ICMR INDIAN COUNCIL OF MEDICAL RESEARCH | NIN NATIONAL INSTITUTE OF NUTRITION

ANAEMIA & MICRONUTRIENT DEFICIENCIES Across the Life Course IN INDIA



FACT SHEETS

SAMPADA

Survey for Assessment of Markers of Population Health, Activity, Diet & Anthropometry

2023 - 2025

ICMR - National Institute of Nutrition
Jamai-Osmania PO, Hyderabad-500 007, India.

Department of Health Research
Ministry of Health and Family Welfare, Government of India

Anaemia and Micronutrient Deficiencies Across the Life Course in India: Evidence from the SAMPADA National Survey (2023-2025)

FACT SHEETS

The ICMR-National Institute of Nutrition (ICMR-NIN) conducted the Survey for Assessment of Markers of Population health, Activity, Diet, and Anthropometry (SAMPADA), a nationally representative, community-based cross-sectional survey, during 2023-25. It is one of the largest and most comprehensive nutrition surveys conducted globally. The survey addresses critical evidence gaps in national nutrition data by generating reliable estimates of dietary intakes, anthropometry, anemia and nutritional biomarkers. SAMPADA analyzed over 1.7 lakh blood samples and generated life-course data on anemia and micronutrient deficiencies across all age groups, including elderly individuals above 60 years of age, marking a significant step in India's national nutrition surveillance capacity.

SAMPADA was implemented using a multistage stratified cluster sampling design to provide national and state-level estimates of anemia prevalence along with comprehensive data on diet, anthropometry, nutritional biomarkers and other relevant indicators collected from over 2,00,000 individuals of all age and physiological groups across 183 districts, 35 states and union territories, and more than 81,000 households, making it a comprehensive national effort.

In SAMPADA survey, haemoglobin was measured using gold-standard venous blood sampling and automated analysers, which offer accuracy and reproducibility compared to point of care devices used in previous national surveys. Hemoglobin was measured within 4-6 hour of blood sample collection in field laboratories and remaining blood samples were processed using standard operating procedures and the corresponding serum/hemolysates were transported to the central laboratory at ICMR-NIN, Hyderabad on dry-ice, and stored at -80 °C in biorepository. Rigorous quality control was maintained throughout the process of blood sample collection and analysis including a robust digital data capture system for real-time entry of hemoglobin estimates, minimising errors and enabling prompt centralised validation. A multi-tier quality assurance framework was embedded throughout the survey, encompassing pre-survey protocol validation, ongoing field supervision and back-checks, and centralised data cleaning and harmonisation. All data were securely managed within a validated data management system, with systematic validation checks applied at each stage.

For estimation of micronutrient status, a nationally representative sub-sample was selected for each age and gender groups through a stratified multistage sampling approach, with stratification based on state, district, primary sampling unit (PSU), and wealth quintile. The required sample size was proportionally allocated across these strata based on their distribution in the target population. Serum ferritin, vitamin B12, Red blood cell folate (RBC-Folate) and inflammatory markers (hsCRP: high sensitive C-reactive protein and AGP: Alpha-1-Acid Glycoprotein) were estimated using automated immunoassay platforms, with stringent internal and external quality measures. Serum ferritin concentrations were adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) approach.

The inflammation-adjusted serum ferritin concentrations have been used for estimating iron deficiency. The prevalence estimates of anemia and micronutrient deficiencies have been estimated against the widely accepted reference thresholds recommended by WHO and other international organizations across different age, gender and physiological groups.

All analyses were conducted using standard statistical techniques appropriate for complex survey data. Sampling weights, computed to account for differential selection probabilities at the district, PSU, and household levels, were incorporated into all estimates to ensure accurate representation of the target population at the national and state/UT levels.

The findings from this survey provide high quality nationally representative prevalence estimates of anemia and micronutrient deficiencies for development of targeted nutrition and public health strategies to combat high anaemia prevalence and realize the dream of Viksit Bharat.

- SAMPADA provides comprehensive, nationally representative estimates of the prevalence of anaemia and micronutrient deficiencies across the life course in India, covering children, adolescents, adults, the elderly population, pregnant and lactating mothers, extending the assessment of anaemia to the complete life course.
- Hemoglobin measurements in SAMPADA were done by the **gold standard technique of automated analyzers using venous blood samples**, providing accurate anaemia prevalence estimates.

Table 1: Anaemia Prevalence across the Life Course in India: Key Findings from SAMPADA, 2023-25

Indicators	Total % (95% CI)	Rural % (95% CI)	Urban % (95% CI)
Prevalence of anaemia (%) among children aged 12 to 59 months			
Children who had anaemia (<10.5 g/dl in 12 - 23 months and <11.0 g/dl in 24-59 months age)	41.8 (39.3- 44.4)	42.0 (39.0- 45.0)	41.2 (36.5- 45.9)
Children who had mild anaemia (9.5-10.4 g/dl in 12-23 months and 10.0-10.9 g/dl in 24-59 months age)	23.3 (21.5- 25.2)	24.1 (21.8- 26.4)	20.7 (17.9- 23.4)
Children who had moderate anaemia (7-9.4 g/dl in 12-23 months and 7-9.9 g/dl in 24-59 months age)	17.0 (15.5- 18.6)	16.5 (14.7- 18.4)	18.6 (15.9- 21.3)
Children who had severe anaemia (<7.0 g/dl)	1.5 (1.1- 1.9)	1.3 (0.9- 1.8)	1.9 (1.0- 2.8)
Prevalence of anaemia (%) among children aged 5 to 9 years			
Children who had anaemia (<11.5 g/dl)	31.3 (28.7- 33.9)	31.9 (28.7- 35.2)	29.2 (25.9- 32.6)
Children who had mild anaemia (11.0-11.4 g/dl)	12.9 (11.7- 14.0)	13.0 (11.7- 14.4)	12.4 (10.4- 14.4)
Children who had moderate anaemia (8.0-10.9 g/dl)	17.4 (15.6- 19.3)	17.9 (15.6- 20.3)	15.9 (13.8- 18.1)
Children who had severe anaemia (<8.0 g/dl)	1.0 (0.6- 1.4)	1.0 (0.5- 1.5)	0.9 (0.4- 1.5)
Prevalence of anaemia (%) among adolescent girls aged 10 to 19 years			
Adolescent girls who had anaemia (<11.5 g/dl in 10-11 years and <12.0 g/dl in 12-19 years age)	46.3 (43.7- 49.0)	46.2 (43.0- 49.5)	46.6 (43.2- 50.1)
Adolescent girls who had mild anaemia (11.0-11.4 g/dl in 10-11 years and 11.0-11.9 g/dl in 12-19 years age)	23.7 (22.3- 25.1)	23.6 (21.8- 25.4)	24.0 (22.1- 25.9)
Adolescent girls who had moderate anaemia (8.0-10.9 g/dl)	20.6 (18.6- 22.5)	20.8 (18.4- 23.3)	19.9 (17.4- 22.5)
Adolescent girls who had severe anaemia (<8.0 g/dl)	2.1 (1.7- 2.4)	1.8 (1.4- 2.3)	2.7 (2.0- 3.4)
Prevalence of anaemia (%) among adolescent boys aged 10 to 19 years			
Adolescent boys who had anaemia (<11.5 g/dl in 10-11 years and <12.0 g/dl in 12-14 years age- and <13.0 g/dl in 15-19 years)	22.8 (20.5- 25.2)	24.5 (21.5- 27.5)	17.8 (14.6- 21.1)
Adolescent boys who had mild anaemia (11.0-11.4 g/dl in 10-11 years and 11.0-11.9 g/dl in 12-14 years age- and 11.0 to 12.9 g/dl in 15-19 years)	16.7 (14.9- 18.5)	17.6 (15.4- 19.9)	13.7 (11.0- 16.3)
Adolescent boys who had moderate anaemia (8.0-10.9 g/dl)	5.7 (4.9- 6.6)	6.4 (5.3- 7.5)	3.7 (2.8- 4.6)
Adolescent boys who had severe anaemia (<8.0 g/dl)	0.4 (0.2- 0.7)	0.4 (0.2- 0.7)	0.5 (0.1- 0.8)

Indicators	Total % (95% CI)	Rural % (95% CI)	Urban % (95% CI)
Prevalence of anaemia (%) among non-pregnant non-lactating women aged 20 to 59 years (NPNL)			
Women who had anaemia (<12.0 g/dl)	54.8 (52.5- 57.0)	55.4 (52.4- 58.3)	53.4 (50.3- 56.4)
Women who had mild anaemia (11.0-11.9 g/dl)	26.0 (25.1- 26.9)	26.3 (25.1- 27.5)	25.2 (24.0- 26.5)
Women who had moderate anaemia (8.0-10.9 g/dl)	26.2 (24.6- 27.9)	26.6 (24.4- 28.7)	25.3 (23.3- 27.4)
Women who had severe anaemia (<8.0 g/dl)	2.6 (2.3- 2.9)	2.5 (2.2- 2.8)	2.8 (2.4- 3.2)
Prevalence of anaemia (%) among women of reproductive age (15-49 years) (NPNL)			
Women who had anaemia (<12.0 g/dl)	55.9 (53.6- 58.2)	56.3 (53.3- 59.3)	54.9 (52.1- 57.6)
Women who had mild anaemia (11.0-11.9 g/dl)	26.1 (25.1- 27.1)	26.4 (25.1- 27.7)	25.3 (24.2- 26.4)
Women who had moderate anaemia (8.0-10.9 g/dl)	26.9 (25.2- 28.6)	27.2 (25.0- 29.4)	26.2 (24.2- 28.3)
Women who had severe anaemia (<8.0 g/dl)	2.9 (2.6- 3.2)	2.7 (2.3- 3.1)	3.3 (2.9- 3.8)
Prevalence of anaemia (%) among adult men aged 20 to 59 years			
Men who had anaemia (<13.0 g/dl)	22.0 (20.3- 23.8)	23.5 (21.2- 25.9)	18.4 (16.2- 20.6)
Men who had mild anaemia (11.0-12.9 g/dl)	17.2 (15.8- 18.7)	18.5 (16.6- 20.4)	14.2 (12.5- 15.9)
Men who had moderate anaemia (8.0-10.9 g/dl)	4.1 (3.7- 4.6)	4.4 (3.8- 5.0)	3.6 (2.9- 4.3)
Men who had severe anaemia (<8.0 g/dl)	0.7 (0.5- 0.8)	0.6 (0.5- 0.8)	0.7 (0.5- 0.9)
Prevalence of anaemia (%) among women aged ≥60 Years*			
Women who had anaemia (<12.0 g/dl)	55.7 (53.3- 58.1)	57.0 (53.9- 60.0)	52.3 (48.6- 56.1)
Women who had mild anaemia (11.0-11.9 g/dl)	25.6 (24.1- 27.1)	25.8 (23.9- 27.7)	24.9 (22.5- 27.4)
Women who had moderate anaemia (8.0-10.9 g/dl)	27.6 (25.5- 29.8)	28.5 (25.8- 31.2)	25.1 (21.8- 28.4)
Women who had severe anaemia (<8.0 g/dl)	2.5 (2.0- 3.1)	2.6 (1.9- 3.3)	2.3 (1.5- 3.1)
Prevalence of anaemia (%) among men aged ≥60 Years*			
Men who had anaemia (<13.0 g/dl)	44.7 (42.2- 47.2)	45.9 (42.8- 49.0)	41.3 (37.2- 45.5)
Men who had mild anaemia (11.0-12.9 g/dl)	31.2 (29.3- 33.1)	31.5 (29.3- 33.7)	30.3 (26.5- 34.1)
Men who had moderate anaemia (8.0-10.9 g/dl)	12.2 (10.9- 13.5)	12.9 (11.2- 14.6)	10.2 (8.6- 11.8)
Men who had severe anaemia(<8.0 g/dl)	1.3 (0.9- 1.7)	1.5 (1.0- 1.9)	0.8 (0.4- 1.2)
Prevalence of anaemia (%) among pregnant women			
Pregnant women who had anaemia [1]	43.6 (39.0- 48.1)	45.9 (40.3- 51.5)	36.5 (30.0- 43.0)
Pregnant women who had mild anaemia [2]	22.5 (18.7- 26.2)	23.3 (18.6- 28.0)	20.0 (14.4- 25.6)
Pregnant women who had moderate anaemia[3]	20.4 (16.2- 24.6)	22.1 (16.8- 27.4)	15.0 (10.3- 19.8)
Pregnant women who had severe anaemia [4]	0.7 (0.1- 1.3)	0.4 (0.0- 1.1)	1.4 (0.0- 2.9)
Prevalence of anaemia (%) among lactating women			
Lactating women who had anaemia (<12.0 g/dl)	58.1 (54.2- 62.0)	60.5 (56.0- 65.0)	50.6 (42.3- 58.9)

Indicators	Total % (95% CI)	Rural % (95% CI)	Urban % (95% CI)
Lactating women who had mild anaemia (11.0-11.9 g/dl)	29.0 (26.1- 31.8)	28.9 (25.5- 32.2)	29.2 (24.2- 34.2)
Lactating women who had moderate anaemia (8.0-10.9 g/dl)	27.2 (24.4- 30.0)	29.2 (25.7- 32.6)	21.0 (16.3- 25.7)
Lactating women who had severe anaemia (<8.0 g/dl)	2.0 (1.1- 2.8)	2.5 (1.4- 3.6)	0.4 (0.0- 1.0)

Reference: *Guideline on haemoglobin cut-offs to define anaemia in individuals and populations (WHO, 2024).*

**In the absence of hemoglobin cut-offs specified for individuals ≥ 65 years of age by WHO, the adult hemoglobin cut-offs were used to define anaemia in men and women in this age group. Abbreviation: NPNL- Non-Pregnant Non-Lactating women*

Hemoglobin cut-offs to define anaemia in Pregnant Women

[1] *I Trimester (<11 g/dL); II Trimester (<10.5 g/dL); III Trimester (<11.0 g/dL)*

[2] *I Trimester (10.0-10.9 g/dL); II Trimester (9.5-10.4 g/dL); III Trimester (10.0-10.9 g/dL)*

[3] *I Trimester (7.0-9.9 g/dL); II Trimester (7.0-9.4 g/dL); III Trimester (7.0-9.9 g/dL)*

[4] *I Trimester (<7.0 g/dL); II Trimester (<7.0 g/dL); III Trimester (<7.0 g/dL)*

Anaemia prevalence estimates lower than previous national surveys

Anaemia prevalence was 20–25% among adolescent boys and adult men, 30–35% among children aged 5–9 years, 40–50% among children aged 12–59 months, adolescent girls and pregnant women, and above 50% among women of reproductive age (WRA), lactating women indicating an overall lower estimates compared with earlier national surveys.

Majority of anaemia is mild grade

A substantial proportion of anaemia cases are mild, with about half of children, adolescent girls and women including pregnant and lactating women having mild anaemia. Among adolescent boys, adult men and the elderly, around three-fourths of anaemic cases are mild. This indicates that most cases are at a less severe stage, and provide an important opportunity for early and timely intervention.

Severe Anaemia is less than 2% in majority of the age groups.

Table 2: Prevalence (%) of Micronutrient Deficiencies Across the Life Course - SAMPADA 2023–25

Indicators	Total % (95% CI)	Rural % (95% CI)	Urban % (95% CI)
Micronutrient deficiencies among children aged 12–59 months			
Prevalence of iron deficiency [Serum ferritin <12 µg/L] (%)	23.0 (21.1-24.8)	21.8 (19.5-24.2)	24.9 (21.7-28.0)
Prevalence of folate deficiency [RBC folate <151 ng/mL] (%)	9.8 (8.3-11.3)	9.5 (7.7-11.4)	10.2 (7.7-12.7)
Prevalence of vitamin B12 deficiency [Serum vitamin B12 <203 pg/mL] (%)	37.3 (35.0-39.6)	36.8 (33.9-39.7)	38.1 (34.3-41.8)
Micronutrient deficiencies among children aged 5–9 years			
Prevalence of iron deficiency [Serum ferritin <15 µg/L] (%)	17.6 (13.7- 21.4)	15.3 (10.6- 19.9)	24.2 (17.8- 30.5)
Prevalence of folate deficiency [RBC folate <151 ng/mL] (%)	10.2 (5.6- 14.9)	9.7 (3.9- 15.6)	11.9 (6.8- 17.1)
Prevalence of vitamin B12 deficiency [Serum vitamin B12 <203 pg/mL] (%)	46.5 (40.4- 52.6)	45.0 (37.7- 52.2)	51.0 (40.7- 61.4)
Micronutrient deficiencies among adolescent girls aged 10–19 years			
Prevalence of iron deficiency [Serum ferritin <15 µg/L] (%)	36.3 (31.4- 41.3)	34.6 (28.3- 40.8)	42.2 (37.5- 47.0)
Prevalence of folate deficiency [RBC folate <151 ng/mL] (%)	8.6 (6.2- 11.0)	8.0 (5.1- 10.9)	10.8 (7.3- 14.3)
Prevalence of vitamin B12 deficiency [Serum vitamin B12 <203 pg/mL] (%)	65.4 (61.4- 69.4)	66.5 (61.8- 71.1)	61.7 (54.3- 69.1)
Micronutrient deficiencies among adolescent boys aged 10–19 years			
Prevalence of iron deficiency [Serum ferritin <15 µg/L] (%)	10.0 (7.3- 12.6)	8.6 (5.8- 11.4)	14.3 (8.5- 20.1)
Prevalence of folate deficiency [RBC folate <151 ng/mL] (%)	6.3 (3.8- 8.8)	5.0 (2.3- 7.6)	10.4 (4.5- 16.4)
Prevalence of vitamin B12 deficiency [Serum vitamin B12 <203 pg/mL] (%)	66.1 (60.3- 71.8)	65.3 (58.3- 72.2)	68.6 (59.6- 77.5)
Micronutrient deficiencies among non-pregnant non-lactating women aged 20 to 59 years (NPNL)			
Prevalence of iron deficiency [Serum ferritin <15 µg/L] (%)	32.6 (30.7- 34.5)	30.4 (28.0- 32.9)	38.2 (35.6- 40.8)
Prevalence of folate deficiency [RBC folate <151 ng/mL] (%)	6.2 (4.9- 7.4)	5.0 (3.6- 6.4)	9.2 (6.5- 11.9)
Prevalence of vitamin B12 deficiency [Serum vitamin B12 <203 pg/mL] (%)	55.2 (53.0- 57.3)	53.9 (51.2- 56.6)	58.3 (55.0- 61.7)
Micronutrient deficiencies among women of reproductive age (15-49 years) (NPNL)			
Prevalence of iron deficiency [Serum ferritin <15 µg/L] (%)	34.1 (32.3- 35.9)	32.1 (29.7- 34.4)	39.4 (37.1- 41.6)
Prevalence of folate deficiency [RBC folate <151 ng/mL] (%)	6.4 (5.2- 7.6)	5.1 (3.9- 6.4)	9.6 (6.9- 12.3)
Prevalence of vitamin B12 deficiency [Serum vitamin B12 <203 pg/mL] (%)	57.4 (55.3- 59.4)	56.5 (54.0- 59.0)	59.6 (56.3- 62.8)
Micronutrient deficiencies among adult men (20–59 years)			
Prevalence of iron deficiency [Serum ferritin <15 µg/L] (%)	3.4 (1.8- 5.0)	3.1 (1.0- 5.2)	4.1 (2.2- 6.0)

Indicators	Total % (95% CI)	Rural % (95% CI)	Urban % (95% CI)
Prevalence of folate deficiency [RBC folate <151 ng/mL] (%)	7.5 (4.5- 10.6)	5.3 (2.3- 8.3)	13.6 (5.8- 21.4)
Prevalence of vitamin B12 deficiency [Serum vitamin B12 <203 pg/mL] (%)	60.4 (55.8- 65.0)	57.1 (51.4- 62.7)	69.0 (62.8- 75.3)
Micronutrient deficiencies among adult women aged ≥60 years			
Prevalence of iron deficiency [Serum ferritin <15 µg/L] (%)	8.8 (6.2- 11.3)	7.6 (4.9- 10.3)	12.7 (6.6- 18.7)
Prevalence of folate deficiency [RBC folate <151 ng/mL] (%)	4.9 (2.6- 7.2)	5.1 (2.2- 8.0)	4.1 (1.3- 6.8)
Prevalence of vitamin B12 deficiency [Serum vitamin B12 <203 pg/mL] (%)	41.2 (33.9- 48.4)	42.1 (33.1- 51.1)	38.1 (28.1- 48.1)
Micronutrient deficiencies among adult men aged ≥60 years			
Prevalence of iron deficiency [Serum ferritin <15 µg/L] (%)	4.8 (3.1- 6.5)	4.6 (2.6- 6.5)	5.5 (1.9- 9.2)
Prevalence of folate deficiency [RBC folate <151 ng/mL] (%)	6.6 (3.3- 9.8)	4.1 (1.4- 6.9)	14.6 (4.4- 24.9)
Prevalence of vitamin B12 deficiency [Serum vitamin B12 <203 pg/mL] (%)	46.8 (40.3- 53.4)	46.3 (38.5- 54.2)	48.6 (38.0- 59.2)
Micronutrient deficiencies among pregnant women			
Prevalence of iron deficiency [Serum ferritin <15 µg/L] (%)	29.6 (26.6-32.6)	31.1 (27.3-34.9)	27.1 (22.3-31.8)
Prevalence of folate deficiency [RBC folate <151 ng/mL] (%)	2.9 (1.7-4.1)	3.1 (1.6-4.7)	2.5 (0.5-4.4)
Prevalence of vitamin B12 deficiency [Serum vitamin B12 <203 pg/mL] (%)	63.1 (59.9-66.4)	61.7 (57.6-65.8)	65.8 (60.3-71.2)
Micronutrient deficiencies among lactating women			
Prevalence of iron deficiency [Serum ferritin <15 µg/L] (%)	26.6 (22.3- 30.9)	26.7 (21.7- 31.8)	26.1 (18.4- 33.8)
Prevalence of folate deficiency [RBC folate <151 ng/mL] (%)	4.8 (3.0- 6.7)	3.9 (1.7- 6.0)	8.4 (4.4- 12.5)
Prevalence of vitamin B12 deficiency [Serum vitamin B12 <203 pg/mL] (%)	51.8 (46.9- 56.8)	50.9 (45.2- 56.7)	55.2 (46.2- 64.2)

Abbreviations: *NPNL- Non-Pregnant Non-Lactating women.*

Definitions: *Anaemia was defined using WHO (2024) haemoglobin cut-offs specific to age- sex and physiological status. Iron deficiency was defined based on inflammation adjusted serum ferritin concentration as <12 µg/L among children aged 12–59 Months and <15 µg/L among aged ≥5 years. Serum ferritin concentrations were adjusted for hsCRP and AGP using the BRINDA (Biomarkers Reflecting Inflammation and Nutritional Determinants of Anaemia) approach. Iron deficiency and anaemia was defined as the coexistence of anaemia and iron deficiency using the respective age/gender specific cut-off values.Vitamin B12 deficiency as serum vitamin B12 <203 pg/mL; folate deficiency as RBC folate <151 ng/mL.*

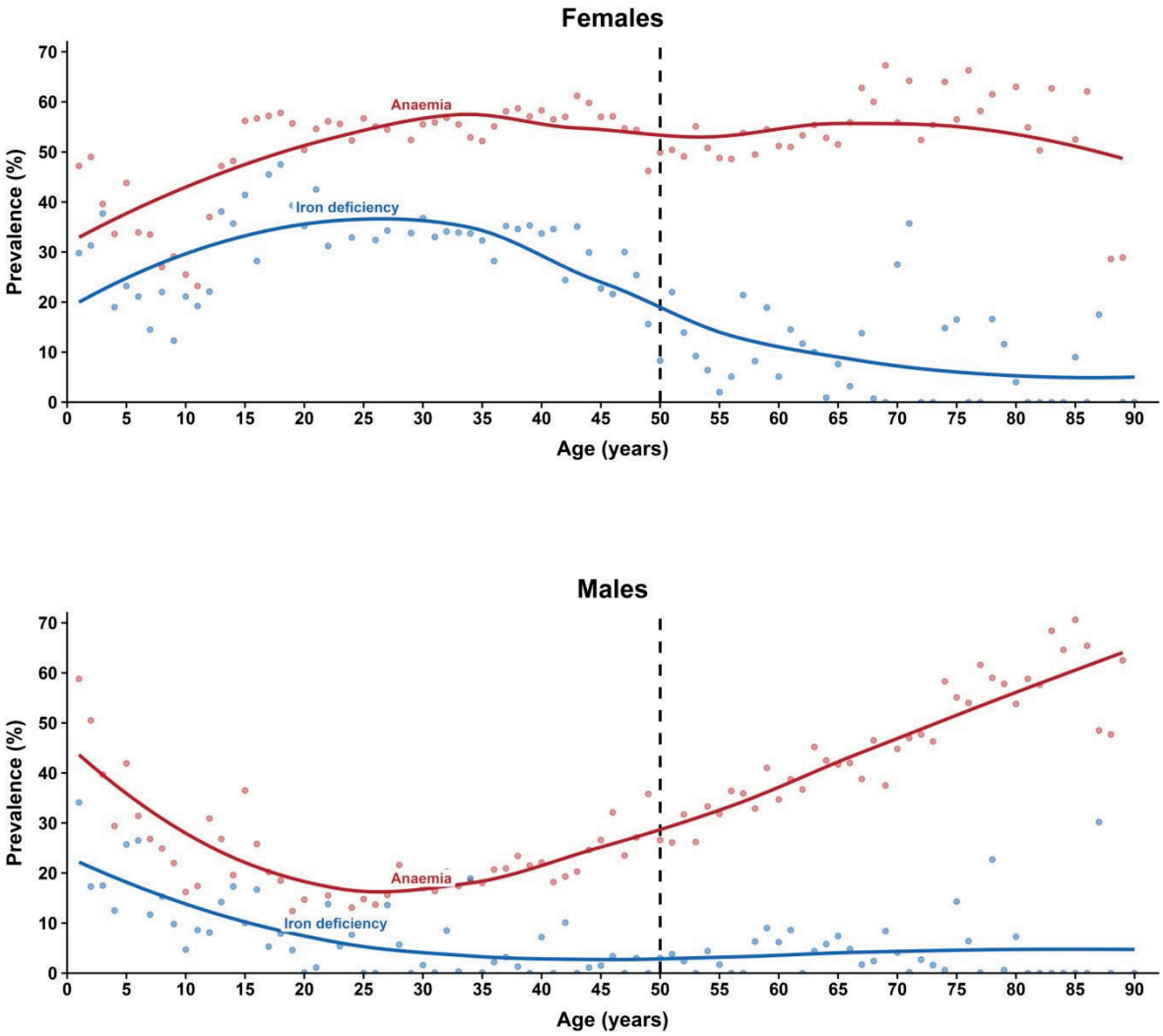
SAMPADA provides a comprehensive picture of micronutrient status

SAMPADA moves beyond anaemia to provide a comprehensive national picture of micronutrient deficiencies, enabling targeted and population-wide strategies to address nutritional gaps across the life course.

Iron deficiency is concentrated in specific life stages

Iron deficiency was 23% among children aged 12–59 months, 18% among children aged 5–9 years, 36% among adolescent girls and 34% among WRA, while it was relatively low among adolescent boys (10%), adult men (3%) and older adults (5–9%). This pattern highlights under five children, adolescent girls, and women as important priority groups for focused iron interventions.

Figure 1. Prevalence of Anaemia and Iron Deficiency Across the Life Course in India: SAMPADA 2023–25



Anaemia was defined using WHO (2024) haemoglobin cut-offs specific to age- sex and physiological status. Iron deficiency was defined based on inflammation adjusted serum ferritin concentration as <12 µg/L among children aged 12–59 Months and <15 µg/L among aged ≥5 years. Serum ferritin concentrations were adjusted for hsCRP and AGP using the BRINDA (Biomarkers Reflecting Inflammation and Nutritional Determinants of Anaemia) approach.

Table 3: At a glance: Prevalence (%, 95% CI) of Anaemia and Micronutrient Deficiencies Across the Life Course- SAMPADA 2023–25

Indicator	12–59 Months % (95% CI)	5–9 Years % (95% CI)	Adolescent Girls (10–19 Years) % (95% CI)	Adolescent Boys (10–19 Years) % (95% CI)	Adult Women (20–59 Years) (NPNL) % (95% CI)	WRA (15-49 years) (NPNL) % (95% CI)	Adult Men (20–59 Years) % (95% CI)	Women Aged ≥60 Years % (95% CI)	Men Aged ≥60 Years % (95% CI)	Pregnant Women % (95% CI)	Lactating Women % (95% CI)
Iron deficiency	23.0 (21.1 - 24.8)	17.6 (13.7 - 21.4)	36.3 (31.4 - 41.3)	10.0 (7.3 - 12.6)	32.6 (30.7 - 34.5)	34.1 (32.3 - 35.9)	3.4 (1.8 - 5.0)	8.8 (6.2 - 11.3)	4.8 (3.1 - 6.5)	29.6 (26.6 - 32.6)	26.6 (22.3 - 30.9)
Iron deficiency and anaemia	16.4 (14.7 - 18.2)	6.3 (4.2 - 8.3)	26.9 (22.2 - 31.6)	5.0 (2.9 - 7.2)	25.7 (23.9 - 27.5)	26.7 (25.1 - 28.4)	2.3 (0.8 - 3.8)	7.8 (5.4 - 10.2)	4.1 (2.5 - 5.7)	18.3 (15.7 - 20.9)	21.8 (17.2 - 26.4)
Folate deficiency	9.8 (8.3 - 11.3)	10.2 (5.6 - 14.9)	8.6 (6.2 - 11.0)	6.3 (3.8 - 8.8)	6.2 (4.9 - 7.4)	6.4 (5.2 - 7.6)	7.5 (4.5 - 10.6)	4.9 (2.6 - 7.2)	6.6 (3.3 - 9.8)	2.9 (1.7 - 4.1)	4.8 (3.0 - 6.7)
Vitamin B12 deficiency	37.3 (35.0 - 39.6)	46.5 (40.4 - 52.6)	65.4 (61.4 - 69.4)	66.1 (60.3 - 71.8)	55.2 (53.0 - 57.3)	57.4 (55.3 - 59.4)	60.4 (55.8 - 65.0)	41.2 (33.9 - 48.4)	46.8 (40.3 - 53.4)	63.1 (59.9 - 66.4)	51.8 (46.9 - 56.8)
ANAEMIA	**41.8 (39.3 - 44.4)**	**31.3 (28.7 - 33.9)**	**46.3 (43.7 - 49.0)**	**22.8 (20.5 - 25.2)**	**54.8 (52.5 - 57.0)**	**55.9 (53.6 - 58.2)**	**22.0 (20.3 - 23.8)**	**55.7 (53.3 - 58.1)**	**44.7 (42.2 - 47.2)**	**43.6 (39.0 - 48.1)**	**58.1 (54.2 - 62.0)**

Abbreviations: *NPNL- Non-Pregnant Non-Lactating women.*

Definitions: *Anaemia was defined using WHO (2024) haemoglobin cut-offs specific to age- sex and physiological status. Iron deficiency was defined based on inflammation adjusted serum ferritin concentration as <12 µg/L among children aged 12–59 Months and <15 µg/L among aged ≥5 years. Serum ferritin concentrations were adjusted for hsCRP and AGP using the BRINDA (Biomarkers Reflecting Inflammation and Nutritional Determinants of Anaemia) approach. Iron deficiency and anaemia was defined as the coexistence of anaemia and iron deficiency using the respective age/gender specific cut-off values. Vitamin B12 deficiency as serum vitamin B12 <203 pg/mL; folate deficiency as RBC folate <151 ng/mL.*

Anaemia is not always due to iron deficiency

SAMPADA shows that iron deficiency with anaemia accounts for only a proportion of the overall anaemia burden; particularly, 27% among adolescent girls and WRA, compared with overall anaemia prevalence of 46% and 56%, respectively. This highlights the need to look beyond iron deficiency to address the multiple nutritional and non-nutritional causes of anaemia. Treatment and tracking until resolution is essential.

Table 4: Prevalence (%) of Micronutrient Deficiencies by Grade of Anaemia Across Population Groups- SAMPADA 2023–25

Population group	Anaemia grade	Iron deficiency (%) (95% CI)	Folate deficiency (%) (95% CI)	Vitamin B12 deficiency (%) (95% CI)
12–59 Months	No anaemia	11.1 (9.1-13.2)	9.9 (7.9-11.9)	35.5 (32.4-38.6)
	Mild	30.1 (24.5-35.7)	8.2 (4.8-11.6)	39.5 (33.5-45.4)
	Moderate / Severe	65.7 (59.2-72.2)	3.4 (0.9-5.8)	38.6 (32.0-45.3)
5–9 years	No anaemia	16.3 (12.3- 20.3)	10.4 (4.6- 16.2)	43.2 (36.0- 50.3)
	Mild	20.6 (4.3- 36.8)	12.5 (2.0- 23.0)	60.7 (45.9- 75.5)
	Moderate / Severe	33.3 (17.6- 49.0)	6.9 (2.6- 11.3)	33.9 (17.1- 50.7)
Adolescent Girls (10–19 Years)	No anaemia	24.0 (16.3- 31.8)	10.0 (6.5- 13.6)	66.0 (60.4- 71.6)
	Mild	43.4 (33.4- 53.4)	8.9 (4.2- 13.5)	68.3 (60.7- 75.9)
	Moderate / Severe	65.3 (52.6- 78.1)	5.5 (2.1- 8.9)	59.3 (44.9- 73.6)
Adolescent Boys (10–19 Years)	No anaemia	6.5 (3.6- 9.5)	6.8 (3.9- 9.6)	65.4 (58.2- 72.5)
	Mild	23.5 (13.0- 33.9)	5.0 (0.4- 9.7)	79.2 (70.3- 88.1)
	Moderate / Severe	24.5 (7.3- 41.8)	0.3 (0.0- 0.7)	67.5 (40.6- 94.3)
Adult Women (20–59 Years) (NPNL)	No anaemia	14.6 (12.5- 16.6)	7.4 (5.6- 9.2)	55.3 (52.3- 58.3)
	Mild	30.5 (27.0- 33.9)	5.4 (3.8- 7.1)	58.2 (54.3- 62.1)
	Moderate / Severe	58.4 (54.0- 62.9)	5.1 (3.6- 6.6)	51.0 (47.1- 55.0)
WRA (15-49 years) (NPNL)	No anaemia	15.8 (13.8- 17.9)	7.4 (5.8- 9.1)	58.4 (55.7- 61.2)
	Mild	33.6 (30.5- 36.7)	5.6 (4.1- 7.2)	60.3 (56.9- 63.6)
	Moderate / Severe	61.0 (56.7- 65.3)	5.4 (3.9- 6.9)	52.4 (48.6- 56.1)
Adult Men (20–59 Years)	No anaemia	1.8 (0.4- 3.1)	8.9 (5.1- 12.7)	59.1 (53.6- 64.5)
	Mild	5.8 (0.7- 10.8)	3.7 (0.1- 7.3)	67.5 (56.6- 78.5)
	Moderate	18.1 (2.8- 33.5)	1.3 (0.0- 3.8)	55.2 (33.8- 76.7)
Women Aged ≥60 Years	No anaemia	2.3 (0.0- 4.7)	5.3 (2.5- 8.0)	33.4 (20.5- 46.4)
	Mild	8.8 (1.3- 16.3)	2.1 (0.0- 4.2)	48.8 (35.5- 62.1)
	Moderate / Severe	22.4 (13.9- 31.0)	7.1 (0.4- 13.9)	37.4 (25.1- 49.7)

Population group	Anaemia grade	Iron deficiency (%) (95% CI)	Folate deficiency (%) (95% CI)	Vitamin B12 deficiency (%) (95% CI)
Men Aged ≥60 Years	No anaemia	1.8 (0.1- 3.4)	8.7 (3.5- 13.9)	51.7 (42.4- 60.9)
	Mild	4.3 (1.3- 7.3)	5.6 (0.0- 11.1)	48.3 (33.8- 62.8)
	Moderate / Severe	20.1 (6.9- 33.3)	0.6 (0.0- 1.6)	50.0 (27.2- 72.9)
Pregnant Women	No anaemia	16.8 (13.1-20.4)	3.3 (1.5-5.1)	60.9 (56.1-65.7)
	Mild	30.7 (23.7-37.7)	3.6 (0.8-6.5)	66.9 (59.7-74.0)
	Moderate / Severe	59.1 (50.5-67.6)	1.6 (0.0-3.7)	70.1 (62.1-78.0)
Lactating Women	No anaemia	10.6 (5.8- 15.5)	6.1 (2.3- 10.0)	48.5 (38.7- 58.3)
	Mild	26.2 (16.4- 36.0)	5.3 (2.2- 8.4)	49.3 (39.5- 59.2)
	Moderate / Severe	52.8 (41.7- 64.0)	2.1 (0.0- 4.3)	57.2 (47.7- 66.8)

Abbreviations: *NPNL- Non-Pregnant Non-Lactating women.*
Definitions: *Anaemia was defined using WHO (2024) haemoglobin cut-offs specific to age- sex and physiological status. Iron deficiency was defined based on inflammation adjusted serum ferritin concentration as <12 µg/L among children aged 12–59 Months and <15 µg/L among aged ≥5 years. Serum ferritin concentrations were adjusted for hsCRP and AGP using the BRINDA (Biomarkers Reflecting Inflammation and Nutritional Determinants of Anaemia) approach. Iron deficiency and anaemia was defined as the coexistence of anaemia and iron deficiency using the respective age/gender specific cut-off values. Vitamin B12 deficiency as serum vitamin B12 <203 pg/mL; folate deficiency as RBC folate <151 ng/mL.*

- Iron deficiency was substantially higher in anemic than in non-anemic individuals across population groups. People with moderate and severe anaemia had higher prevalence of iron deficiency than those with mild anemia.
- Across population groups, prevalence of vitamin B12 and folate deficiency was similar in both anemic and non-anaemic individuals.

Annexure: Anaemia Prevalence across Age Groups and States in India – SAMPADA 2023-25

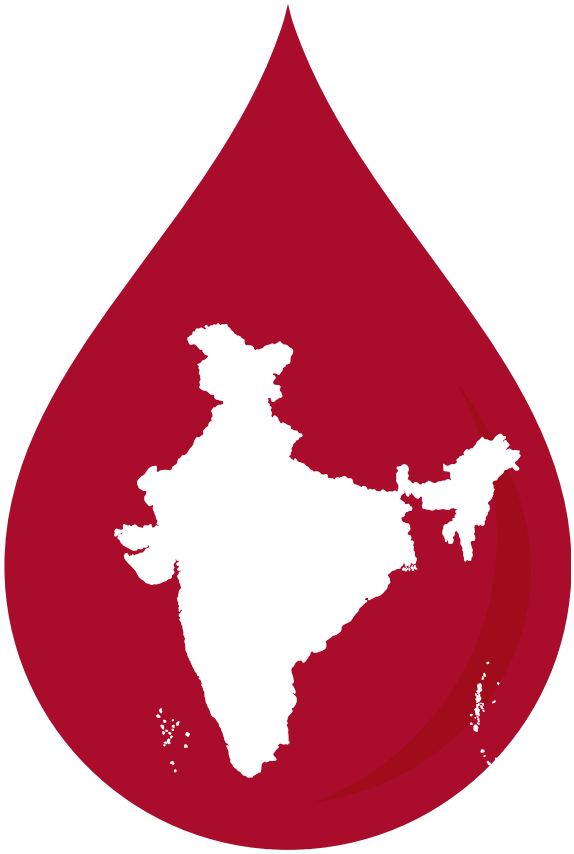
States/UTs	12–59 Months % (95% CI)	5–9 Years % (95% CI)	Adolescent Girls (10–19 Years) % (95% CI)	Adolescent Boys (10–19 Years) % (95% CI)	Adult Women (20–59 Years) (NPNL) % (95% CI)	WRA (15-49 years) (NPNL) % (95% CI)	Adult Men (20–59 Years) % (95% CI)	Women Aged ≥60 Years % (95% CI)	Men Aged ≥60 Years % (95% CI)
India	41.8 (39.3 - 44.4)	31.3 (28.7- 33.9)	46.3 (43.7- 49.0)	22.8 (20.5- 25.2)	54.8 (52.5- 57.0)	55.9 (53.6- 58.2)	22.0 (20.3- 23.8)	55.7 (53.3- 58.1)	44.7 (42.2- 47.2)
Andaman & Nicobar Islands	51.3 (39.1- 63.5)	41.2 (32.8- 49.6)	70.3 (64.0- 76.6)	31.5 (18.3- 44.7)	80.0 (78.6- 81.4)	81.2 (80.6- 81.8)	35.4 (26.3- 44.4)	78.7 (76.2- 81.1)	64.7 (59.9- 69.4)
Andhra Pradesh	57.5 (53.6- 61.4)	32.0 (24.4- 39.6)	51.9 (43.4- 60.3)	26.9 (18.6- 35.3)	68.2 (62.4- 73.9)	68.5 (63.2- 73.8)	21.3 (16.0- 26.6)	81.7 (75.5- 87.8)	62.5 (58.1- 66.9)
Arunachal Pradesh	21.9 (5.3- 38.5)	24.8 (9.8- 39.8)	35.2 (24.0- 46.5)	17.1 (0.0- 34.4)	43.6 (27.4- 59.8)	43.8 (28.9- 58.6)	21.3 (8.8- 33.8)	39.6 (22.8- 56.5)	35.9 (23.9- 47.9)
Assam	40.6 (28.3- 53.0)	44.9 (36.8- 53.0)	58.8 (47.7- 69.9)	37.4 (25.5- 49.3)	72.8 (63.9- 81.6)	71.9 (61.8- 81.9)	46.8 (37.6- 56.0)	76.9 (68.7- 85.1)	74.0 (63.6- 84.4)
Bihar	48.8 (39.9- 57.6)	40.3 (30.0- 50.7)	57.6 (48.1- 67.1)	30.0 (19.5- 40.5)	65.5 (55.1- 75.9)	65.5 (55.1- 75.8)	30.5 (24.1- 36.9)	66.0 (58.3- 73.7)	54.9 (45.4- 64.4)
Chandigarh	26.7 (26.3- 27.2)	16.8 (16.6- 17.0)	38.2 (37.7- 38.7)	8.1 (7.6- 8.7)	51.5 (51.1- 51.8)	53.2 (52.8- 53.6)	10.8 (10.6- 10.9)	52.5 (51.0- 53.9)	28.1 (27.2- 29.1)
Chhattisgarh	55.6 (44.3- 66.9)	59.9 (43.9- 75.9)	65.4 (54.8- 76.1)	35.1 (25.5- 44.7)	71.5 (63.5- 79.6)	71.5 (63.2- 79.7)	37.1 (25.8- 48.4)	81.5 (75.2- 87.9)	61.1 (55.0- 67.3)
Dadra Nagar Haveli & Daman & Diu	29.1 (24.6- 33.5)	25.2 (18.5- 31.9)	55.5 (49.8- 61.2)	19.4 (5.1- 33.7)	63.2 (55.4- 70.9)	63.8 (56.9- 70.8)	24.9 (20.1- 29.7)	65.4 (48.4- 82.3)	46.6 (28.3- 65.0)
Delhi	37.5 (27.1- 47.8)	20.4 (12.2- 28.6)	41.2 (28.2- 54.2)	12.7 (4.1- 21.3)	52.9 (42.7- 63.1)	52.5 (42.3- 62.7)	13.8 (8.3- 19.3)	47.8 (27.1- 68.5)	36.0 (30.2- 41.8)

States/UTs	12–59 Months % (95% CI)	5–9 Years % (95% CI)	Adolescent Girls (10–19 Years) % (95% CI)	Adolescent Boys (10–19 Years) % (95% CI)	Adult Women (20–59 Years) (NPNL) % (95% CI)	WRA (15-49 years) (NPNL) % (95% CI)	Adult Men (20–59 Years) % (95% CI)	Women Aged ≥60 Years % (95% CI)	Men Aged ≥60 Years % (95% CI)
Goa	17.4 (15.2- 19.7)	20.3 (18.7- 22.0)	29.4 (25.0- 33.7)	14.2 (5.3- 23.1)	40.4 (36.2- 44.6)	42.2 (36.4- 48.1)	10.9 (8.9- 12.9)	42.8 (39.1- 46.5)	27.9 (22.5- 33.2)
Gujarat	56.5 (40.4- 72.5)	51.7 (31.6- 71.9)	61.4 (42.6- 80.3)	41.5 (16.5- 66.4)	63.8 (49.3- 78.2)	66.2 (51.0- 81.5)	28.6 (11.5- 45.7)	53.1 (37.3- 69.0)	49.6 (36.2- 62.9)
Haryana	34.1 (23.8- 44.3)	26.3 (17.5- 35.1)	38.1 (23.2- 53.1)	18.2 (11.8- 24.5)	49.3 (37.9- 60.6)	51.4 (39.4- 63.4)	14.7 (10.5- 18.9)	36.7 (25.8- 47.7)	25.4 (21.0- 29.7)
Himachal Pradesh	21.2 (12.5- 29.9)	11.9 (1.6- 22.2)	23.7 (16.8- 30.6)	9.6 (3.6- 15.6)	31.0 (16.8- 45.2)	31.3 (19.0- 43.7)	10.2 (4.5- 15.9)	33.2 (17.3- 49.0)	25.8 (14.9- 36.7)
Jammu & Kashmir	30.5 (19.4- 41.6)	18.6 (12.4- 24.9)	36.2 (15.6- 56.7)	10.2 (3.0- 17.3)	48.4 (28.7- 68.1)	48.6 (29.7- 67.5)	14.6 (7.1- 22.1)	45.1 (27.3- 62.8)	40.9 (25.1- 56.7)
Jharkhand	36.9 (27.5- 46.3)	39.6 (32.5- 46.8)	43.1 (28.9- 57.3)	31.5 (20.6- 42.4)	54.6 (38.6- 70.5)	54.5 (38.4- 70.5)	32.1 (23.7- 40.4)	57.7 (36.3- 79.2)	55.9 (46.7- 65.0)
Karnataka	35.6 (22.8- 48.5)	20.3 (13.5- 27.2)	36.2 (28.1- 44.3)	19.2 (9.6- 28.8)	48.6 (39.9- 57.2)	50.3 (41.9- 58.8)	11.7 (8.0- 15.3)	49.1 (42.5- 55.6)	30.1 (23.4- 36.9)
Kerala	14.5 (9.7- 19.3)	9.8 (7.7- 11.9)	21.4 (17.4- 25.4)	6.3 (2.9- 9.6)	28.0 (23.4- 32.5)	29.1 (25.4- 32.9)	7.1 (5.3- 9.0)	37.3 (32.2- 42.4)	30.4 (26.2- 34.6)
Ladakh	47.9 (27.3- 68.5)	59.3 (35.1- 83.5)	70.6 (49.5- 91.7)	47.9 (26.7- 69.1)	73.8 (60.5- 87.2)	77.1 (64.2- 90.0)	37.1 (20.0- 54.3)	65.2 (40.4- 90.1)	54.4 (40.3- 68.5)
Lakshadweep	25.6 (19.1- 32.2)	26.6 (20.5- 32.7)	48.3 (47.3- 49.3)	25.2 (18.9- 31.5)	54.9 (54.5- 55.3)	56.6 (56.4- 56.8)	13.2 (8.7- 17.6)	61.5 (54.3- 68.8)	42.8 (29.7- 55.8)
Madhya Pradesh	35.0 (27.7- 42.2)	17.6 (13.7- 21.6)	32.4 (28.1- 36.7)	16.9 (10.4- 23.3)	39.5 (31.6- 47.4)	40.2 (33.9- 46.5)	14.9 (8.0- 21.7)	33.1 (24.4- 41.8)	30.3 (18.8- 41.7)

States/UTs	12–59 Months % (95% CI)	5–9 Years % (95% CI)	Adolescent Girls (10–19 Years) % (95% CI)	Adolescent Boys (10–19 Years) % (95% CI)	Adult Women (20–59 Years) (NPNL) % (95% CI)	WRA (15-49 years) (NPNL) % (95% CI)	Adult Men (20–59 Years) % (95% CI)	Women Aged ≥60 Years % (95% CI)	Men Aged ≥60 Years % (95% CI)
Maharashtra	34.8 (23.6- 46.0)	28.2 (19.4- 37.1)	41.3 (36.6- 46.0)	20.3 (15.9- 24.7)	51.5 (46.5- 56.5)	52.5 (47.7- 57.3)	16.6 (12.2- 21.1)	50.4 (41.5- 59.4)	29.0 (25.4- 32.5)
Meghalaya	37.2 (11.2- 63.2)	42.9 (15.2- 70.5)	47.1 (20.9- 73.3)	33.1 (4.8- 61.4)	60.9 (38.0- 83.7)	61.8 (38.3- 85.2)	38.9 (21.0- 56.8)	54.3 (25.8- 82.8)	58.6 (37.6- 79.7)
Mizoram	14.8 (9.9- 19.8)	16.2 (12.6- 19.8)	24.8 (15.6- 34.0)	16.2 (7.9- 24.5)	36.6 (30.4- 42.8)	37.0 (30.8- 43.3)	20.4 (16.0- 24.8)	35.4 (30.1- 40.7)	35.2 (27.7- 42.7)
Nagaland	25.7 (18.2- 33.1)	20.5 (16.7- 24.3)	22.8 (15.7- 29.8)	12.9 (9.7- 16.2)	35.7 (29.8- 41.6)	36.6 (30.2- 43.0)	14.1 (11.5- 16.6)	43.2 (39.4- 47.0)	40.2 (30.5- 49.8)
Odisha	35.8 (24.0- 47.6)	21.5 (13.1- 29.9)	45.0 (37.0- 53.0)	17.5 (13.1- 21.8)	53.4 (43.0- 63.7)	51.3 (41.0- 61.5)	22.7 (15.5- 29.8)	59.6 (50.3- 68.9)	46.2 (32.4- 59.9)
Puducherry	26.7 (18.7- 34.8)	14.5 (4.5- 24.5)	35.9 (27.2- 44.6)	11.9 (1.7- 22.0)	45.4 (42.8- 48.0)	50.0 (46.7- 53.3)	10.1 (7.5- 12.7)	44.8 (38.3- 51.4)	39.9 (23.7- 56.2)
Punjab	45.7 (39.1- 52.2)	38.9 (31.7- 46.1)	59.0 (51.0- 67.0)	32.5 (23.9- 41.2)	70.1 (62.0- 78.2)	70.5 (63.7- 77.4)	37.1 (32.3- 42.0)	64.4 (56.7- 72.2)	54.7 (46.1- 63.3)
Rajasthan	41.1 (28.5- 53.7)	29.1 (10.5- 47.8)	50.2 (35.3- 65.0)	21.6 (8.7- 34.4)	47.8 (34.8- 60.8)	51.8 (38.9- 64.6)	19.5 (8.4- 30.5)	44.1 (28.8- 59.4)	34.9 (21.4- 48.3)
Sikkim	21.5 (15.6- 27.4)	14.9 (8.8- 20.9)	35.6 (23.3- 47.8)	7.1 (0.8- 13.4)	37.2 (31.8- 42.7)	38.3 (32.0- 44.6)	11.8 (8.6- 15.1)	43.9 (34.6- 53.1)	44.0 (31.4- 56.7)
Tamil Nadu	43.3 (35.5- 51.0)	22.2 (15.5- 28.9)	35.9 (31.0- 40.9)	15.5 (10.7- 20.3)	51.4 (46.4- 56.5)	52.8 (47.9- 57.6)	17.3 (11.5- 23.1)	54.0 (50.2- 57.9)	46.9 (36.3- 57.5)
Telangana	47.4 (39.7- 55.1)	23.8 (13.4- 34.1)	43.6 (35.9- 51.3)	16.4 (8.2- 24.6)	51.0 (41.8- 60.2)	54.0 (45.1- 62.8)	12.5 (5.0- 19.9)	44.8 (37.6- 52.1)	28.6 (17.6- 39.6)

States/UTs	12–59 Months % (95% CI)	5–9 Years % (95% CI)	Adolescent Girls (10–19 Years) % (95% CI)	Adolescent Boys (10–19 Years) % (95% CI)	Adult Women (20–59 Years) (NPNL) % (95% CI)	WRA (15-49 years) (NPNL) % (95% CI)	Adult Men (20–59 Years) % (95% CI)	Women Aged ≥60 Years % (95% CI)	Men Aged ≥60 Years % (95% CI)
Tripura	25.7 (16.9- 34.5)	39.3 (31.3- 47.2)	59.5 (47.1- 72.0)	26.5 (21.8- 31.2)	73.3 (65.7- 80.9)	70.0 (60.5- 79.5)	31.8 (25.4- 38.1)	79.6 (71.5- 87.8)	64.8 (54.1- 75.4)
anaemiaUttar Pradesh	43.1 (34.4- 51.9)	27.3 (19.5- 35.1)	44.0 (34.6- 53.3)	19.8 (12.8- 26.8)	47.8 (39.2- 56.3)	50.2 (40.9- 59.4)	20.3 (14.3- 26.3)	47.2 (39.8- 54.7)	40.7 (30.1- 51.3)
Uttarakhand	14.6 (8.0- 21.1)	18.7 (5.3- 32.0)	33.2 (21.0- 45.3)	17.9 (11.3- 24.6)	32.6 (20.8- 44.3)	34.0 (22.8- 45.2)	23.6 (18.2- 29.1)	31.6 (12.6-50.6)	32.1 (20.7- 43.5)
West Bengal	39.1 (27.3- 50.9)	42.8 (35.7- 49.9)	60.4 (54.3- 66.4)	25.2 (18.1- 32.2)	70.7 (62.8- 78.7)	72.4 (65.4- 79.5)	32.1 (24.7- 39.6)	80.6 (74.4- 86.9)	62.1 (50.7- 73.6)

***Abbreviations**: NPNL- Non-Pregnant Non-Lactating women. **Definitions:** Anaemia was defined using WHO (2024) haemoglobin cut-offs specific to age- sex and physiological status.*



आई.सी.एम.आर.- राष्ट्रीय पोषण संस्थान
ICMR - National Institute of Nutrition

भारतीय आयुर्विज्ञान अनुसंधान परिषद
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स्वास्थ्य एवं परिवार कल्याण मंत्रालय, भारत सरकार
Ministry of Health and Family Welfare, Government of India

तारनाका, हैदराबाद- 500007, तेलंगाना, भारत
Tarnaka, Hyderabad-500 007, Telangana, India.

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Suggested Citation

Indian Council of Medical Research–National Institute of Nutrition. Anaemia and Micronontrent Deficiencies Across the Life Course in India: Evidence from the Survey for Assessment of Markers of Population Health, Activity, Diet and Anthropometry (SAMPADA) National Survey (2023–2025). Hyderabad: ICMR-NIN, Department of Health Research, Ministry of Health and Family Welfare, Government of India; 2026.