



## Anaemia Mukht Bharat - A Desirable Goal or National Myth?

**K Suresh\***

*Professor of Practice, School of Environment Sciences, Public Health, and Sanitation Management, Karnataka State Rural Development and Panchayat Raj University (KSRDPRU), GADAG, Karnataka, India*

**\*Corresponding Author:** K Suresh, Professor of Practice, School of Environment Sciences, Public Health, and Sanitation Management, Karnataka State Rural Development and Panchayat Raj University (KSRDPRU), GADAG, Karnataka, India.

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### Abstract

Anaemia is a condition with either the number of red blood cells or the concentration of haemoglobin within the blood cells less than normal. Anaemia is the cause of poor cognitive and motor development in children, low work capacity in adults resulting in lower productivity and poorer country's economic development compared to its potential.

Global anaemia estimates in 2019 indicate a prevalence of anaemia in women 29.9% of women aged 15-49 years, 39.8% of children aged 6-59 months years. Out of a total of 633 thousand of anaemia burden worldwide, Southeast Asia contributes the most 37% followed by Africa (15%) Western Pacific (11.7%), Eastern Mediterranean (9%) and Europe and America (6% each) each of anaemic women and children.

Prevalence of Anaemia among pregnant women in India has been hovering around 68-70% and has come down by only 7% over period of 20 years between 1989-90 (NFHS2) and NFHS 5 (2019-21). The leading causes of anaemia in India are poverty, caste factors and poor sanitation. Frequent occurrences of malaria and worm infestations, a vegetarian diet is also implicated with iron-deficiency anaemia. National efforts since 1970 have yielded very little benefit, therefore it has launched an initiative called Anaemia Mukht Bharat in 2018. It aims reducing of anaemia prevalence among young children and women of the reproductive age group, though indicative of socio-economic inequality in anaemia among men in India. The Covid 19 Pandemic since early 2020 has disrupted, this initiative like many other national programs.

Most community research in India has shown that improving green leafy vegetables in daily diet, IFA supplementation, menstrual awareness and services and birth spacing are important in achieving Anaemia Mukht Bharat. The reality is most urban slum and rural population, worse the tribal people either have no access or poverty prevents to procure the most need green leafy vegetables and fruits to supplement and iron and other minerals and vitamins for haemoglobin synthesis. The need of the next decade is to encourage children, adolescents, pregnant and lactating women and all reproductive age women and men in developing countries including India into the habit of eating more of green leafy vegetables and other Iron and vitamins rich foods. Better to go from doing nothing to doing something to ameliorate the challenge

**Materials and Methods:** This article analyses the burden of anaemia, trends of anaemia over last 20 years, challenges, national efforts so far, and road ahead. The data available in last 5 years from the global estimates, Global burden of diseases (2005-06 and 2015-16) national surveys like comprehensive national nutritional survey, national Family health surveys and local surveys, AMB-September 21-Scorecard and some published papers in the recent past have been used.

**Keywords:** Anaemia; Iron Deficiency Anaemia (IDA); Comprehensive National Nutritional Survey (CNNS); National Family Health Surveys (NFHS 1-5); Years Lived with Disabilities (YLDs) and Disability-Adjusted Life Years (DALYs); Mod-day Meals (MDM)

## Introduction

Anaemia is a condition in which the number of red blood cells or the concentration of haemoglobin within the blood cells is less than normal, leads to a decreased capacity of blood to carry oxygen in the body. As a result, the person experiences symptoms such as weakness, dizziness, fatigue, shortness of breath, etc. The required optimal concentration of haemoglobin in the blood varies with age, sex, altitude, pregnancy, and smoking behaviour. The prevalence of anaemia among women of reproductive age (aged 15-49 years) is diagnosed when the haemoglobin concentration is less than 12 grams per decilitre (g/dL) for non-pregnant and lactating women, and less than or 11 g/dL for pregnant women, and children (aged 6-59 months) is with a haemoglobin concentration less than 11 g/dL. Prevalence of anaemia 40% and above in any country is considered as severe public health problem [1].

Anaemia is the cause of poor cognitive and motor development in children, low work capacity in adults resulting in lower productivity and poorer country's economic development compared to its potential. Among pregnant women, iron deficiency anaemia is responsible for adverse reproductive outcomes such as preterm delivery, low-birth-weight new-born, and decreased iron stores for the baby, that leads to impaired development. The basic symptoms of anaemia are fatigue, weakness, lethargy, shortness of breath and decreased concentration. Anaemia is an indicator of both poor nutrition and poor health.

World Health Organization defines public health significance of prevalence of Anaemia by the levels of prevalence in a geographical area. If the prevalence is < 5% No public health problem, if it is 5% - 19.9% Mild public health problem, 20% - 39.9% Moderate public health problem and more than as 40% Severe public health problem [2].

Global anaemia estimates in 2019 indicated a prevalence of 29.9% (27.0% to 32.8%) with a relative precision of 10% in all women of reproductive age. Desegregated prevalence works out to be 29.6% and 36.5% in non-pregnant and pregnant women of reproductive age, respectively with similar relative precision at 95% confidence level. The global prevalence of anaemia among in pregnant women has decreased slightly in 2019, though overall anaemia prevalence has been stagnant since 2000. Since 2000, the global prevalence of anaemia in children under five has decreased over the years, from 48.0% to 39.8% till 2010, but has been stagnant thereafter [3].

Southeast Asia contributes the most 235K followed by Africa-95K Western Pacific-74K, Eastern Mediterranean-58K and Europe and America 38K each of anaemic women and children. Among the 75 countries Yemen with nearly 80% children and women ebbing anaemic tops the dubious distinction, whereas India comes at 33 ranks with 59%, the least being Tonga with 37% anaemic women and children. Our neighbours Pakistan (56%), Bhutan (43%) Nepal (42%), and Bangladesh (41%) fair a shade better than us [3].

Prevalence of Anaemia among pregnant women in India has been hovering around 70% and has come down only by 7% over period of 20 years between 1989-90 (NFHS2) and NFHS 5 (2019-21). Iron-deficiency anaemia has remained the top cause of disability in India for over 50 years now. The last two Global Burden of Disease (GBD) surveys (2005-06 and 2015-16) reconfirmed this fact. As a result of poverty, malnutrition, poor sanitation and imbalanced vegetarian diet, widespread anaemia has remained as unresolved health and nutrition challenge and impacted the productivity of India's workforce. The 2005 GBD survey ranked anaemia caused by shortage of mineral iron in the body as the top factor for disability in India, The GBD 2015 report published in 2016 showed that it caused 10.56% of all Years lived with disabilities (YLDs). According to the National Family Healthy Survey, 2019-21 (NFHS-5), Iron-deficiency anaemia in India affects more than 2/3 of the children below the age of five (67%), followed by adolescent girls 59%; Pregnant women (52%), adolescent boys 31% and men follow at 25%. The periodical NFHS surveys have revealed that anaemia affected 56% of all adolescent girls between the ages of 15-19, and 69 per cent in tribal communities [4-7].

These alarming results drew attention to the scale of the anaemia burden in India, especially among the most vulnerable groups which include pregnant women, adolescent girls, children under 5 years. In 2015, GBD estimated that 10.56% of total YLDs were due to iron-deficiency anaemia. These YLD rates are twice of Russia's and thrice China's. India also leads this list in the disability-adjusted life years (DALYs) [7].

The leading causes of anaemia in India are poverty, caste factors and poor sanitation. Frequent occurrences of malaria and worm infestations also lead to a high incidence of anaemia. A vegetarian diet is implicated with iron-deficiency anaemia, despite containing as much dietary iron as a non-vegetarian diet, as the research has shown that animal-based iron is better absorbed (15-40%) compared to plant-based iron (1-15%). To make up for the low absorption, large quantities of green leafy vegetables, pulses

and nuts need to be consumed. But these are unaffordable for the poor. Deficiencies of other mineral and vitamins such as folate, vitamin B12, vitamin A, and copper interfere with erythropoiesis. The genetic haemoglobin disorders also play an important role in the development of anaemia. The inflammation caused due to infections leads to poor nutrient absorption and increased nutrient losses. Infectious diseases such as malaria, tuberculosis, fevers, diarrhoea, parasitic infestations, and other infections common in developing countries also contribute to anaemia. Recent evidence suggests that unsafe water, sanitation, and hygiene promote the transmission of enteric pathogens, leading to diarrhoeal diseases and chronic inflammation. Environmental enteric dysfunction due to poor WASH practices reduces the absorption of nutrients including iron [7].

### Nutritional anaemia prevention, control, and management initiatives in India

India has been running the National Nutritional Anaemia Prophylaxis Programme (NNAPP) since 1970 to battle anaemia. In 1991, the MoH&FW revised the policy guidelines for the prevention and control of anaemia, renaming the program as National Nutritional Anaemia Control Programme (NNACP). In 2007, the national policy of iron supplementation was again revised to include provision of liquid formulation of ferrous sulphate and folic acid containing 20 mg elemental iron and 100 µg folic acid per millilitre for children (6-60 months). School children aged 6-10 yr and adolescents aged 11-18 yr were included and provided with 30 mg elemental iron and 250 µg folic acid daily for 100 days in a year. Adolescents aged 11-18 yr were given priority and supplemented at the same doses and duration as adults. The program was further fine-tuned to include beneficiaries from all age groups namely children aged 6-59 months, 5-10 yr, adolescents aged 10-19 yr, pregnant and lactating women and women in reproductive age group under the National Iron Plus Initiative (NIPI) programme in 2013. The contribution of iron deficiency in the aetiology of anaemia is lower in countries like India where the prevalence of anaemia is more than 40 per cent, especially in rural populations. In addition, the impact of IFA supplementation on the increase in haemoglobin (Hb) levels of anaemic individuals has been documented to be marginal as iron supplementation has been suggested to increase the mean blood Hb concentration by 8.0 g/l in children, 10.2 g/l in pregnant women and 8.6 g/l in non-pregnant women [8].

Dose and frequency of iron for the prevention of anaemia under National Iron Plus Initiative (NIPI) programme and their comparison with global guidelines indicates that we provide more than

global recommendations both in terms of dose per day and number of days of supplementation [8]. Despite this the progress has been negligible (7%) in children, 2.5% among pregnant women over last 52 years.

### Weekly IFA supplementation Program (WIFS)

The Ministry of Health and Family Welfare launched the Weekly Iron and Folic Acid Supplementation (WIFS) Programme in 2012 to meet the challenge of high prevalence and incidence of anaemia amongst adolescent girls and boys. It is an evidence based programmatic response to the prevailing anaemia situation amongst adolescent girls and boys through supervised weekly ingestion of IFA supplementation and biannual helminthic control. The long-term goal is to break the intergenerational cycle of anaemia, the short-term benefits is of a nutritionally improved human capital. The programme, implemented across the country both in rural and urban areas.

- **Objective of WIFS:** To reduce the prevalence and severity of anaemia in adolescent population (10-19 years). ii. Target groups: School going adolescent girls and boys in 6th to 12th class enrolled in government/government aided/municipal schools and out of school adolescent girls.
- Intervention involves administration of supervised Weekly Iron-folic Acid Supplements of 100mg elemental iron and 500ug Folic acid using a fixed day approach.
- Screening of target groups for moderate/severe anaemia and referring these cases to an appropriate health facility.
- Biannual de-worming (Albendazole 400mg), six months apart, for control of helminthic infestation.
- Addressing non-nutritional causes of anaemia in endemic pockets, with special focus on malaria, haemoglobinopathies and fluorosis
- Information and counselling for improving dietary intake and for taking actions for prevention of intestinal worm infestation.
- Convergence with the Ministry of Women and Child Development and Ministry of Human Resource Development for joint programme planning, capacity building of nodal service providers including Medical Officers, Anganwadi Worker (AWW) Staff Nurses, School teachers, monitoring, and a comprehensive communication component.

The programme rolled out in all States/UTs, covers 11.2 crore beneficiaries including 8.4 crore in-school and 2.8 crore out of

school beneficiaries. However, the coverage in school children the last 2 years has been 26% in September 2021 for the year 21-22 and 16.5% in 20-21 as per the AMB score Card of the MOH and FW [11].

Public health experts have pointed out that the strategy of simply handing out iron tablets to pregnant women or even WIFS have not worked as a solution as seen from the NFHS 5 data. Anaemia was prevalent among 59% of girls and 31% of the boys. The actual consumption is hardly monitored except in WIFS. Iron tablets may show side-effects like diarrhoea and vomiting, black colouring of the stool for instance which, add to a consumers' discomfort. It is important to build a woman's iron reserves before pregnancy to prevent haemorrhage.

### FOGSI efforts

Federation of Obstetricians and Gynaecologists of India (FOGSI) in 2012 had passed a resolution to strive to ensure 12 gm of Hb% for all pregnant women by the time delivery. That also remains a dream as the prevalence of anaemia among pregnant women was 52.2% nationwide and ranged between the highest of 63.1% in Bihar among large states, followed by Gujarat, West Bengal 62% each, Odisha 61% and the least in Kerala at 32%. While 4 of the 15 large states had anaemic pregnant women over 60% and another 5 states had between 50-60% and six more states had 40-50% of anaemic pregnant women. Only the state of Kerala had less than one third of anaemic pregnant women. The prevalence of anaemia was still worse among women of 15-19 years at 59.1% and 67.1% among 6 months to 59 months children.

### Fortified Rice supplementation in Mid-day meals-Karnataka-2021-22

Recognising food fortification as a tool in the Centre's kitty to tackle micronutrient malnutrition or "hidden hunger" where people are under-nourished due to the chronic lack of vitamins and minerals. Rice fortified with multiple micro-nutrients including iron, folic acid, and vitamins and this is supplied to schools under the Karnataka government's midday meal scheme, an initiative is the "biggest ever program (of staple food fortification) in terms of reach started in 2016 [12]. In October 2021 Government of Karnataka has decided to supply the rice fortified with nutrients like iron 4.25 mg, folic acid- 12.5 mcg, and vitamin B12-0.125mcg, to 14 districts of Bagalkot, Bellary, Bidar, Vijayapura, Chikkaballapur, Davangere, Gadag, Kalaburagi, Haveri, Koppal, Raichur, Shivamogga, Uttara Kannada, and Yadgir throughout the year [13]. Gajapati dis-

trict in Odisha has demonstrated a reduction of IDA from 68% to 34% after 5 years use [13].



**Figure 1:** Labels on the Fortified Rice Sourced: Filed visits in Karnataka December-March 2021.

Ultra-Rice technology packs vitamins and minerals into rice-shaped "grains" made from rice flour and manufactured using pasta-extrusion equipment. The Ultra Rice is mixed with regular rice in the ratio 1:99 [12].

Unfortunately, in the recent field visits (December 2021-March 2022) to Yadgir and Gadag, we found to our shock, headmasters or teachers and head cooks in charge of MDM are not fully aware of this supply and quite a few cooks do remove them as they look brownish or float when put in water doubting them to be plastic rice.

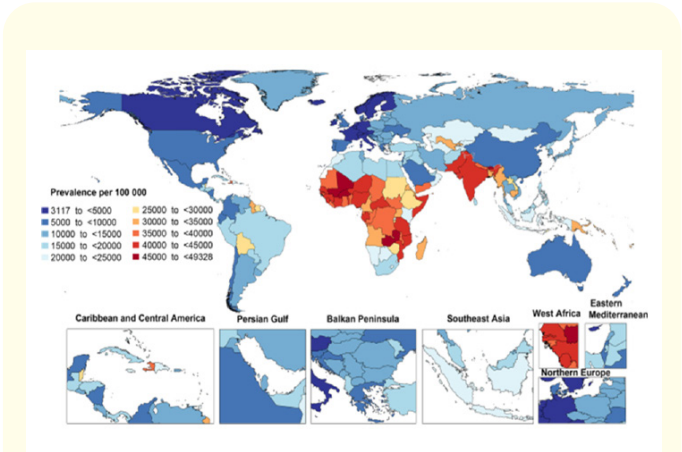
### Data on Anaemia in last 5 years

#### Global burden

Global anaemia estimates in 2019 indicate a prevalence of anaemia in women 29.9% of women aged 15-49 years, 39.8% of children aged 6-59 months years. The years lived with disability (YLD) is highest in India at 10.5% followed by Russia (5.6%), Brazil (4.9%), South Africa (4.3%) and China (3.5%). Similarly, the Disability adjusted Life Years (DALYs) is highest in India at 3.18%, followed by Brazil (1.92%), Russia (1.76%), China (1.39%) and South Africa (1%). Clearly indicating that Indians are at the highest dis-



advantage due to anaemia. Among the countries some of the South and west African countries have the highest burden of anaemia ranging from 45,000 to 49328 per lakh population as seen in the map below. India is in the category of 40,000 to 45,000 per lakh population based on this study. However, the current rate is over 57,000 per lakh population [3].



**Figure 2:** Map showing the Burden of Anaemia in 204 countries and territories, GBD 2019 source: Journal of Haematology and Oncology.

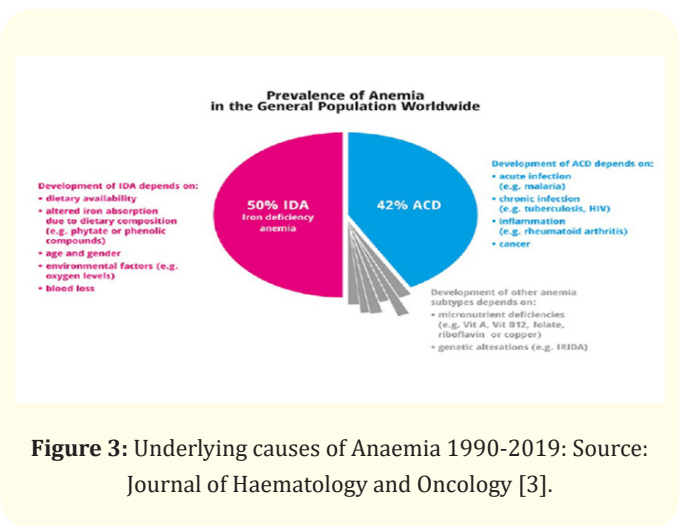
India stands low on the list of nations dealing with problems arising out of iron deficiency--it was 170<sup>th</sup> among 180 countries ranked for anaemia among women, 114<sup>th</sup> among 132 for stunting in children under five, and 120<sup>th</sup> among 130 for wasting in children under five, according to the Global Nutrition Report, 2016.

**Broad causes of global anaemia**

The prevalence of Anaemia global indicates that 50% of anaemia is attributable of Iron deficiency anaemia and 42% to acute and chronic infections and inflammations and remaining 8% to genetic factors and other micronutrients deficiencies.

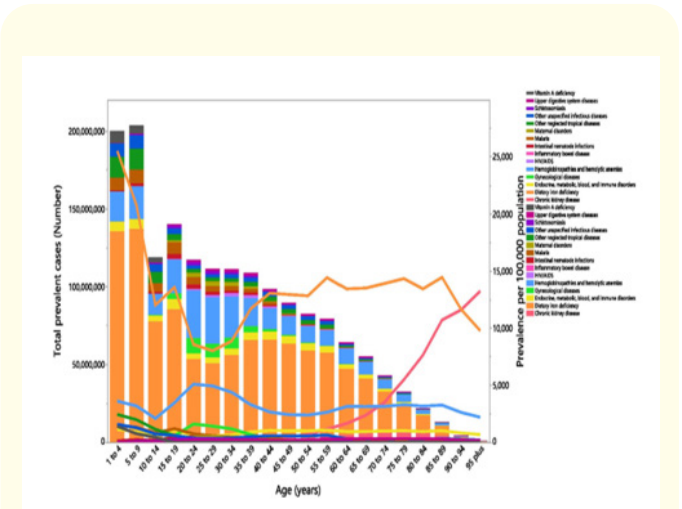
**Anaemia causes by age groups**

The distribution of causes of anaemia by age group are indicated in the graph below. Dietary iron deficiency in orange colour bars dominates as the chief cause among all age groups except over 90 years. Its maximum contribution is seen in children of 1-4 years and 5-9 years (70%) of the total burden then dropping to 35% in 10-14 years and 40% in 15-19 years age group. It further reduces to 25% in 20-34 years, going up gain to 35%between 35-44 years



**Figure 3:** Underlying causes of Anaemia 1990-2019: Source: Journal of Haematology and Oncology [3].

and further down to less than 25% reaching less than 10% 85 years and above [3].

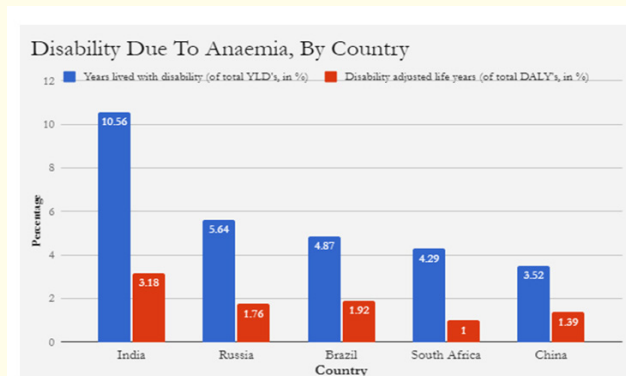


**Figure 4:** Causes of Anaemia by age - GBD 2019, Journal of Haematology and Oncology.

**Disabilities due to anaemia**

Global anaemia estimates in 2019 indicate a prevalence of anaemia in women 29.9% of women aged 15-49 years, 39.8% of children aged 6-59 months years. The years lived with disability (YLD) is highest in India at 10.5% followed by Russia (5.6%), Brazil (4.9%), South Africa (4.3%) and China (3.5%). Similarly, the Disability adjusted Life Years (DALYs) is highest in India at 3.18%, followed by Brazil (1.92%), Russia (1.76%), China (1.39%) and South

Africa (1%). Indians are at the highest disadvantage due to anaemia [8].



**Figure 5:** Disabilities (YLDs and DALYs) attributable to Anaemia by countries.

## Indian data on anaemia

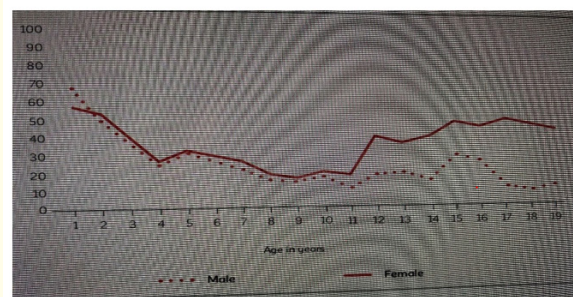
### Comprehensive national nutrition survey (CNNS-206-18)

In the CNNS, anaemia assessed based on haemoglobin concentration of venous whole blood, using the cyanmethemoglobin method indicated that, overall, 41% of pre-schoolers aged 1-4 years, 24% of school-age children aged 5-9 years and 28% of adolescents aged 10-19 years had some degree of anaemia. The severity of anaemia varied as 22% pre-schoolers, had mild anaemia, 18% had moderate anaemia and 1% had severe anaemia. Among school-age children, 10%, 13% and 1% had mild, moderate, and severe anaemia respectively. Among adolescents, 17% had mild anaemia, 10% had moderate anaemia and 1% had severe anaemia.

Anaemia was most prevalent (>50%) among both boys and girls under two years of age and thereafter, decreased steadily to 11 years of age to about 15%. An increased prevalence was observed among older adolescents, was more prevalent among female adolescents 12 years of age and older (~40%) compared to their male counterparts (~18%).

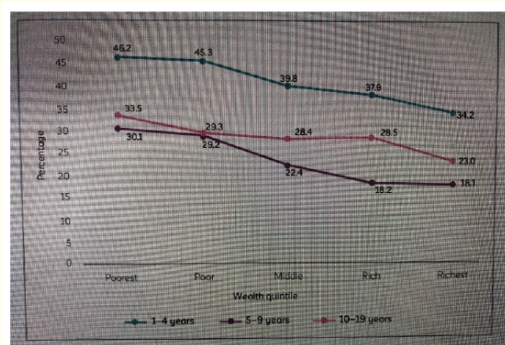
### Household wealth and prevalence of anaemia

CNNS data shows that as the prevalence of anaemia decreased steadily with an increase in household wealth in all three age groups. Anaemia prevalence in the lowest vs. highest wealth quintiles 46% vs. 34% among pre-schoolers aged 1-4 years; 30% vs.



**Figure 6:** Prevalence of Anaemia from 1-19 years by gender: Source CNNS 206-18.

18% among school age children aged 5-9 years; and 34% vs. 23% among adolescents aged 10-19.

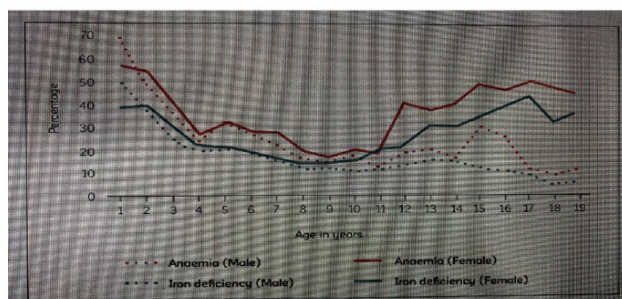


**Figure 7:** Prevalence of anaemia by household wealth quintile India, CNNS 2016-18.

### Proportion of anaemia attributable to iron deficiency

About half of anaemia cases worldwide are estimated to be due to iron deficiency. Considering low serum ferritin among children and adolescents with normal C-reactive protein levels as a biomarker for iron deficiency in CNNS. Serum ferritin was assessed using the direct chemiluminescence method. Thus, CNNS proved that among pre-schoolers, 21% were both anaemic and iron deficient, 11% were iron deficient but not anaemic, and 18% were anaemic but not iron deficient. Among school-age children, 6% were anaemic and iron deficient, 11% were iron deficient but not anaemic, and 16% were anaemic but not iron deficient. Among adolescents 12% had anaemia and iron deficiency, 10% were iron deficient but

not anaemic, and 17% had anaemia but no iron deficiency. This created evidence that among anaemic children more than half of pre-school children, one fourth of school-age children and 40% among adolescents Iron deficiency was the cause of anaemia.



**Figure 8:** Prevalence of Anaemia and Iron Deficiency Anaemia by gender and age 10-19 years, CNNS 2016-18.

As per CNNS among pre-schoolers, the prevalence of anaemia was highest in Madhya Pradesh (54%), followed by Haryana (48%) and Delhi (47%) and was lowest in Nagaland (8%) and Manipur (10%). Among school-age children, Tripura (41%), Assam (35%) and Jharkhand (34%) and West Bengal (34%) had the highest prevalence of anaemia and Kerala (3%), Jammu and Kashmir (7%) and Manipur (7%) had the lowest prevalence. Among adolescents, West Bengal (46%), Tripura (41%) and Assam (37%) had the highest prevalence of anaemia, while Nagaland (8%) and Kerala (9%) had the lowest prevalence.

### National family health surveys

The National Family Health Survey (NFHS) is a large-scale, multi-round survey conducted in a representative sample of households throughout India. It is a Ministry of Health and Family Welfare GOI initiative, collaborative by the International Institute for Population Sciences (IIPS). The First National Family Health Survey (NFHS-1) was conducted in 1992-93, collecting data on population, health, and nutrition, with an emphasis on women and young children. The Second NFHS (NFHS-2) was conducted in 1998-99 adding additional features on the quality of health and family planning services, domestic violence, reproductive health, anaemia, the nutrition of women, and the status of women. NFHS 3 was carried out in 2005-2006 and NFHS 4 in 2015-16. The NFHS-5 findings were released in December 2021. Thus, the information of Anaemia burden among women and children in India by states is available for

us for last 20 years (since 1992-93). The assessment of anaemia situation among men was added only in NFHS 3. NFHS is the most comprehensive survey on socio-economic and health indicators in the country and has highlighted some key demographic trends in its fifth edition, with the biggest being the distressing health epidemic, rising cases of anaemia across all age groups. Each successive round of the NFHS provide essential data on health and family welfare needed by MOH&FW and other agencies for policy and programme purposes and on important emerging health and family welfare issues of concern. It Provides estimates of important family welfare and health indicators by background characteristics at the national and state levels and trends in family welfare and health indicators over time at the national and state levels. Latest report released in December 2021 reveals that the prevalence of anaemia has increased among children, women of all age and worse in pregnant women, men over the last 16 years in almost all states except a few.

### Results of NFHS 5 and NFHS 4

National Family Health surveys have been classifying Anaemia among various population subgroups based on Hb% as shown in the table below.

Classification	Normal	Mild	Moderate	Severe
Men	13g/dL and more	12 - 12.9 g/dL	9 - 11.9 g/dL	< 9g/dL
Women (not pregnant)	12g/dL and more	10 - 11.9 g/dL	7 - 9.9 g/dL	< 7g/dL
Pregnant women	11g/dL and more	10 - 10.9 g/dL	7 - 9.9 g/dL	< 7g/dL
Children	11g/dL and more	10 - 10.9 g/dL	7 - 9.9 g/dL	< 7g/dL

**Table 1:** Criteria used to diagnose Anaemia in NFHS-5.

Assessed on the above criteria the overall Anaemia has increased in NFHS 5 at the national level, among women, children and men compared to the NFHS-4 survey of 2015-16.

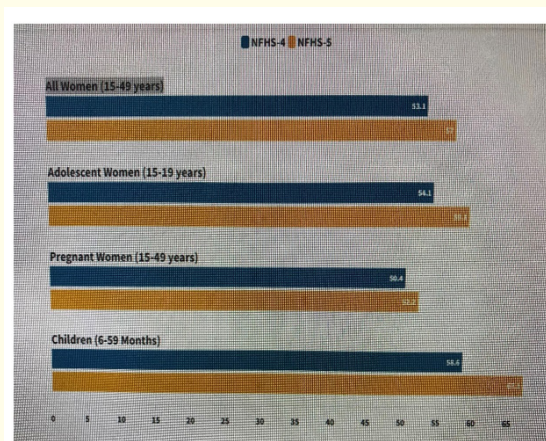
Sixty-seven out of 100 children under the age of 5 years in India (67%) suffer from some form of anaemia, a number that has grown from 59 percent in 2015-16. The prevalence of anaemia has increased highest among children under 5 years by about 8.5 percentage points, followed by among adolescent women by 5 percentage points, all women of 15-49 years by 3.9% percent-



Indicators	NFHS 2019-21 (%)	NFHS 2015-26 (%)
Anaemia		
Children (under 5 yrs)	67.1	58.6
Women (15-49)	57	53.1
Women (15-49)	59.1	54.1
Men (15-49)	25	22.7
Men (15-49)	31.1	29.2

**Table 2:** Comparative data of Anaemia between NFHS 4 and 5.

age points and among the pregnant women least increase 1.8%. The prevalence of anaemia was still worse among women of 15-19 years at 59.1% and 67.1% among 6 months to 59 months children.

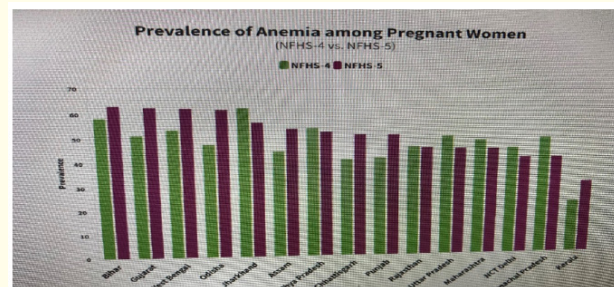


**Figure 9:** Prevalence of Anaemia among Indian women and Children between NFHS 4 and 5.

### Rise in anaemia burden by states

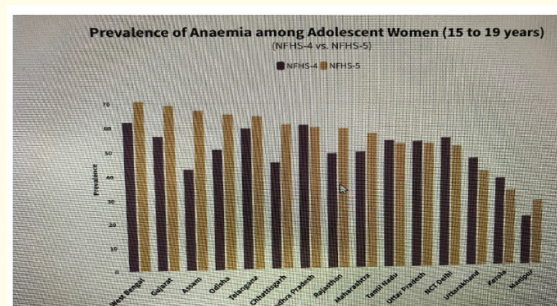
Assam is among the worst performing states, with a sharp increase in anaemic cases, especially in children -- 68.4 percent reporting anaemia in NFHS-5, up from 35.7 percent in NFHS-4. Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh have all shown an increase in anaemia cases between 2015-2016 and 2019-21. Rajasthan has seen a 9-12 percent increase in anaemia cases. Chhattisgarh saw a 26 percent increase in anaemia in children and a 10-15 percent increase in women. Maharashtra reported 4-15 percent increase across age groups and Gujarat recorded a 17 percent rise

in anaemia cases in children. An increase in iron deficiency in adolescents (15-19 years) with a sharp rise among girls is recorded in NFHS 2019-21.



**Figure 10:** Prevalence of Anaemia by states among Pregnant Women compared between NFHS 5 and 4.

The prevalence of anaemia among pregnant women was 52.2% nationwide and ranged between the highest of 63.1% in Bihar among large states, followed by Gujarat, West Bengal 62% each, Odisha 61% and the least in Kerala at 32%. While 4 of the 15 large states had anaemic pregnant women over 60% and another 5 states had between 50-60% and six more states had 40-50% of anaemic pregnant women. Only the state of Kerala had less than one third of anaemic pregnant women.

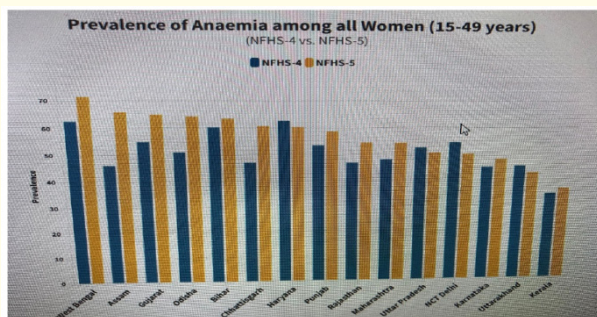


**Figure 11:** Prevalence of Anaemia by states among Adolescent Women compared between NFHS 5 and 4.

The prevalence of anaemia among adolescent women (mothers to be) was highest in West Bengal at 70% followed by Gujarat, Assam and the least in Manipur little lower than 30%. All the states have seen an increase in prevalence in the range of 5% to 24%. While Assam has witnessed the highest increase of 24.3% in As-



sam, followed by Odisha 14.5% Gujarat 12.5% and the least increase of 6.1% in Manipur indicating a bleak future for the mothers to be if no definitive action is taken. This group did suffer in the last 2 years due to disruption of IFA tablet supplies due to Covid 19 pandemic.

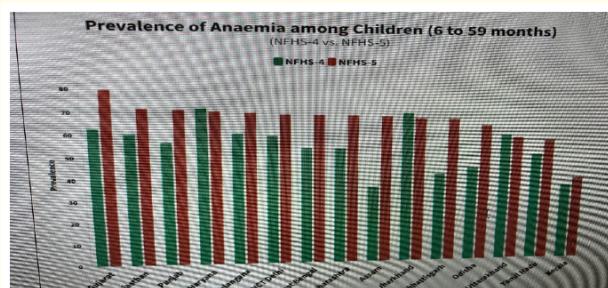


**Figure 12:** Prevalence of Anaemia by states among All Women (15-49 Yrs.) compared between NFHS 5 and 4.

While Prevalence of anaemia among all women of 15-49 years was around 47%, interstate variation ranged from the highest in West Bengal (70%) followed by Assam and Gujarat and the least of 36.3% in Kerala during 2019-21. The increased in prevalence of anaemia in this group was led by Assam (20%) and the least of 2% in Kerala.

#### Prevalence of anaemia in children (6-59 months)

More than 2/3 (67%) of the children in India were anaemic in 2019-21. There was an overall increase of 8.6% in prevalence of anaemia in this age cohorts compared to NFHS4 in 2015-16, again pointing to the failure of any impact of NIPI.

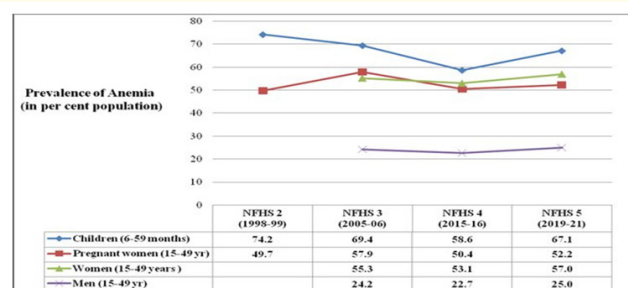


**Figure 13:** Prevalence of Anaemia by states among Children (6-59 months) compared between NFHS 5 and 4.

The interstate comparison indicates the highest prevalence of anaemia in Gujarat (79.9%) and the least in Kerala (39.4%). The highest increase between the 4<sup>th</sup> and 5<sup>th</sup> NFHS is witnessed in Assam (32.7% points) followed by Chhattisgarh (25.6%), Odisha (19.6%) and the least increase in Kerala (3.7%) painting a gloomy scenario for children's cognitive and motor development in coming years.

#### Trends of Anaemia over last 2 decades (1998-99 and 2019-21)

A review of the anaemia prevalence trends in last 2 decades indicates that while we have made a little progress (7.1%) of reduction of prevalence of anaemia among children, the prevalence has increased in pregnant women by 2.5% in 20 years and in all reproductive age women by 1.7% in the last 15 years. Among the men in the age group of 15-49 years also the prevalence of anaemia has increased by 0.8% over last 15 years.



**Figure 14:** Trends in Prevalence of Anaemia by states among Children, Women and Men through NFHS 2 to 5.

#### Prevalence of anaemia in Karnataka data

Karnataka State Rural Development and Panchayat Raj University (KDRPRU), Gadag Karnataka in December 2021, screened 6354 school children in the age group of 6-14 years, for undernutrition including Anaemia as a part of bases line study to assess the value add of Egg in mid-day meals. Out of the total children 3029 (male 1457 and Female 1554) were from Yadgir district and remaining 3325 (Male- 1546 and Female 1779) from Gadag district. Clinical pallor was found in 68% of the Yadgir students and 30% of Gadag students. In Yadgir out of a total of 2000 children with clinical pallor 259 were subjected to Haemoglobin test by the local RBSK team with consent and found that all of them were anaemic with Hb% less than 10G/Dl. While only 1 (0.4%) girl was severely anaemic (Hb <7 G%), 116 were moderately anaemic (45%- Hb%

7-10 g/dl) and 154 (55.6%) had mild anaemia. In Gadag district 109 children of 1112 suspected pallor children were test for Hb% and nearly half of them were mild anaemic and little less than half were moderately anaemic and 19 children were normal.

## Discussions

Among the countries some of the South and west African countries have the highest burden of anaemia ranging from 45,000 to 49,328 per lakh population as seen in the map above. India is in the category of 40,000 to 45,000 per lakh population based on this study. However, the current rate is over 57,000 per lakh population.

NFHS 4 and 5 comparative data is worrisome more so because the increase in anaemia burden is despite the country running an anaemia prevention and management/control program under different nomenclature for over 50 years since 1970. Some experts have started questioning if the burden of iron-deficiency anaemia among women in India is failing as iron and folic acid interventions failed?

Assam has been the worst performing states, with a sharp increase of nearly doubling of anaemic population, (68.4% NFHS-5, vs 35.7% in NFHS-4). Assam is followed by Chhattisgarh (25.6% points), Odisha (19.6% points) Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh have all shown an increase (10-19 percentage points) in anaemia cases between 2015-2016 and 2019-21. Rajasthan has seen a 9-12 percent increase in anaemia cases. Even Kerala has seen an increase of 3.7% points.

An increase of 3.9% in iron deficiency in adolescents' women (15-19 years) and 1.9% in adolescent men was reported in NFHS 2019-21 compared NFHS 4. Again, a sharper rise of roughly 1% each year in girls is a matter of great concern. Rising urbanization with changes in dietary habits towards junk food is leading cause for this faster increase in urban areas as compared to rural [14].

Some Public Health Professional and Haematologists do questions over the cut offs and resultant over-diagnosis. A group of a team of researcher's multiple institutions across India said it is possible that anaemia is being over-diagnosed in India due to higher than appropriate haemoglobin diagnostic cut-off and argued for a re-examination of WHO haemoglobin cut-offs to define anaemia. Some of them drew attention to the difference in sampling methods between the NFHS and the Comprehensive National Nutrition Survey (CNNS) 2016-18 as the CNNS reported significantly lower figures (41% for 1-4 years, 24% for 5-9 years and 28% for adoles-

cents aged 10-19 years) of anaemia prevalence among children as compared NFHS5 data of 59% and 25% 15-19 years ages women and men respectively.

India carries the highest burden of the disease world over, especially in pregnant and lactating mothers for over 50 years and the family health survey 2019-21 points to worsening statistics. Poor dietary habits, preference for boys, repeated pregnancies and lactation leading to increased iron requirements have been key reasons for women bearing the brunt of anaemia.

The majority of the socio-economic related inequality is explained by wealth quintile followed by geographical regions of India, body mass index and educational attainment. The results also emphasize that older men belong to the high-risk groups. Moreover, the likelihood of anaemia is 40% more likely among men who belonged to East region and 25%, 13% and 7% less likely among those who belonged to Northeast, West and South region compared to those who belonged in the North region of the country.

## Conclusions

- Between 2005-2006 and 2019-2021, IDA in India decreased by only 1.7 percentage points (from 56.5% in 2005-2006, 53.0% in 2015-2016 and 57.3% in 2019-21 for women aged 15-49 years. The status of pregnant women has also increased by 2.5%. An increase of 5% points among adolescent women (15-19) and 1.9% points among adolescent men (15-19) is a concern to be addressed.
- Fortification as a tool in the Centre's kitty to tackle micronutrient malnutrition or "hidden hunger" where people are under-nourished due to the chronic lack of vitamins and minerals. Rice fortified with multiple micro-nutrients including iron, folic acid, and vitamins was tested in Odisha with success and now supplied to schools to use in Mid-day meals
- While Anaemia Mukht Bharat Program (AMBP) aims reducing of anaemia prevalence among young children and women of the reproductive age group, is indicative of socio-economic inequality in anaemia among men in India.
- Though the most common cause of anaemia is iron deficiency, there are other causes which require diagnosis and health interventions.
- The reality is many rural and tribal population (children and women in particular) are averse to eat vegetables especially GLVs.

### Way Forwards:

- More comprehensive data on epidemiology of anaemia will help in addressing the problem.
- Introduction of IFA fortified rice for school children in Karnataka, Odisha and some other states need to be monitored for the operational challenges and outcomes.
- Consumption of green leafy vegetables (GLVs) is the key social mobilization for reduction or prevention of prevalence of anaemia.

MDM in schools be used for the social mobilization case studies

- Availability and the cost of GLVs are to be addressed by encouraging school or other institution and kitchen level gardening.
- As many children and women are averse to eat vegetables especially GLVs appropriate awareness efforts, improved dietary choices and nutrition, education, and
- IFA supplementation during pregnancy and lactation be improved from distribution to directly observed therapy (DOTs) through ASHAs.

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