

Review Article

Prevalence and determinants of anaemia among women of reproductive age in India: a narrative review

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ABSTRACT

Anaemia is India's most prevalent nutritional disorder among women of reproductive age (15-49 years), affecting their physical, social, and mental well-being. This narrative review synthesizes evidence on the prevalence of anaemia and its determinants, including dietary, economic, and cultural factors, as well as education, gender disparities, early marriage, and limited access to health services. Understanding these factors can help identify high-risk subgroups and guide targeted interventions. A review of studies published between 2015 and 2026 was conducted using PubMed, Google Scholar and publicly accessible National Family Health Survey (NFHS) and World Health Organization (WHO) reports. Included studies were observational, cross-sectional, community-based, or secondary data analysis. NFHS data showed that anaemia prevalence among women increased from 53% (NFHS-4, 2015-2016) to 57% (NFHS-5, 2019-2021), with higher rates in aspirational districts which rose from 58.7% (NFHS-4) to 61.1% (NFHS-5). Across all the covered studies, prevalence was predominant among rural women and socially disadvantaged groups, and were associated with inadequate dietary intake, low socioeconomic status, limited education, gender disparities, and cultural practices. Interventions reported to reduce anaemia included iron-folic acid supplementation, government health programs, nutrition education, and community-based initiatives. Anaemia persist as a major public health concern in India. Strengthening existing programs, including Anaemia Mukh Bharat, promoting nutrition education, and improving access to health services are essential to reduce anaemia.

Keywords: Anaemia, Women of reproductive age, Dietary factors, Anaemia Mukh Bharat

INTRODUCTION

Despite several decades of public health interventions, Anaemia (traditionally termed Raktālpātā) remains one of the most common health conditions among women of reproductive age (15-49 years) worldwide. In Asia, Yemen, Pakistan, and India have the highest prevalence of anaemia.¹ According to the WHO, in 2019, anaemia accounts for 50 million years lived with a disability, of which dietary iron deficiency is a primary cause. Globally, about 37% of pregnant women (32 million) and 30% of non-pregnant women (539 million) in this age group have anaemia, accounting for almost half a billion women.² Anaemia has a high disease burden and

negatively impacts the quality of life; therefore, it has been included in the United Nations 2030 Sustainable Development Goals.³ Several global efforts include the Nutrition for Growth Summit 2021 and the WHO-UNICEF Anaemia Action Alliance.

WHO estimates that 244 million women in South East are affected by anaemia. India has a high burden, as per NFHS data: it increased from 53% in NFHS-4 (2015-16) to 57% in NFHS-5 (2019-21) among women of reproductive age.⁴ The burden is high in rural women and socially disadvantaged groups, which are associated with dietary inadequacy, poverty, and a lack of education and health care. Despite national anemia programs, including

Anaemia Mukht Bharat (2018), iron-folic Acid supplementation, and Poshan Abhiyan (2018), anemia remains highly prevalent due to limited awareness and poor compliance.

This narrative review presents evidence on the prevalence and determinants of anemia among women of reproductive age in India and discusses the findings for public health planning and designing targeted interventions for anemia reduction.

LITERATURE SEARCH

This narrative review summarizes current evidence. As this is a narrative review, PRISMA guidelines were not strictly followed; however, an established and transparent search process was implemented that protected relevant and reliable studies. The overview summarizes the prevalence and determinants of anemia in girls of reproductive age in India. The assessment aimed to identify national-level trends and site-specific patterns to understand variations in anemia prevalence and associated threat elements.

The literature published between 2015 and 2026 was systematically searched using PubMed, Google Scholar, and publicly available statistics from the National Family Health Survey (NFHS) and WHO. Only studies conducted in India among women of reproductive age group were included. This duration was chosen to cover the most current and applicable evidence. Search terms included “anemia in India” and terms related to dietary and non-nutritional determinants.

Approximately 90 records were identified and out of these, 45 full-text articles were reviewed and 24 studies meeting eligibility criteria were included. The included studies covered multiple regions of India to provide a representative overview, including rural and urban areas (e. g., Chandigarh, North India urban areas and slums, North Eastern India), various districts and villages (e.g.,

Bankura District in West Bengal, Rural Odisha, Rural Areas of Bareilly in Uttar Pradesh), and academic or medical institutions (e.g., University of Delhi, PSG Institute of Medical Science and Research, Abhilashi College, Unani Hospital, Bangalore). This approach allowed assessment of overall prevalence, as well as urban-rural differences and related determinants.

The studies were included if they examined women of reproductive age, were conducted in India between 2015 to 2026, reported haemoglobin levels and anaemia prevalence, employed cross-sectional, hospital-based, community-based, cohort, or secondary data analysis designs, and represented both urban and rural population.

The studies were excluded if they were conducted outside India, involved children or older age group, did not report anaemia outcomes, were not available in English, or involved non-Indian population.

Data extraction

Data extracted from each selected study included author, year, study location and design, sample size and age group, anaemia prevalence, haemoglobin measurement method and diagnostic criteria, dietary and non-dietary determinants, interventions (if reported), and key findings and limitations. Extracted data were organized in Microsoft excel for systematic analysis.

Quantitative and qualitative approach

Quantitative assessment included haemoglobin measurement. Haemoglobin levels were assessed using various methods across studies, including: Digital hemoglobinometer (Aarson Scientific Works RSHB-301), HemoCue Hb 201+ Analyser, HemoCue Photometer System, HemoCue Hb Analyser, spectroscopy, peripheral blood smear examination, Sahli's method and blood test. The classification of anaemia based on WHO guidelines is mentioned in Table 1.

Table 1: Haemoglobin classification of anaemia according to WHO.²⁶

Populations	Non-anaemic	Mild anaemic	Moderate anaemic	Severe anaemic
Pregnant women	≥11.0 g/dl	10.0-10.9 g/dl	7.0-9.9 g/dl	<7.0 g/dl
Non-pregnant women	≥12.0 g/dl	11.0-11.9 g/dl	8.0-10.9 g/dl	<8.0 g/dl

Qualitative assessments included data collected through interviews, questionnaires, and focus group discussions regarding dietary patterns, health knowledge, and socioeconomic influences.

Data synthesis

Both quantitative and qualitative data were summarized in excel tables. Findings were then synthesized, highlighting nutritional anaemia, prevalence of anaemia, dietary determinants, and non-dietary determinants. This approach enabled a comprehensive understanding of the

magnitude and causes of iron deficiency anaemia among Indian women of reproductive age.

Ethical considerations

Ethical approval was not necessary as the review used only published data and publicly available information.

OVERVIEW OF INCLUDED STUDIES

The research from 2015 and 2026 is included in this narrative review. These included hospital-based studies,

secondary analyzes of NFHS datasets, and mixed methods studies representing more than 1 million women of reproductive age, along with each pregnant and non-pregnant contributors from rural, urban, and tribal groups.

PREVALENCE OF ANEMIA

Anemia remains a full-scale public health concern among women of reproductive age in India, with prevalence varying across regions and populations. Urban female undergraduate students in Delhi showed a reduction in the occurrence of anemia (mild anemia: 17%, moderate anemia: 10%, non-anemic: 73%),⁵ even as ladies in rural Chengalpattu district, Tamil Nadu performed much better in prevalence of 37.4%.⁶ Rural and tribal populations

showed consistently higher levels of anemia, along with districts in West Bengal, Odisha and Assam tea gardens.⁷⁻¹⁰

Data from nationwide surveys indicate a slow increase in anemia among ST, SC, while other caste women confirmed lesser increases.^{11,12} Some studies additionally stated modest declines, suggesting improvements due to applications of maternal care and efforts at iron-folic acid supplementation. Mild and moderate anemia were the most frequently located categories, while intense and really severe cases were predominantly observed in pregnant women and rural people with a high threat. A detailed assessment of prevalence, and regional distribution is provided in Table 2.

Table 2: Overview of prevalence of anaemia (India).

Study locations	Study type	Sample size	Non-anaemic (%)	Overall (%)	Mild (%)	Moderate (%)	Severe (%)	Reference
UG institutes, Delhi	Cross-sectional	1473 (Non pregnant)	73	27	17	10	NR	4
Chengal-paattu, T. N.	Cross-sectional, community based	438 (Non pregnant)	NR	37.4	NR	NR	NR	5
Bankura, West Bengal	Qualitative (FGDs)	41 (Pregnant: 17 lactating: 11 Mothers-in-law: 13)	NR	67	NR	NR	NR	6
Aspirational districts	Cross-sectional	NFHS 4: 114,444, NFHS 5: 108,782 (Both pregnant and non pregnant)	NR	NFHS-4-5: 53-57 Aspirational: 58.7-61.1	NR	NR	NR	4
Nagla Chandi, U. P.	Cross-sectional, FGDs	Non pregnant	35.3	64.7	20.6	14.7	NR	13
West Bengal	Secondary data analysis, cross sectional	15,756 (Non-pregnant)	NR	64	NR	NR	NR	7
PSG, IMSR, Coimbatore, T. N.	Cross sectional, community-based	426 (Non pregnant)	NR	64.8	35.7	22.7	6.3	14
Unani hospital, Bengaluru, KA	Cross sectional, hospital-based	400 (Non pregnant)	NR	42	NR	NR	NR	15
Serumavilangai Village, Karaikal, P. Y.	Cross-sectional	Non pregnant	NR	35.9	23.6	8.9	3.4	16
Karad, Maharashtra	Cross-sectional	300 (Non pregnant)	NR	28.6	18	10.6	0	17
Dibrugarh, Assam	Cross sectional, community-based	770 (Non pregnant)	NR	NR	NR	91.6	8.4	9
Koppal District Hospital, K. A.	Longitudinal, prospective	1769 (Pregnant women)	NR	96.5	22.47	56.30	14.98 and v. severe: 2.73	18
Valayakaranur, T. N.	Observational, home-based epidemiological	200 (Both pregnant and non pregnant)	27	73	38.5	33.5	1.5	19
Abhilashi College, Mandi, H. P.	Cross-sectional, descriptive	87 (Non pregnant)	NR	55	NR	NR	NR	20

Continued.

Study locations	Study type	Sample size	Non-anaemic (%)	Overall (%)	Mild (%)	Moderate (%)	Severe (%)	Reference
Bareilly, UP	Cross-sectional, observational	435 (Pregnant)	NR	49	27.1	16.8	5	21
Indian Muslim women	Secondary data analysis	212,837 (Both pregnant and non pregnant)	NR	48.77to 55.6	NR	NR	NR	22
India	Cross sectional, secondary data analysis	NHFS-3: 112,478, NFHS-4: 688,896, NFHS-5: 714,421 (Both pregnant and non pregnant)	NR	>55 (highest in SC and ST women, followed by OBC, then general women)	NR	NR	NR	10
North East India	Cross- sectional, observational	65,941 (Both pregnant and non pregnant)	NR	40	NR	NR	NR	23
Chandigarh, urban areas and slums	Cross-sectional, FGDs	120 (Pregnant women)	NR	65.7	37	28.7	0	24
India (tribal analysis)	Cross sectional, secondary data analysis	NFHS-2: 30,918, NFHS-3: 37,951, NFHS-4: 176,504, NFHS-5: 171,130, tribal and general caste	NR	Overall: 1998-2021: 51.8-57.2 and General caste: 1998-2021: 46.5-54.8 (general)	NR	NR	NR	25

*Note: NR, not reported.

DIETARY DETERMINANTS

Diet emerged as a major factor influencing anaemia among women of reproductive age. Low dietary diversity was strongly associated with anaemia. Consumption of fewer than five different food groups was linked to higher rates of mild to moderate anaemia. Specific dietary patterns contributing to anaemia included largely vegetarian diets without adequate sources of iron enhancers, low intake of green leafy vegetables, pulses, millet, and protein-rich foods, including eggs, fish, or meat, high consumption of tea and over-reliance on carbohydrate-based staple foods without adequate dietary balance, skipping meals- particularly breakfast, and infrequent consumption of fruits or vitamin C-rich foods. Qualitative evidence highlighted additional challenges, including aversion to iron and folic acid-rich foods, nausea during pregnancy, misconceptions about fortified foods and skipping meals which collectively contribute to the prevalence of anaemia.

Conversely, women with a more varied diet, including regular consumption of pulses, legumes, leafy vegetables, and vitamin C-rich foods, had a lower risk of anaemia, demonstrating a clear inverse relationship between dietary quality and anaemia prevalence.

NON-DIETARY DETERMINANTS

Several non-dietary factors also contributed to anaemia risk. Low educational levels, poverty and rural/ slum residence reported frequent risk factors. Reproductive factors, including early marriage, high parity, short birth intervals, and prolonged breastfeeding associated with higher anaemia prevalence. Other contributors included heavy/ prolonged menstrual bleeding, low BMI/under-nutrition (sometimes occurring alongside overweight), poor sanitation, unsafe drinking water, open defecation, and recurring infections like malaria. Limited healthcare access and inadequate antenatal care further increased vulnerability. Qualitative studies underscored additional barriers, including lack of knowledge about anaemia, fear/ poor adherence to iron-folic acid supplementation due to side effects, family influence on dietary choices, gender inequities, and low decision-making power among women.

INTERVENTIONS AND PROGRAMMATIC COVERAGE

While most studies were observational, they highlighted the critical role of national programme in addressing anaemia. Strategies included iron-folic acid

supplementation (often supervised to ensure compliance), periodic haemoglobin testing, nutrition education and awareness campaigns, promotion of iron-rich and diverse diets, use of iron cooking utensils and fortified foods, hygiene and sanitation improvements, and strengthened antenatal and maternal healthcare services.

Smaller, community-based initiatives, such as home counselling and distribution of educational materials, were reported to improve dietary practices and awareness, demonstrating that local interventions can effectively complement national programme.

DISCUSSION

This review's results show that anaemia continues to be a major public health issue for Indian women in their reproductive years. Rates vary greatly by region, the type of population studied, and the context in which research was conducted. Across studies, rural and tribal groups repeatedly have higher anaemia levels than urban and more educated groups, likely linked to differences in food habits, knowledge about nutrition, and availability of health services.

Both diet-related influences and non-diet influences shaped anaemia levels: dietary drivers included limited variety in foods, diets centered mainly on cereals, and too little consumption of iron-rich items; non-diet drivers included low schooling, poverty, and reproductive factors, along with poor sanitation, repeated infections, and restricted healthcare access, especially for marginalized groups. This underlines that anaemia has multiple causes, shaped by nutritional conditions and socioeconomic forces.

While national programme, such as iron-folic acid distribution, nutrition guidance, and maternal health efforts have produced small gains, but anaemia levels still remain elevated in rural, tribal, and aspirational districts, suggesting weak overall impact. While national programme, including anemia Mukh Bharat, iron-folic acid supplementation and maternal care initiative have had some beneficial effect, the continued higher rates in rural, tribal settings point to the need for customized, context-based actions that increase dietary variety and strengthen women's agency.

In comparison with global patterns, anaemia among women of reproductive age is less prevalent worldwide than it is in India, showing that India carries an unusually heavy load. The findings stress that lowering anaemia effectively requires an integrated strategy that tackles socioeconomic conditions alongside diet-related issues.¹¹

CONCLUSION

Anaemia continues to affect a large proportion of women of reproductive age in India, with the highest burden observed among rural, tribal, and socioeconomically

disadvantaged groups. Mild and moderate anaemia remain the most common forms, while severe anaemia persists among pregnant women and high-risk rural populations. Both dietary inadequacies and non-dietary factors, including socioeconomic status, reproductive history, and poor sanitation play a key role in its persistence.

To effectively address anaemia, efforts should focus on strengthening iron-folic acid supplementation programs, promoting dietary diversity, improving maternal and reproductive health services, and implementing targeted interventions for vulnerable populations. This review synthesizes evidence on regional prevalence, and determinants, providing insights for guiding policy, program planning, and future research to reduce anaemia among women of reproductive age.

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