

REVIEW ARTICLE

Magnitude of anemia and Strategies for Prevention and Control in South East Asia Countries

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Anemia is a condition in which the number of red blood cells (and consequently their oxygen-carrying capacity) is insufficient to meet the body's physiologic needs. Specific physiologic needs vary with a person's age, gender, residential elevation above sea level (altitude), smoking behavior, and different stages of pregnancy (1).

Globally, anemia affects 1.62 billion people (95% CI: 1.50–1.74 billion), which corresponds to 24.8% of the population (95% CI: 22.9–26.7%). The highest prevalence is in preschool-aged children (47.4%, 95% CI: 45.7–49.1), and the lowest prevalence is in adult men (12.7%, 95% CI: 8.6–16.9%). However, the population group with the greatest number of individuals affected is non-pregnant women (468.4 million, 95% CI: 446.2–490.6) (2). The prevalence of anemia is estimated at 9% in countries with high development, in countries with low development, the prevalence is 43% (3).

Anemia impairs health and well-being in women and increases the risk of maternal and neonatal adverse outcomes. Anemia and iron deficiency reduce individuals' well-being, cause fatigue and lethargy, and impair physical capacity and work performance. Median losses in physical productivity due to iron deficiency are important. Failure to reduce anemia worldwide consigns millions of women to impaired health and quality of life, generations of children to impaired development and learning, and communities and nations to

impaired economic productivity and development. Maternal anemia is associated with mortality and morbidity in the mother and baby, including risk of miscarriages, stillbirths, prematurity and low birth weight (4).

Iron deficiency is thought to be the most common cause of anemia globally, but other nutritional deficiencies (including folate, vitamin B12 and vitamin A), acute and chronic inflammation, parasitic infections, and inherited or acquired disorders that affect hemoglobin synthesis, red blood cell production or red blood cell survival, can all cause anemia. Hemoglobin concentration alone cannot be used to diagnose iron deficiency. The prevalence of anemia is an important health indicator when it is used with other measurements of iron status. The hemoglobin concentration can provide information about the severity of iron deficiency (5). Anemia is estimated to contribute to more than 115 000 maternal deaths and 591 000 perinatal deaths globally per year (6). The consequences of morbidity associated with chronic anemia extend to loss of productivity from impaired work capacity, cognitive impairment, and increased susceptibility to infection (7) which also exerts a substantial economic burden (8).

The distribution of countries in the World according to category of anemia as a public health significance in world has been depicted in [Table 1](#). The number of countries which have anemia as a severe Public

Health problem, in under five children, Non pregnant Mothers and pregnant mothers is 69, 32 and 37, respectively (9).

The estimated percentage of anemia that is amendable to iron supplementation is shown in [Table 2](#). In South East Asia (SEA) region countries only 41, 45 and 47 percent of anemia in Under five children, non-pregnant women and pregnant women are amenable to iron supplementation (9). Prevalence of anemia in South Asian countries is the highest among the World. WHO regional estimates generated for preschool-aged children and pregnant and non-pregnant women indicate that the highest proportion of individuals affected were in Africa (47.5–67.6%), while the greatest number of those affected were in South-East Asia, where 315 million (95% CI: 291–340) individuals in these three population groups happened to be affected (6).

In SEA region countries, in addition to iron, the folate deficiency is also a major contributing factor. In recent years, vitamin B12 deficiency is increasingly being reported in some SEA Region countries. Poor bioavailability of iron from plant-based diets rich in phytates is also an important factor responsible for the widespread iron-deficiency anemia (5).

In SEA region moderate and severe anemia is seen even among educated families and the higher income group. There are considerable variations between countries in the prevalence of moderate and severe anemia, which are associated with adverse health consequences (6).

The prevalence of anemia in preschool children, Non-pregnant women, Pregnant women and women in reproductive age group in SEA Region countries is given in [Table 3](#), [Table 4](#), [Table 5](#). Prevalence of anemia in all 4 groups is high in all countries of the SEA region. However, there are substantial differences in the prevalence between countries. Sri Lanka and Thailand have been successful in reducing the prevalence of anemia over the last three decades and hence have relatively lower prevalence of anemia currently (9).

Most countries of the SEA Region have programmes for nutrition education aimed at improving the consumption of micronutrient-rich food and iron

folic acid supplementation to vulnerable groups. Similarly, several countries have also invested in efforts to promote the availability of micronutrient-rich vegetables at affordable cost throughout the year but the coverage achieved under such efforts is very low. In an effort to increase iron intake some of the SEA countries have attempted to fortify commonly consumed inexpensive foodstuffs such as soya sauce and fish sauce in Thailand and salt with iron in India. There had been efforts to fortify rice and wheat flour at the central and local distribution levels and also to ensure that iron and multiple micronutrient sachets be sprinkled over food in order to improve iron intake. None of these have so far been scaled up to national level. As a component of community-based interventions to reduce anemia, there are ongoing programmes of once-daily, twice-a-week and once-a-week iron folic acid supplementation to preschool children, school children and adolescent girls. Some of these programmes cover fairly large populations and have been sustained for several years. Available data from studies evaluating the efficacy of these interventions in terms of reduction in anemia levels and their cost-effectiveness have yielded conflicting results. The current consensus appears to be that while these efforts can improve iron intake and perhaps prevent deterioration in hemoglobin levels, they will not be useful measures for the management of moderate and severe anemia (5).

The programmes for screening, early detection and appropriate management of anemia have been attempted mainly in pregnant women in SEA Countries. Mostly, these efforts have remained hospital-based and so there has not been any substantial reduction in the prevalence of anemia or associated health problems during pregnancy.

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Tables

TABLE 1 NUMBER OF COUNTRIES CATEGORIZED BY PUBLIC HEALTH SIGNIFICANCE OF ANEMIA, 2011

Category of public health problem*	Children (6–59 months)	Non-pregnant women (15–49 years)	Pregnant women (15–49 years)	All women of reproductive age (15–49 years)
None	0	0	0	0
Mild	32	44	2	42
Moderate	84	109	146	110
Severe	69	32	37	33

The prevalence of anemia as a Public Health significance is categorized as follows: <5%, no Public Health problem; 5–19.9%, mild Public Health problem; 20–39.9%, moderate Public Health problem; ≥40%, severe Public Health problem.

TABLE 2 ESTIMATED PERCENTAGE (95% CI) OF ANEMIA THAT IS AMENDABLE TO IRON SUPPLEMENTATION

WHO region	Children (6–59 months)	Non-pregnant women (15–49 years)	Pregnant women (15–49 years)
African Region	32 (30 to 34)	41 (36 to 46)	44 (42 to 47)
Region of the Americas	56 (48 to 63)	55 (44 to 62)	60 (52 to 68)
South-East Asia Region	41 (34 to 54)	45 (35 to 53)	47 (42 to 54)
European Region	54 (44 to 65)	55 (46 to 61)	62 (54 to 71)
Eastern Mediterranean Region	38 (33 to 43)	45 (39 to 50)	49 (46 to 54)
Western Pacific Region	64 (46 to 73)	59 (44 to 70)	61 (49 to 72)
Global	42 (38 to 46)	49 (43 to 53)	50 (47 to 53)

CI: credibility interval.

a Anemia is defined as blood hemoglobin concentration <110 g/L for children and pregnant women and <120 g/L for non-pregnant women

TABLE 3 NATIONAL ESTIMATES OF ANEMIA IN COUNTRIES OF SOUTH EAST REGION FOR THE YEAR 2011 FOR CHILDREN AGED 6-59 MONTHS

S. No.	Country	Mean blood hemoglobin concentration (g/L)		Percentage of children with blood hemoglobin concentration <110 g/L		Percentage of children with blood hemoglobin concentration <70 g/L		Level of public health significance
		Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	
1	Bangladesh	107	102 to 112	56	40 to 70	1.1	0.3 to 3.4	Severe
2	Bhutan	107	98 to 119	55	24 to 78	2.3	0.2 to 7.7	Severe
3	Democratic People's Republic of Korea	114	105 to 122	34	14 to 61	0.5	0.0 to 2.8	Moderate
4	India	106	101 to 112	59	40 to 72	1.8	0.4 to 4.9	Severe
5	Indonesia	114	111 to 119	32	21 to 44	0.3	0.1 to 1.1	Moderate
6	Maldives	115	107 to 122	30	13 to 56	0.4	0.0 to 1.8	Moderate
7	Myanmar	112	104 to 120	40	19 to 67	0.7	0.0 to 3.9	Severe
8	Nepal	109	103 to 114	51	34 to 68	0.9	0.2 to 3.1	Severe
9	Sri Lanka	113	107 to 120	36	19 to 56	0.2	0.0 to 1.1	Moderate
10	Thailand	116	107 to 123	29	11 to 55	0.5	0.0 to 2.7	Moderate
11	Timor-Leste	111	107 to 115	45	33 to 58	0.2	0.1 to 0.6	Severe

TABLE 4 NATIONAL ESTIMATES OF ANEMIA IN COUNTRIES OF SOUTH EAST REGION FOR THE YEAR 2011 ESTIMATE FOR NON-PREGNANT WOMEN AGED 15-49 YEARS

S. No.	Country	Mean blood hemoglobin concentration (g/L)		Percentage of non-pregnant women with blood hemoglobin concentration <120 g/L		Percentage of non-pregnant women with blood hemoglobin concentration <80 g/L		Level of public health significance
		Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	
1	Bangladesh	122	119 to 124	43	35 to 50	0.7	0.3 to 1.3	Severe
2	Bhutan	121	112 to 129	44	21 to 63	2.2	0.4 to 8.1	Severe
3	Democratic People's Republic of Korea	127	121 to 133	25	17 to 46	0.6	0.0 to 2.2	Moderate
4	India	119	113 to 125	48	29 to 63	2.5	0.8 to 5.4	Severe
5	Indonesia	128	123 to 131	22	12 to 37	0.6	0.1 to 1.6	Moderate
6	Maldives	124	119 to 128	37	20 to 52	0.6	0.1 to 1.9	Moderate
7	Myanmar	125	118 to 132	30	13 to 51	1	0.1 to 3.1	Moderate
8	Nepal	125	122 to 127	36	28 to 44	0.8	0.4 to 1.4	Moderate
9	Sri Lanka	127	120 to 132	26	12 to 46	0.7	0.1 to 2.3	Moderate
10	Thailand	127	115 to 132	24	10 to 58	0.9	0.1 to 3.5	Moderate
11	Timor-Leste	128	124 to 132	22	14 to 34	0.7	0.3 to 1.6	Moderate

TABLE 5 NATIONAL ESTIMATES OF ANEMIA IN COUNTRIES OF SOUTH EAST REGION FOR THE YEAR 2011 FOR PREGNANT WOMEN AGED 15-49 YEARS

S. No.	Country	Mean blood hemoglobin concentration (g/L)		Percentage of pregnant women with blood hemoglobin concentration <110 g/L		Percentage of pregnant women with blood hemoglobin concentration <70 g/L		Level of public health significance
		Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	
1	Bangladesh	110	107 to 113	48	37 to 58	0.5	0.2 to 1.0	Severe
2	Bhutan	110	104 to 118	46	25 to 67	1.2	0.2 to 4.2	Severe
3	Democratic People's Republic of Korea	118	111 to 124	27	14 to 47	0.4	0.1 to 1.5	Moderate
4	India	108	104 to 113	54	37 to 67	1.3	0.5 to 2.8	Severe
5	Indonesia	117	109 to 123	30	17 to 51	0.5	0.1 to 1.5	Moderate
6	Maldives	113	105 to 119	39	21 to 63	0.6	0.1 to 1.8	Moderate
7	Myanmar	115	108 to 122	33	18 to 56	0.7	0.1 to 2.3	Moderate
8	Nepal	111	108 to 115	44	33 to 56	0.6	0.3 to 1.3	Severe
9	Sri Lanka	118	112 to 124	25	15 to 42	0.4	0.0 to 1.5	Moderate
10	Thailand	117	104 to 126	30	12 to 66	0.6	0.1 to 2.0	Moderate
11	Timor-Leste	119	115 to 123	24	16 to 35	0.6	0.2 to 1.4	Moderate

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