutrition interventions requires robust political commitment reflected in policy framework, budget allocation, inter-ministerial coordination, implementation, community engagement and private-sector support.

Over the past decade, there has been increased **commitment towards fortification interventions** in Southeast Asia. As a strategy, fortification of staples can significantly fill micronutrient gaps in the population's diet, complement the gaps in the coverage and uptake of supplementation programmes and reduce the overall cost of a nutritious diet. Countries are fortifying different staple foods to enrich the population's diet. For example, all countries have mandatory salt fortification, the Philippines has mandatory rice, wheat flour, edible oil, sugar fortification, and Indonesia has mandatory wheat flour and edible oil fortification.

One of the criticisms of fortification is that it may not be equitably accessible and affordable for the poorest segments of societies (227). Governments have been exploring and **adopting targeted modalities to supply fortified foods to vulnerable groups through social safety nets** such as school meals (Cambodia, the Philippines, Lao PDR) **and emergency assistance programmes** (Myanmar). Cambodia, Myanmar, and the Philippines are also channelling them into the open market. However, more opportunities and effective targeting mechanisms to link fortified foods with social safety nets need to be explored.

Furthermore, given that Asia accounts for 90 percent of global rice consumption, **fortified rice has tremendous potential in improving micronutrient intake and reducing equity gaps**, especially to benefit low-income families who cannot afford a diverse and nutritious diet. However, the Philippines is the only country in the region with mandatory legislation on the fortification of rice and, in effect, minimal quantities are being fortified due to difficulty in regulating a fragmented rice milling industry, making a compelling case for integration of fortified rice into social safety nets.

Absence and/or poor compliance with mandatory legislation, challenges in enforcement and implementation, inequitable access to and insufficient targeting of vulnerable groups, low demand for fortified foods, and

data gaps on intake of fortified staples remain critical areas that need to be addressed. Leveraging the full potential of fortification initiatives call for an enabling policy environment, developing national fortification standards, commitment to scaling up without compromising the quality of fortification, appropriate targeting of vulnerable groups and mass awareness generation activities.

Staple biofortification – a food-based approach – is also being capitalised on in certain countries to reach masses with essential micronutrients (iron, zinc), especially smallholder farmers. Biofortified rice is commercially available in Indonesia and the Philippines, while Cambodia and Myanmar are testing several promising rice varieties (228). Agriculture extension services have a major role in facilitating the adoption and uptake of biofortified crops by farmers. In light of the pandemic, food fortification and biofortification of staples could be further capitalised on as millions of people are at risk of slipping into poverty and facing challenges to afford a healthy diet. Moreover, providing micronutrients through staples can build the first line of defence against infections and improve health and nutrition well-being when consumed regularly.

Regional and in-country policy debates have often raised **concerns over toxicity** from staple food fortification or parallel implementation of multiple micronutrient approaches targeting the same age group (227). However, no evidence from research or large-scale programmes indicates that multiple micronutrient interventions can provide 'too much' micronutrients to be deemed unsafe as levels of micronutrients provided through fortification and supplementation remain below the upper limit[50] (229). At the same time, fortified rice consumption is considered safe for those who have a high rice intake in the region (230). Ensuring the quality and safety of fortified foods call for work on appropriate fortification standards based on food availability, population's dietary intake, regulatory standards, and reach and uptake of micronutrient supplementation (204).

Another major concern in programming remains the **sustainability aspect of the micronutrient interventions** either due to dependence on external funding or when the micronutrient products are not locally sourced. Any fluctuations in the external systems or available resources can considerably impact the programmes.

Diversification of diets is a long-term, sustainable strategy to address multiple MNDs. Lack of availability, physical and economic access, inadequate knowledge, socio-cultural restrictions and poor food choices lay significant obstacles in increasing consumption of nutritious foods in the population (231,232). Even at the macro-level, food policies and trade typically focus on the production of staple crops rather than diverse foods. Numerous efforts such as homestead farming, fish farming, integrated rice, duck and fish production, home gardens, and cash-based transfers are underway to improve diet diversity, especially targeting smallholder farmers and women farmers in rural settings.

Increasing home-production of foods, improving provisioning of nutritious foods/services, cash-transfers coupled with household' knowledge and desire to buy nutritious foods has massive potential in reducing the costs of nutritious diets, especially for rural and poor households. For example, FNG analyses showed that in Cambodia and Myanmar, homestead gardening and fish-pond intervention could substantially reduce the cost of a nutritious diet for households. Targeted cash transfers (MCCT in Myanmar, 4Ps in the Philippines, Bolsa da Mãe in Timor-Leste) offer support to the vulnerable population to access diverse and nutritious foods. Effective implementation of the multi-sectoral intervention package warrants consistent delivery of nutritious food and nutrition services, quality BCC and regular monitoring to identify issues limiting the potential to achieve greater impact.

The existing nutrition policies and programming place emphasis on awareness-generation activities such as nutrition counselling of pregnant women through the health sector, nutrition education in schools, sensitisation of farmers in farmer schools and mass campaigns. Yet, current efforts fall short in facilitating and measuring appropriate behaviour change to uptake micronutrient-rich diets and supplements due to insufficient data and patchy implementation, lacking quality, intensity, coverage, and continuity. Implementing **long-term evidence-based social behaviour change interventions with comprehensive monitoring systems** targeting different age groups through established platforms is crucial in increasing demand and consumption of diverse foods and nutrition services, alongside fixing the supply side.

The region presents a fast-changing and complex food landscape triggered by rapid urbanisation, migration, and economic growth, putting the **urban population at risk of developing MNDs and nutrition-related NCDs**, despite greater food availability and financial access. In many cases, the urban population prefers and consumes highly processed foods high in salt, sugar, and fat, often from an unsafe source. These challenges require actions on both upstream (taxing unhealthy food, increase production and

50 97.5 percent of the population will not observe adverse effects when this level is consumed over a prolonged period of time

subsidies on nutritious foods, food safety standards) and downstream factors (nutrition education) to generate awareness and nudge healthy behaviours. Furthermore, the ongoing pandemic has prompted people's interest in immunity-building foods. Countries can harness this opportunity to create awareness and generate demand for micronutrient-rich foods and fortified staples.

In this whole agenda of addressing MNDs, **ensuring no one is left behind** is paramount. Policies and programmes should adopt a pro-equity lens to improve nutrition among the most vulnerable groups, which calls for more inclusive, responsive, and interconnected systems, including food, health, education, and social safety nets. These systems have a strategic role in identifying vulnerable individuals affected by poverty, disabilities, chronic illnesses, and the elderly who are also nutritionally at risk and in linking them to social safety nets to access better nutrition. As a way forward, countries should explore and expand the benefits of fortified staples and/or cash transfers through different macro-level platforms-welfare schemes, health systems (hospitals, hospices), and micro-level emergency assistance programmes.

Another cardinal issue emerged concerning the data on micronutrient deficiencies, their drivers and nutrient intake. Except for anaemia, it is challenging to estimate the actual burden of MNDs in the region, as the national prevalence of MNDs are either missing or not recent. There is **very limited, up-to-date data on the comprehensive situation of micronutrient deficiencies in all vulnerable groups**. Limited or no biochemical evidence on folate, thiamine, niacin, vitamins B 12, C, and D, and calcium deficiencies warrants investment in infrastructure and capacity to collect biomarkers on these MNDs where recent evidence does not exist. The biochemical data should be collected at the national level, every ten years and ideally more frequently, to monitor programmes, track progress, and inform policies. There is a need to strengthen existing nutrition information systems to fill data gaps and advocate for integrating databases of relevant sectors to facilitate data triangulation, minimise duplication of efforts, and facilitate joint reviews for better-informed programming responses.

Furthermore**, lack of comprehensive data on dietary intake, and coverage and uptake of micronutrient supplementation and fortification** and uptake of different interventions concurrently at the individual level hinder programming actions. Therefore, there is an increasing need for comprehensive and quality dietary intake data, including proxies (expenditure surveys, dietary diversity scores) at household or target group level, to design appropriate strategies to address MNDs.

Overall, government policies and actions should align to deliver healthy diets for all, central to improving all other development indicators. Food systems actions have a significant role in making micronutrient-rich foods more available, affordable, and desirable through legislation, governance, production, supply, and demand generation. There is a broader **need to reshape food systems that should reduce inequality and inequities** in accessing nutrient-rich foods between men and women, rich and poor, rural and urban. Investment in diversifying food production, strengthening the agriculture value chain, and **climate-resilient agriculture** is warranted to ensure availability and access to locally available micronutrient-rich foods, generating income, and building resilience within communities. Engaging and mobilising the private sector can further provide impetus to nutrition strategies such as fortification, fortified complementary foods, biofortification, social marketing efforts, and innovations to improve nutrition.

Lastly, addressing the epidemic of micronutrient deficiencies calls for **commitment to harmonising national policies across relevant sectors, investment, and concerted and collaborative efforts** of the public and private sector to deliver diverse and affordable nutritious diets along with quality short-term micronutrient interventions to bring Southeast Asian countries closer to better health, better education, and better lives. Based on the review, the following are a set of policy recommendations that are relevant across six countries.

7. Recommendations

1

DESIGN CONTEXT-SPECIFIC STRATEGIES AND ADDRESS EXISTING BOTTLENECKS IN HEALTH SYSTEMS TO IMPROVE QUALITY AND COVERAGE OF MICRONUTRIENT SUPPLEMENTATION PROGRAMMES

- Devise context-specific strategies-targeting regions/ provinces with high iron and vitamin A deficiency levels and address existing bottlenecks, including supply chain breaks and poor compliance, in supplementation programmes to improve coverage
- Bolster evidence base (efficiency and effectiveness) for multiple micronutrient supplements (MMS)
- Design and implement evidence-based behaviour change strategy to ensure demand and utilisation of supplementation programmes
- Generate evidence through monitoring and evaluation to enable re-evaluating the direction of programming strategy, for example shifting from blanket to targeted supplementation where vitamin A deficiency is no longer a public health issue
- Identify new service delivery platforms across different sectors to target lesser-focused groups of out-of-school children and women of reproductive age, for example distributing iron folic acid (IFA) supplements to women working in industries and those studying in higher educational institutions.

2

ENHANCE MICRONUTRIENT QUALITY IN THE DIETS OF YOUNG CHILDREN AND PREGNANT AND LACTATING WOMEN (PLW)

- Develop a social and behaviour change strategy to support caregiver's behaviours to improve infant and young child feeding (IYCF) practices, particularly complementary feeding
- Strengthen controls on the marketing of unhealthy baby foods by focusing on legislation, regulation, and enforcement
- Promote local complementary feeding recipes that include micronutrient-rich fruits, vegetables, and animal protein in young children's diets
- Devise appropriate strategies (in-kind/cash/voucher transfers) targeting children with or at risk of malnutrition, disability, or from low-income families and single women-headed households to improve their access to nutritious foods
- Advocate for improving coverage of standardised specialised nutritious foods to manage acutely malnourished children and women
- Integrate specialised nutritious foods (SNF) into health systems or social safety nets and emergency response plans to effectively target vulnerable children and PLW, for example through advocating for the inclusion of RUTF for children with SAM in the essential list of medicines
- Invest and build national capacity to produce safe, specialised nutritious foods, including local SNF. For example, production of local specialised nutritious foods in Cambodia.

3

IMPROVE DIETS OF SCHOOL-AGED CHILDREN AND ADOLESCENTS THROUGH SCHOOL-BASED NUTRITION INTERVENTIONS

- Increase public investment to scale efforts to improve nutrient quality and diversity of school meals by integrating local procurement that supports small-scale farmers, local women groups, and inclusion of fortified staples
- Advocate use of school menu planner software such as PLUS School Menus, to optimise school meals by making them more nutritious, locally sourced, and cost-efficient
- Formulate policies (incentivize the sale of nutritious foods in canteens, levy tax on unhealthy foods, control the marketing of unhealthy foods, incentivise the private sector to increase the availability of healthy foods) to improve the food environment within/ around schools to nudge healthy behaviours among school children
- Develop clear regulations on hygiene, sanitation and safety of school meals and build appropriate kitchen and WASH infrastructure to ensure safe school meals
- Ensure greater synergy between different sectors to deliver a comprehensive package of nutrition (school meals), health (deworming, intermittent iron

supplementation, routine check-ups), education (school health and nutrition education) and WASH (safe drinking water, promotion of hygiene) services at the school level
- Advocate nutrition-sensitive cash-based (or voucher) transfer to children who are in areas not covered by school meals and face heightened vulnerabilities due to food insecurity and conflict
- Universalise delivery of quality and continued health and nutrition education to raise awareness among children on the importance of diverse diets and micronutrients.

4

MAINSTREAM STAPLE FORTIFICATION TO FILL ESSENTIAL NUTRIENT DEFICITS IN THE POPULATION

- Identify, at country-level, widely consumed staples for fortification and develop national standards for mandatory fortification where not formulated, and in countries where standards exist, ensure harmonising national standards with regional and international standards
- Invest in infrastructure (quality control laboratories, modern equipment, supply-chain) and build technical capacity to ensure safe production of quality fortified foods
- Establish robust regulatory mechanisms and delineate clear roles and responsibilities to agencies to enforce standards (including imported food items)
- Maximize the reach of fortified staples, including rice, wheat flour (with iron, folic acid, zinc, and vitamin B12) and oil, milk (with vitamin A and D), by saturating the existing social safety nets and integrating them in the commercial market.

5

ADAPT SOCIAL PROTECTION AND AGRICULTURE SECTORS TO DELIVER ADEQUATE, SAFE, AND MICRONUTRIENT-RICH DIETS FOR ALL

- Use social safety nets to reach poor and the most vulnerable groups with micronutrient-rich foods, including through sufficient cash-based transfers linked to nutritious foods supported with robust SBC activities, such as integrating fortified rice[51] into social safety nets to improve access to and affordability of nutritious diet for vulnerable households
- Align macro-policies (land rights, subsidies on fruits and vegetable production, the inclusion of biofortified crops, mandating vegetables in institutional meals) to deliver nutritious diets that are accessible and affordable
- Gear agricultural extension services to encourage farmers to increase production and consumption of diverse, micronutrient-rich foods, including -fruits, vegetables, animal food sources
- Provide technical and financial support to subsistence farmers and local communities to adopt activities that diversity household food baskets and incomes, such as homestead gardening, fish farming, rice integration, and apiculture
- Revive traditional food systems and promote adoption of underutilised nutritious vegetables, millets and legumes and wild plants for increased access to nutrition
- Promote agricultural advancement by expanding biofortified crops and agronomic biofortification[52] to boost the nutrient content of crops growing in regions where the soil is deficient in micronutrients
- Build infrastructure and use technology to minimise food losses and preserve and enhance the nutrient quality in the food value chain.

6

COLLECT AND USE DATA ON MICRONUTRIENT DEFICIENCIES AND DIETARY CONSUMPTION FOR PROGRAMMING AND TRACKING PROGRESS

- Advocate and forge partnerships with relevant stakeholders to invest in and conduct national micronutrient surveys to generate reliable, up-to-date and comprehensive data on MNDs for children under 5, SAC, adolescents, and women.
- Invest in building laboratory infrastructure and technical capacity to ensure quality data collection and analyses.
- Advocate for the inclusion of elderly and individuals with disabilities in nutrition surveys to design appropriate strategies
- Strengthen existing nutrition information systems through:
    - ◊ bridging data gaps, including on the practice of delayed cord clamping, receipt and consumption of fortified foods, dietary diversity among women, and diets of school children

51 Commonly consumed staple
52 Application of micronutrient-containing mineral fertilizer to the soil to increase micronutrient contents of food crops

- ◊ integrating databases of relevant sectors (health, nutrition, school) to facilitate data triangulation, minimise duplication of efforts, and facilitate joint reviews.
- Advocate to collect quality dietary intake data for vulnerable age groups and develop standardised indicators to collect information on diets of school children, urban population, and consumer behaviour.
- Use evidence from Cost of the Diet and Fill the Nutrient Gap studies for informed policy dialogue and strategic decision-making on selecting optimal micronutrient intervention package for vulnerable age groups
- Evaluate gaps in nutrition-sensitive programming of social safety net for corrective actions
- Conduct research studies to identify drivers of MNDs in the region to design an evidence-based, context-specific package of interventions to address both nutritional and non-nutritional causes.

7

DESIGN EVIDENCE-BASED SOCIAL AND BEHAVIOUR CHANGE (SBC) STRATEGIES TO PROMOTE RECOMMENDED BEHAVIOURS TOWARDS UPTAKE OF MICRONUTRIENT-RICH DIETS AND MICRONUTRIENT SUPPLEMENTS

- Advocate for targeted micronutrient interventions for the most vulnerable populations, including children, adolescents, women, elderly, and individuals affected by poverty, disabilities, and chronic diseases
- Promote long-term social behaviour change strategy through diverse platforms across sectors using a life-cycle approach targeting different age groups
- Identify adequate and accessible media channels to target desired audiences, such as the use of diverse transmedia approaches, mass media, digital including social marketing, and nudging to promote positive dietary behaviours across relevant sectors. For instance, behaviour change strategy can target farmers to produce and consume diversified crops through farmer training schools. Quality health and nutrition education in schools and social media offer immense potential to nudge positive dietary behaviours among school-aged children and adolescents
- Advocate and allocate adequate investment and resources to design and implement scalable SBC strategies. For example, mass campaigns on iodised salt were largely successful due to political commitment and the allocation of public resources
- Emphasize evidence generation on Knowledge, Attitude and Practices (KAP) on micronutrients among the target population to:
  - ◊ understand prevailing myths and misconceptions to support the design and modification of existing/proposed interventions
  - ◊ understand driving factors of unhealthy food choices in urban and rural settings
  - ◊ assess the success and failure of an intervention, thus creating an evidence base for learnings from interventions.

8

FORGE MULTI-SECTORAL, PUBLIC-PRIVATE PARTNERSHIPS

- Strengthen collaboration and coordination mechanisms between relevant government ministries to deliver a micronutrient interventions package with greater accountability

- Leverage private sector engagement and investment to bring the nutrition agenda to the forefront through SUN Business Network (SBN), economic forums and private industries (mobilise the support of the private sector in staple fortification, biofortification of staple crops, agronomic biofortification, building food value chain infrastructure, innovative demand creation of nutritious foods and facilitate innovations)

- Engage and mobilise the private sector in improving workforce nutrition by providing healthy meals at work, IFA supplementation, and nutrition education on the benefits of micronutrients. For instance, in Lao PDR, the government is collaborating with the private sector to target the women workforce through meals at work or cash support to buy food, nutrition education, and health check-ups.

8. Annex

8.1 TABLE DEPICTING EXISTING NATIONAL POLICIES AND PROGRAMMES TO ADDRESS MICRONUTRIENT DEFICIENCIES, AGE-WISE

AGE GROUPS	INTERVENTIONS	Cambodia	Indonesia	Lao PDR	Myanmar	Philippines	Timor-Leste
	Existing national nutrition policy with reduction of MNDs as a	■	■	■	■	■	■
Children <5 years	Delayed cord clamping at birth	■		■		■	
	Promotion of IYCF among children aged 0-24 months	■	■	■	■	■	■
	Vitamin A supplementation among children aged <5 years	■	■	■	■	■	■
	Iron supplement for children	■			■	■	■
	Zinc supplementation in management of diarrhoea < 5 years	■	■	■	■	■	■
	Deworming among children <5 years	■	■		■		
	Treatment of acute malnutrition <5 years with recommended LNS	■				■	■
School-aged children and adolescents	Weekly iron and folic acid supplementation for school children		■			■	
	Existing national school meal programme	■		■	■	■	■
	Deworming	■	■	■	■	■	■
Women and Pregnant, Lactating Women	Iron and folic acid supplementation during pregnancy	■	■	■	■	■	■
	Inclusion of multiple micronutrient supplementation		■		■		
	Iron and folic acid supplementation for WRA	■		■			
	Maternal calcium supplementation		■			■	
	Maternal VAS post-partum	■	■	■	■	■	■
	Maternal deworming in pregnancy	■	■	■	■	■	■
	Mandatory iodisation of salt	■	■	■	■	■	■
General population/ Vulnerable groups	Mandatory legislation on rice fortification					■	
	Mandatory legislation on wheat flour fortification		■			■	
	Mandatory legislation on oil fortification		■			■	
	Mandatory legislation on fish sauce fortification	■					
	Mandatory legislation on soy sauce fortification	■					
	Mandatory legislation on sugar fortification					■	
	Biofortified rice in markets					■	

■ Existing policy/programme/scaling up ■ No programme

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