View Point

# Anemia in Indian Men: An Emerging Public Health Challenge

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## Abstract

Approximately one-quarter of the world's population is suffering from anemia, out of which 12.7% of men suffer from anemia around the globe. In India, anemia is a moderate public health problem (ranging from 20 to 39.9%). Prevalence of anemia is 25% in men and 31% in adolescent boys, in India. In recent years, there has been an alarming rise in anemia prevalence among adolescent boys (15–19 years) in 23 states, and among men (15–49 years) in 17 states. Anemia in the states of Jammu and Kashmir and Ladakh is a severe public health problem. Despite being a vital issue, indicators for anemia in men are not given due importance in national health statistics reports. This article highlights the issue to prioritize men's health in the context of anemia at state and national levels.

**Keywords:** Adolescent boys, anemia, men, public health

## Introduction

The Global Nutrition Report, 2017 revealed that anemia is prevalent in 125 countries worldwide, presenting a significant global health burden.[1] Based on estimates, nearly one-quarter of the global population is grappling from anemia, with a striking 89% of the affected individuals hailing from developing countries.[2] anemia prevalence is markedly higher among women of reproductive age, reaching an alarming rate of 29.9% worldwide.[3] This condition poses a serious public health challenge, particularly in South Asian and Sub-Saharan African nations where the prevalence exceeds 40%.[3,4] By contrast, nations such as Australia, China, and those in the American continent demonstrate lower anemia prevalence, ranging between 5 and 20%.[3,4]

Globally, the prevalence of anemia is higher among women; however, 12.7% of the global male population is also affected by this condition.[5] Based on a joint report by World Health Organization (WHO) and Centers for Disease Control and Prevention anemia in men aged 15 and above is characterized by hemoglobin levels below 13 grams per deciliter.[6] The rising prevalence of anemia among males raises grave concerns, given the array of negative health outcomes it can precipitate, including impaired attention span, diminished work performance, and reduced productivity.[7] Furthermore, individuals suffering from anemias have 2.5-fold increased risk of developing comorbidities, such as rheumatoid arthritis, lupus, chronic kidney disease, cancer, tuberculosis, diabetes, asthma, osteoarthritis, hypertension, and cardiovascular disease.[8] Despite these serious implications, anemia in men is often underrepresented at both global and national health statistics. In addition, the Global Health Observatory database currently lack any indicators for anemia in men, highlighting a significant deficiency in our understanding in the global epidemiology of anemia.

In India, national and state-level data for anemia in men were first reported in the National Family Health Survey-3 conducted in 2005–2006. Nearly a decade later, NFHS-4 (2015–2016) was conducted, with a particular emphasis on anemia among adolescent boys aged 15–19 years. This focus was reiterated in the recent NFHS-5 report, which identified an increasing trend in anemia prevalence among both men and adolescent boys. Blood samples were collected from a finger prick and a HemoCue photometer was used for assessing anemia.[9] 6.1 lakh sample households were involved in the survey.[10] In NFHS- 5, anemia cut-off levels were set at <11.0 g/dl for children (6–59 months), pregnant women (15–49 years),

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<12.0 g/dl for nonpregnant women (15–49 years), and <13.0 g/dl for men (15–49 years). However, adjustments for smoking and altitude were done. This has potential to produce inaccurate results, misinterpretation of the trends, leading to a lack of targeted interventions. To reduce the impact of such results on policy and healthcare implications, anemia indicators are not added in NFHS-6. This step raises a new concern as it will result in the complete unavailability of data on anemia status of the population as a whole.

State-wise analysis of anemia among men reveals that Ladakh, West Bengal, and Jharkhand present higher rates of anemia in men (20% and above), while states like Nagaland, Manipur, and Goa demonstrate less prevalence (below 20%). Anemia is responsible for 8–9% of years lived with disability (YLD) globally.[2] According to the Global Nutrition Report 2003, iron deficiency anemia was found to cause a 0.9% loss of India's total GDP. Based on the World Bank's 2016 GDP data for India, this translates to a substantial financial loss of approximately USD 20.38 billion.[11] Given the serious implications of this, there is an urgent need to prioritize men's health in the context of anemia, at the state, national, and international levels.

## Age-Wise Cut-off Levels of Anemia Grading

Universally anemia levels are considered based on WHO standards [Table 1].[6]

## Anemia: A Public Health Crisis in India

A comprehensive analysis of anemia in the population, as reported by the NFHS-5, highlights a severe public health crisis in India. More than half of the country's women and children are grappling with this condition, placing India squarely in the "severe" category on the anemia prevalence scale. While anemia in men and adolescent boys is considered a moderate public health problem at the national level, with prevalence rates ranging from 20 to 39.9%. There are several states where the problem intensifies to severe proportions. Notably, regions like Ladakh and Jammu and Kashmir fall into this category.[6,12]

An alarming observation is that Ladakh reports the highest prevalence of anemia, with a staggering 75.6% of men aged between 15 and 49 years being afflicted. There is also a strong inverse correlation between education levels and anemia rates. The NFHS-5 reports indicate that men with no education demonstrate higher rates of anemia (32%) as compared to those who have completed 12 or more years of education (19%). The anemia prevalence is further affected by socioeconomic status, as evident by the decreasing trend from 36% in the least affluent group to 18% in the most affluent group. Geographical location also plays a significant role, with higher anemia rates reported in rural areas (27%) compared to urban locales (20%).[13]

The categorization of states based on public health significance, as indicated in Tables 2 and 3, is conducted in alignment with the WHO's hemoglobin concentration thresholds for anemia diagnosis and severity assessment.[6] The above data underscore the pressing need for addressing anemia, an often underestimated yet severely impacting public health in India.

## Trend of Anemia Prevalence

a. *Overall countrywide trend*
Anemia has shown a rising trend across all age groups and gender from NFHS-4 to NFHS-5 [Table 4]. Including men, however, considering the grading of anemia in men, the prevalence of severe and moderate anemia has declined from NFHS-4 to NFHS-5, but mild anemia has increased.[13] [Figure 1]

b. *Anemia trend – in different states of the country*
The anemia prevalence among adolescent

**Table 1: Age-wise cut-off levels of anemia grading[6]**

| Population | Anemia | | |
|---|---|---|---|
| | Mild | Moderate | Severe |
| Men (15 years of age and above) | 11–12.9 | 8–10.9 | <8 |
| Children 6–59 months of age | 10–10.9 | 7–9.9 | <7 |
| Children 5–11 years of age | 11–11.4 | 8–10.9 | <8 |
| Children 12–14 years of age | 11–11.9 | 8–10.9 | <8 |
| Nonpregnant women (15 years of age and above) | 11–11.9 | 8–10.9 | <8 |
| Pregnant women | 10–10.9 | 7–9.9 | <7 |

**Table 2: Categorization of states as per prevalence of anemia in adolescent boys (15–19 years)**

| Category (as per Public Health Significance) | States |
|---|---|
| Severe Public Health Significance (40% or higher) | Jammu & Kashmir, Ladakh |
| Moderate Public Health Significance (20–39.9%) | Mizoram, Himachal Pradesh, Tamil Nadu, Arunachal Pradesh, Telangana, Karnataka, Andaman & Nicobar Island, Tripura, Kerala, Uttarakhand, Maharashtra, Uttar Pradesh, Haryana, Odisha, Meghalaya, Madhya Pradesh, Puducherry, Chhattisgarh, Punjab, Rajasthan, Bihar, Gujarat, Dadra & Nagar Haveli and Daman & Diu, West Bengal, Assam, Jharkhand |
| Mild Public Health Significance (5–19%) | Manipur, Goa, Sikkim, Andhra Pradesh, Delhi, Nagaland |

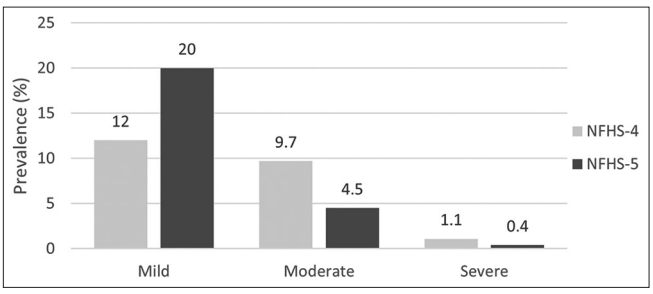


**Figure 1:** Prevalence of mild, modurate, and severe anemia: A comparison between NFHS 4 and NFHS 5 surveys

boys (15–19 years) increased in 23 states, while it decreased in 11 states [Figure 2]. However, anemia among men (15–49 years) increased in 17 states, while it has decreased in 18 states [Figure 3]. Ladakh, West Bengal, Jammu and Kashmir, and Assam are the few states which have shown an increasing trend of anemia across all age groups in men. Ladakh has the highest change from NFHS-4 to NFHS-5 in both age groups of men 15–19 and 15–49 years. The lowest prevalence of anemia was reported in Lakshwadeep (5.6%) in 15–49 years, while in 15–19 years; it was lowest in Manipur (7.8%).

## Causes of Anemia among Adolescent Boys (15–19 Years)

Adolescence, a pivotal life stage, holds significant implications for future health trajectories. This period is characterized by a rapid increase in muscle and body mass, which subsequently necessitates an enhanced nutritional intake. Insufficient nutrition during this phase can adversely impact growth and developmental processes.[14] Group of nutritional deficiencies, including iron, folate, vitamin A, and vitamin B12, are primary contributors to adolescent anemia in developing nations.[15,16]

Iron deficiency, in particular, is postulated as the most prevalent and significant etiological factor for anemia in India. Other contributing factors span across a broad spectrum, encompassing malaria infections, hookworm infestations, hemoglobinopathies, and excessive blood loss resulting from violence or unintentional injuries.[17] Various studies have highlighted that socioeconomic determinants and dietary habits significantly influence the risk of developing anemia. Specifically, various factors have been identified as significant risk factors associated with the development of anemia such as lower maternal education levels, lower socioeconomic status, decreased intake of flesh foods, eggs, and dairy products, adherence to food fads, and meal skipping.[16] These findings underscore the multifactorial nature of anemia, necessitating

**Table 3: Categorization of states as per prevalence of anemia in men (15–49 years)**

| Category | States |
|---|---|
| Severe Public Health Significance (40 or higher) | Ladakh |
| Moderate Public Health Significance (20–39.9) | Arunachal Pradesh, Uttar Pradesh, Maharashtra, Madhya Pradesh, Punjab, Rajasthan, Dadra & Nagar Haveli and Daman & Diu, Meghalaya, Gujarat, Chhattisgarh, Odisha, Bihar, Jharkhand, Assam, Jammu & Kashmir, Tripura, West Bengal |
| Mild Public Health Significance (5.0–19.9) | Lakshadweep, Manipur, Chandigarh, Nagaland, Goa, Delhi, Uttarakhand, Tamil Nadu, Telangana, Mizoram, Andaman & Nicobar Island, Andhra Pradesh, Kerala, Himachal Pradesh, Sikkim, Haryana, Puducherry, Karnataka |

**Table 4: Trend of anemia prevalence in India[13]**

| Anemia Prevalence (%) | NFHS-5 (2019–2021) | NFHS-4 (2015–2016) |
|---|---|---|
| Children age 6–59 months who are anemic (<11.0 g/dl) | 67.1 | 58.6 |
| Nonpregnant women age 15–49 years who are anemic (<12.0 g/dl) | 57.2 | 53.2 |
| Pregnant women age 15–49 years who are anemic (<11.0 g/dl) | 52.2 | 50.4 |
| All women age 15–49 years who are anemic | 57.0 | 53.1 |
| All women age 15–19 years who are anemic | 59.1 | 54.1 |
| Men age 15–49 years who are anemic (<13.0 g/dl) | 25.0 | 22.7 |
| Men age 15–19 years who are anemic (<13.0 g/dl) | 31.1 | 29.2 |

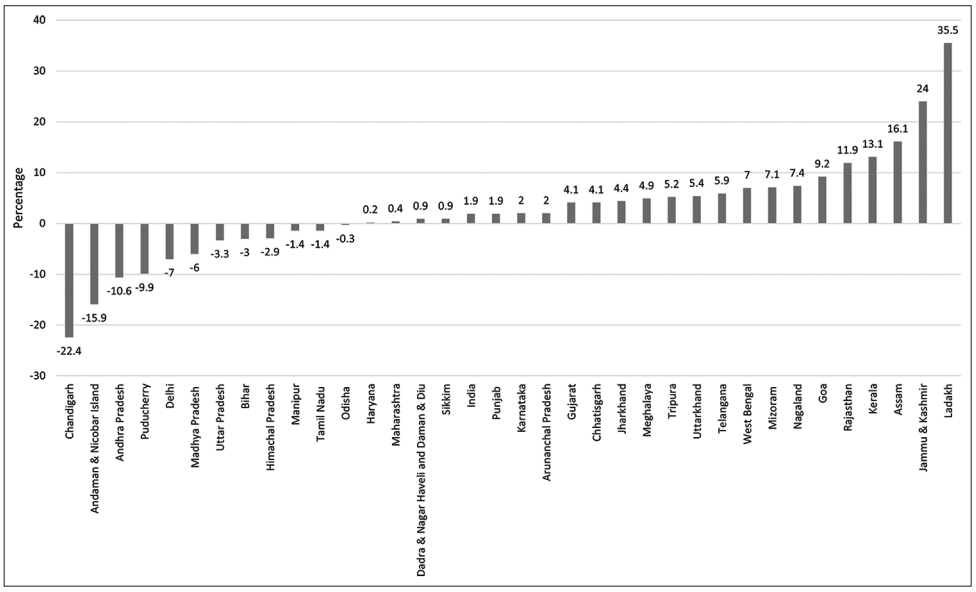


**Figure 2:** Change in anemia prevalence in adolescent boys (15-19 years) from NFHS 4 (2015-2016) to NFHS 5 (2019-2021)

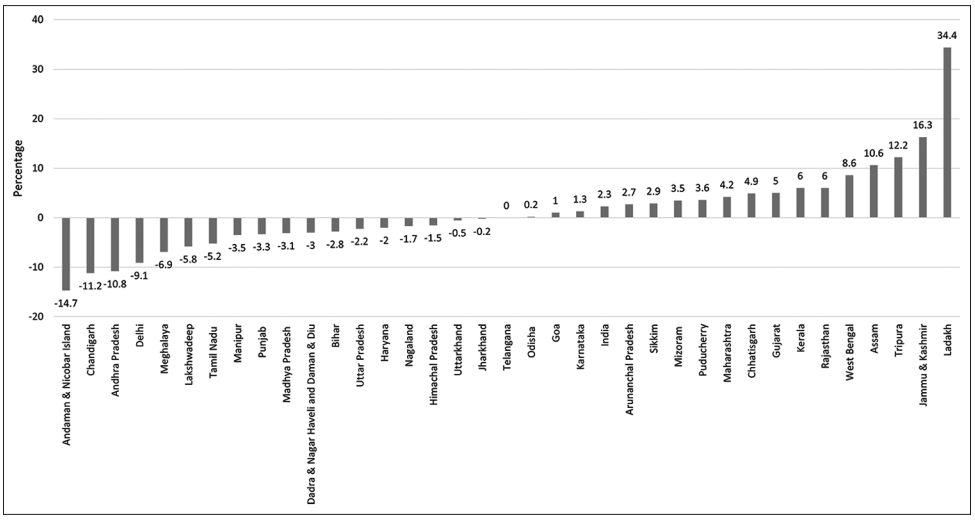


**Figure 3:** Change in anemia prevalence in men (15-49 years) from NFHS 4 (2015-2016) to NFHS 5 (2019-2021)

**Table 5: National programs for reduction in anemia prevalence[24-27]**

| Name of program | Female beneficiaries | Male beneficiaries | Children beneficiaries |
|---|---|---|---|
| Anemia Mukt Bharat | Adolescent girls (10–19 years)<br>Women of reproductive age (20–49 years)<br>Pregnant and lactating females | Adolescent boys (10–19 years) | Children (6–59 months of age)<br>Children (5–9 years) |
| Poshan Abhiyan | Adolescent girls<br>Pregnant and lactating females | No | Children (0–6 years) |
| 5 Weekly Iron Folic Acid Supplementation (WIFS) | School-going adolescent girls in 6th to 12th class enrolled in government/government-aided/municipal schools<br>Out-of-school adolescent girls | School-going adolescent boys in 6th to 12th class enrolled in government/ government-aided/municipal schools | Not applicable |
| Integrated Child Development Scheme (ICDS) | Women of reproductive age (15–45 years)<br>Pregnant and lactating females | No | Children (0–6 years) |

a comprehensive, integrative approach to its prevention and management.

## Causes of Anemia among Adult Men

The etiology of anemia in adult males aligns closely with the causes enumerated above. However, in adult men, certain chronic comorbidities, including renal disorders, liver disorders, malignancies, rectal bleeding, and bone marrow disorders, among others, have been linked to an increased incidence of anemia. Another risk factor identified is ageing, with the probability of anemia development escalating with advancing years.[18,19]

A potential physiological correlation between anemia and low testosterone levels in older males has been proposed in several studies. These suggest that decreased testosterone levels are associated with lower hemoglobin concentrations, thus predisposing these individuals to an increased risk of anemia.[20,21]

Research conducted in Malawi indicated that men with a lower body mass index, specifically less than 18.5 kg/m$^2$, were more likely to exhibit mild anemia.[22] Moreover, the increasing prevalence of diabetes and hypertension may also indirectly contribute to the occurrence of anemia. These conditions, either independently or due to the dietary restrictions they impose, can potentially exacerbate anemia development. This underscores the necessity of a comprehensive understanding of the multifactorial nature of anemia, which is critical for effective intervention strategies in men.

## Consequences of Anemia

Anemia exerts substantial influence on numerous aspects of human performance and wellbeing. Academic performance, endurance, and attention span are notably compromised in individuals suffering from this condition. Commonly experienced symptoms encompass lethargy, fatigue, and exhaustion. The impact extends beyond these immediate symptoms, with numerous studies indicating significant detriments to cognitive and physical performance. These performance deficits can culminate in diminished overall productivity, illustrating the far-reaching consequences of this condition.[23] Indeed, anemia's substantial contribution to the global disease burden is underscored by its accountability for approximately 8–9% of the YLD worldwide.[2]

## Government of India's Strategies for Reduction in Anemia among Men

Anemia poses a severe public health problem in India. The Government of India is addressing Anemia through various programs. Although some of these strategies include adolescent boys (10–19 years) as a beneficiary, the focus still remains on women and children, and adult men are not included in any of these strategies. Table 5 provides details of beneficiaries of health programs focusing on anemia reduction.

## Way Forward

To address the significant challenge of anemia among men in our country, it is essential to strategize and implement an effective and comprehensive approach. Here, we propose several key strategies:

- **Male-Centric Programmatic Action**: The primary focus should be on improving the nutritional intake of adolescent boys and adult males. Not only including nutritional supplementation but also awareness campaigns on the detrimental effects of smoking, a recognized risk factor for anemia.
- **State-Specific Strategies**: Given the variance in anemia status across states, it is crucial to tailor strategies accordingly. Especially integrating adult males into the Anemia Mukt Bharat initiative.
- **Research on Anemia in Adult Males**: For understanding the causes, features, and prevalence of different types of anemia including the impact of dietary factors on anemia in adult males can help shape appropriate interventions.
- **Inclusion of Male-Specific Data in National and International Surveys**: To formulate effective public health policies, it is vital to incorporate relevant indicators related to male anemia and nutrition in national and international surveys.
- **Anemia in Men with Chronic Diseases**: Clinical investigations should prioritize anemia associated with chronic diseases (diabetes, renal diseases, tuberculosis, etc.) in men, as these conditions often exacerbate anemia.
- **Adjusted Anemia Hemoglobin Cut-Off Levels**: To accurately identify and manage anemia, hemoglobin cut-off levels should be adjusted for altitude and smoking in surveys.
- **Information, Education, and Communication Activities**: Health education campaigns on anemia and its health impact are key to raising public awareness and encouraging preventive measures.
- **Leveraging Information and Communication Technology**: Utilizing media platforms like television, radio, and the internet, including social networking platforms, can effectively disseminate information and reach remote populations.
- By implementing these strategies, we can potentially turn the tide against anemia, thereby enhancing the health and wellbeing of men in our country.

## Conclusion

The increasing prevalence of anemia among men nationwide signifies an imminent threat to our economic productivity. To counter this rising trend, a strategic and targeted approach, specifically tailored to individual states, is essential for mitigating and preventing anemia among men.

Furthermore, advancing our understanding of this complex issue necessitates an increased emphasis on research. Identifying significant risk factors and epidemiological determinants among men is pivotal in designing effective interventions and shaping health policies. Such research efforts will elucidate the complex etiological landscape of male anemia, guiding the development of precise, evidence-based strategies to combat this rising health concern.

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### Conflicts of interest

There are no conflicts of interest.

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