

SHORT ARTICLE

Status of Anaemia amongst women in India: trend analysis of NFHS data

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Abstract

The study was taken up to assess the changing trend in prevalence and severity of anaemia in women of reproductive age over the last 15 years by analyzing National Family Health Survey (NFHS) factsheet data and to draw a comparison between the prevalence of anaemia across different states/UTs of India. NFHS 3, 4 and 5 factsheets have been referred for the same. An increase in the prevalence of anaemia from 53% to 57% in all women aged 15-49 years is seen, 50.4% to 52.2% in pregnant women and 53.2% to 57.2% in non-pregnant women between NFHS 4 and 5. West Bengal has the highest prevalence of anaemia, followed by Tripura (67.2%) and Assam with 65.9% among women of 15-49 years. NFHS 5 data shows an increase in the prevalence of anaemia in all women by 4%, 1.8% in pregnant women and a increase by 4 % in non-pregnant women. Anemia Mukht Bharat campaign launched in 2019, was expected to reduce or inert the anaemia burden, but NFHS 5 data indicates a surge in anaemia incidences significantly across women of all age groups over the last five years. Hence, there is a need for revamping and implementing the programmes in a better way.

Keyword

Anemia; Health; Iron Deficiencies.

Introduction

World Health Organization (WHO) defines anaemia as a condition in which the number of RBCs or the haemoglobin concentration within them is lower than normal. Anaemia can occur either due to a condition present at birth (congenital) or a condition one develops (acquired) during a lifetime.

Anaemia is a serious global public health problem affecting 42% of young children and 40% of pregnant women globally.(1) Prevalence of anaemia globally in 2019 was 29.9% in women of reproductive age, equivalent to over half a billion women aged 15-49 years; prevalence was 29.6% in non-pregnant women of reproductive age, and 36.5% in pregnant women.

In guidelines of WHO for daily iron supplementation in adult women and adolescent girls, the recommendation for a preventive supplementation for non-pregnant women of reproductive age in countries where the prevalence of anaemia is 40% are 30-60 mg elemental iron in the form of tablets, need to be taken daily for three consecutive months in a year. (1,3)

Several countries have demonstrated a reduction in anaemia prevalence in non-pregnant women, as indicated by national surveys reported in the Sixth report on the world nutrition situation of the United Nations Standing Committee on Nutrition: 21 has indicated a 4% to 8% relative reduction per year in the prevalence of anaemia in non-pregnant in several countries, E.g., China from 50% to 19.9% in 21 years (1981-2002); Viet Nam from 40% to 24.3% in 14 years (1987-2001); Sri Lanka from 59.8% to 31.9% in 13 years (1988-2001); Nepal from 65% to 34% in 8 years (1998-2006); Guatemala from 35% to 20.2% in 7 years (1995-2002) and Cambodia from 56.2% to 44.4% in 6 years (2000-2006). (4,5)

Adolescent girls run a higher risk of being anaemic due to menstrual blood losses, accompanied by rapid growth and increased tissue iron requirements which most of the time continue throughout their adult life as well. WHO has a global target of a 50% reduction of anaemia in women of reproductive age by 2025. (6)

India has one the highest prevalence of anaemia in pregnant women in the world. Earlier studies had also

shown that low intake of iron and folate is one of the major contributors to the high percentage of anaemic women in India. According to the National Family Health Survey (NFHS) 4, 53% of women aged 15–49 in India are anaemic. (7)

Aims & Objectives

1. To assess the prevalence of anemia in women from age ≥ 15 years and how it varies between our populations.
2. To assess the changing trend in prevalence and severity of anemia in women of reproductive age over the years by analyzing the national state/ union territory (UT) level data from NFHS Factsheets and to draw a comparison between the prevalence of anemia in the rural and urban population of pregnant and non-pregnant above the age of 15 years across different states/UTs of India in NFHS 4 and 5.
3. To show the status of IFA consumption for 100 or more in different states/UTs of India as per NFHS 5.

Material & Methods

This article was written in an attempt to highlight the occurrence of anaemia both in rural and urban populations. National and State factsheets (NFHS 3, 4 and 5) have been referred to for the same to highlight the prevalence of anaemia in different states in India. (10)

NFHS factsheets give us information regarding the trends on various key indicators. The fieldwork for this survey was done in 2 phases. The first phase was conducted from 17th June 2019 to 30th January 2020 and the second phase from 2nd January 2020 to 30th April 2021 by 17 field agencies who gathered information from 6,39,699 households and 7,24,115 women.

These surveys were carried out in local languages using computer-assisted personal interviewing (CAPI) on a mini-notebook. A sample of households was then scientifically selected to be included in the survey from the list in each of the clusters. The survey used a uniform sample design, questionnaires (translated into 18 regional languages, field procedures, and procedures for biomarker measurements throughout the country. All these surveys were cross-sectional in nature and were conducted in a selected sample of households throughout the country. Selected survey agencies conducted the field survey. For anaemia, testing of new clinical, anthropometric and biochemical components was done using portable instruments, an improved model of the hemo-cue instrument was used for testing haemoglobin.

NFHS 2, 3, 4, 5 graded anaemia according to the WHO grading of anaemias; pregnant women with Hb levels $>$ or equal to 11 as non-anaemic, those with Hb levels between 10 and 10.9g/dl as mildly anaemic, those with Hb levels between 7 and 9.9 g/dl as moderately anaemic and those with Hb levels below 7.0 g/dl as severely anaemic

Data on the prevalence of anaemias among women was tabulated from factsheets of NFHS 3, 4, 5 using indicators of anaemia among pregnant women, anaemia among women aged 15 to 49 years, anaemia among women of all ages, anaemia among women who consumed iron-folic acid for more than 100 days. Findings are represented in the form of graphs and tables.

Results

NFHS-5 has highlighted a worrying trend in the prevalence of anaemia among women across all states and UTs, especially in the childbearing age (15-49 years). Between NFHS 4 and 5, there is an increase in the prevalence of anaemia from 53% to 57% in all women age 15-49 years, 50.4% to 52.2% in pregnant women and 53.2% to 57.2% in non-pregnant women, 30.3% to 44.1% in women who consumed folic acid for 100 days or more. (Figure 1).

Figure 2. shows the relation of folic acid and anaemia percentage among pregnant women. States like Goa, Kerala, Mizoram, Manipur, Lakshadweep, Tamil Nadu, Puducherry, Andaman and Nicobar islands, Himachal Pradesh, Delhi, Sikkim showed less percentage of anaemia among women who consumed folic acid for 100 days or more.

Table 1. shows the prevalence of anaemia among women in the age group 15-49 years has increased in 14 states including Assam, Bihar, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Manipur, Mizoram, Nagaland, Sikkim, Telangana, Tripura, and West Bengal and UTs- Jammu and Kashmir.

A decrease in anaemia among all women was recorded in the states of Himachal Pradesh, Andhra Pradesh and Meghalaya by 1%, 2% and 4% respectively. In the Union Territories of Andaman and Nicobar Islands, Daman and Diu, Lakshadweep by 12%, 10.4%, and 44% respectively.

A decrease in anaemia among pregnant women was recorded in the states of Himachal Pradesh, Arunachal Pradesh and Meghalaya by 16%, 26 % and 16%. In the UTs of Andaman & Nicobar Islands and Lakshadweep by 13% and 46% respectively.

With 71.4% of the total women surveyed suffering from the condition, West Bengal has the highest prevalence of anaemia among women of 15-49 years. Tripura comes next with the second-highest share of anaemic women, 67.2%, followed by Assam with 65.9%. Among Union territories, 92.8% of women (15-49 years) surveyed in Ladakh have anaemia followed by Jammu and Kashmir with 65.9 % women suffering from the condition given in the NFHS-5 data.

The prevalence of anaemia and different grades of anaemia in women of reproductive age (aged 15-49) in NFHS-5. Severe anaemia is found in Assam, Goa, Gujarat, Kerala, Mizoram, Tripura, West Bengal and Jammu and Kashmir. Moderate anaemia is seen in Maharashtra, Rajasthan, M.P., Telangana, Delhi, Haryana, Punjab, and

Tamil Nadu and mild anaemia is found in Kerala, Mizoram, Manipur, Chandigarh and Sikkim.

These findings suggested that there is an increase both in the prevalence and severity of anaemia in women of childbearing age, despite the better reach of ANMs (Auxiliary Nursing Midwifery), increase in antenatal care (ANC) checkups, more distribution of iron-folic acid (IFA) and institutional deliveries.

Discussion

This data shows the prevalence of anaemia has increased by 4% in all women, 1.8% in pregnant women and decreased by 6% in non-pregnant women. There was a stark difference between urban (45.7%) and rural India (54.3%). In West Bengal, 71.4 % of women surveyed have anaemia, the highest among states. Anaemia in childbearing age from 15 to 49 years increased by 17% in Jammu and Kashmir, 14.4% in Ladakh, 19.9% in Assam, 12.7% in Gujarat, 10.1% in Mizoram as compared to the previous survey (NFHS 4). India is among one of the countries recording the highest prevalence of anaemia in pregnancy globally. Earlier studies showed that anaemia in pregnancy was mainly due to low intake of iron and folic acid deficiencies. The guidelines in the national iron plus initiative elaborate how the program is to be implemented. It is very essential to find the impact of these national programs on the prevalence and severity of anaemia in India. Low reduction in the prevalence of anaemia (%) was attributed to poor implementation of the National Anemia Control Programme (NACP) and National Iron Plus Initiative (NIPI) guidelines.

All nationwide surveys are well-designed, with multi-stage stratified probability proportional sampling used in each. Between surveys, the factors used to calculate sample numbers necessary differed. Estimated sample sizes for calculating these parameters in all of the surveys were more than enough for estimating the prevalence of anaemia in pregnancy. Every attempt was taken in all of these surveys to reduce sampling and non-sampling errors. Another explanation was that the observed discrepancies were due to changes in Hb estimate methods between the NFHS and the DLHS-AHS series. This study also suggested that HemoCue might be utilised in an emergency case where quick findings are needed to make a treatment choice, but it should be followed with an accurate Hb estimate approach subsequently. HemoCue overestimated Hb and underestimated anaemia, according to Indian research, and there was no linear link between Hb assessed by HemoCue and cyanmethemoglobin techniques.

The study's strength was that it analysed time trends in the prevalence of anaemia in pregnant women using data on Hb levels in pregnant women from large-scale national surveys conducted over the previous two decades. The study's shortcoming was that it relied solely on data from cross-sectional surveys.

Conclusion

Anaemia is a multifactorial disorder that requires a multipronged approach. There is a need for identification of the actual cause of anaemia and induce treatment based on the cause. The lab services used to identify all types of anaemia should be strengthened at the ground level. And the monitoring of compliance of IFA supplementations has to be strengthened. NFHS 5 data indicates the incidence of anaemia rises significantly across women of all age groups over the last five years. With the launch of the Anemia Mukh Bharat campaign in 2019, it was expected that the anaemia burden would reduce or at least stay static. But in contrast to the expectations, the NFHS 5 factsheet gave a clear view of risen incidences. There is a need to redesign the plan and implement the programmes in a better way.

Recommendation

There is a pressing need to speed up the interventions to decrease the rate of anemia in pregnant women. To accomplish the aim, a two-pronged approach of universal diagnosis and treatment of anemia in pregnant women, as well as steps to reduce anemia before pregnancy, may be necessary. Because these have been provided under the programme, right up to subcenters across the country, both the NACP and the NIPI envisaged screening all pregnant women for anemia using either the Hb color scale or Sahli's haemoglobinometer. Neither of these is precise enough to grade anemia or accurately assess the treatment's impact. In the most recent prenatal care guidelines given by WHO, the use of the Hb color scale for screening is not recommended. In addition, India should abandon the incorrect Hb color scale and Sahli's haemoglobinometer in favor of the cyanmethemoglobin technique for accurate Hb measurement. This will allow practitioners to follow National Iron Plus Initiative (NIPI) guidelines for the prevention and treatment of infections.

Limitation of the study

Present study is a secondary data analysis using NFHS factsheets thus subjected to any sampling errors and bias.

Relevance of the study

On November 27, 2021, the National Family Health Survey (NFHS) released its fifth set of factsheets, offering valuable insights into the prevalence of anaemia in India. These factsheets presented a comprehensive statewide distribution of anaemia rates. The data highlighted iron deficiency as a predominant factor contributing to the high prevalence of anaemia in the country. HemoCue is used to estimate anaemia. In response to the concerning prevalence of anaemia, the government launched "Anaemia Mukh Bharat," a program launched at reducing and stabilizing the prevalence of anaemia across the nation.

Our comprehensive study has revealed significant findings regarding the prevalence of anaemia in India based on the

comparison between NFHS 4 and NFHS 5 data. The percentage change analysis indicates a notable increase in anaemia rates across several states in the country. It is alarming to see the higher prevalence of anaemia among pregnant women, especially in the eastern and northeastern regions of India, emphasizing the need for targeted interventions in these areas. Moreover, our research underscores the importance of broadening the focus beyond iron-folic acid (IFA) supplementation alone. While iron deficiency is a major contributor to anaemia, our findings suggest that addressing dietary factors is equally crucial. Additionally, our study raises concerns about the accuracy of HemoCue in estimating hemoglobin levels, as it tends to overestimate Hb and consequently underestimate the prevalence of anaemia. These insights provide a nuanced understanding of the anaemia landscape in India.

Authors Contribution

All authors have contributed equally.

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Tables

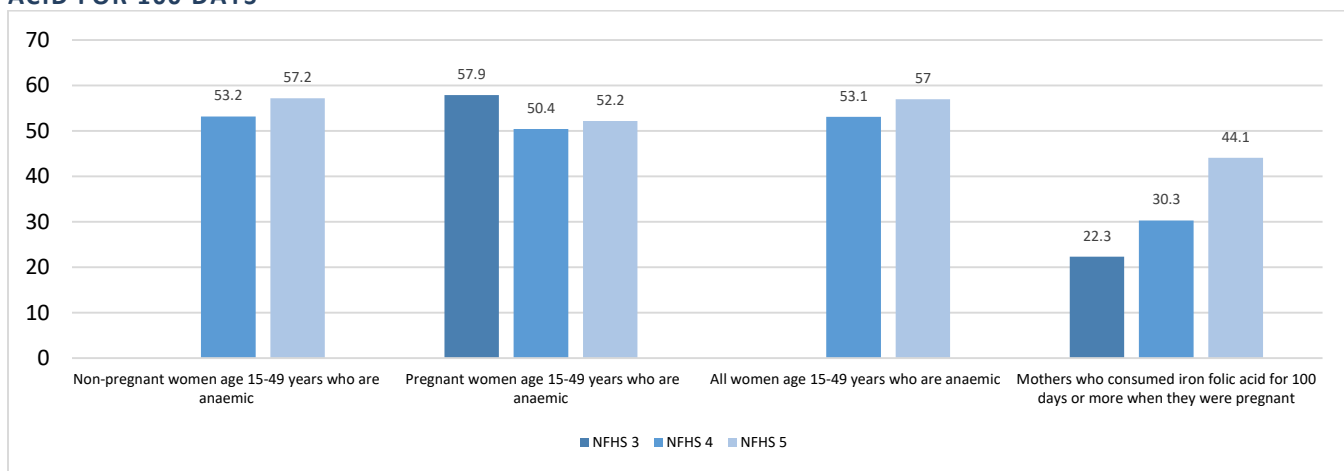
TABLE 1 PERCENTAGE CHANGE BETWEEN NFHS 4 & 5 - STATE/UNION TERRITORY WISE DISTRIBUTION OF VARIOUS INDICATORS OF ANAEMIC WOMEN

States/UTs	Non-pregnant women age 15-49 years who are anaemic		Pregnant women age 15-49 years who are anaemic		All women age 15-49 years who are anaemic	
	NFHS 5 (%)	Percentage change between NFHS 4 & 5	NFHS 5 (%)	Percentage change between NFHS 4 & 5	NFHS 5 (%)	Percentage change between NFHS 4 & 5
India	57.2	8% ↑	52.2	4% ↑	57	7% ↑
Andhra Pradesh	59	-2% ↓	53.7	2% ↑	58.8	-2% ↓
Arunachal Pradesh	40.8	-6% ↓	27.9	-26%	40.3	-7% ↓
Assam	66.4	44% ↑	54.2	18% ↑	65.9	47% ↑
Bihar	63.6	5% ↑	63.1	8% ↑	63.5	5% ↑
Chhattisgarh	61.2	29% ↑	51.8	25% ↑	60.8	29% ↑
Goa	38.9	24% ↑	41	54% ↑	39	25% ↑
Gujarat	65.1	18% ↑	62.6	22% ↑	65	18% ↑
Haryana	60.6	-4% ↓	56.5	3% ↑	60.4	-4% ↓
Himachal Pradesh	53.4	0%	42.2	-16% ↓	53	-1% ↓
Jharkhand	65.7	1% ↑	56.8	-9% ↓	65.3	0%
Karnataka	47.8	7% ↑	45.7	1% ↑	47.8	7% ↑
Kerala	36.5	5% ↑	31.4	39% ↑	36.3	6% ↑
Madhya Pradesh	54.7	4% ↑	52.9	-3% ↓	54.7	4% ↑
Maharashtra	54.5	14% ↑	45.7	-7% ↓	54.2	13% ↑
Manipur	29.3	11% ↑	32.4	25% ↑	29.4	11% ↑
Meghalaya	54.4	-4% ↓	45	-16% ↓	53.8	-4% ↓
Mizoram	34.8	41% ↑	34	26% ↑	34.8	40% ↑
Nagaland	29.3	6% ↑	22.2	-32% ↓	28.9	4% ↑
Odisha	64.4	26% ↑	61.8	30% ↑	64.3	26% ↑
Punjab	58.8	9% ↑	51.7	23% ↑	58.7	10% ↑
Rajasthan	54.7	17% ↑	46.3	0%	54.4	16% ↑
Sikkim	42.1	20% ↑	40.7	72% ↑	42.1	21% ↑
Tamil Nadu	53.6	-3% ↓	48.3	9% ↑	53.4	-3% ↓

States/UTs	Non-pregnant women age 15-49 years who are anaemic		Pregnant women age 15-49 years who are anaemic		All women age 15-49 years who are anaemic	
Telangana	57.8	2%↑	53.2	10%↑	57.6	2%↑
Tripura	67.4	24%↑	61.5	13%↑	67.2	23%↑
Uttar Pradesh	50.6	-4%↓	45.9	-10%↓	50.4	-4%↓
Uttarakhand	42.4	-6%↓	46.4	0%	42.6	-6%↓
West Bengal	71.7	14%↑	62.3	16%↑	71.4	14%↑
Andaman & Nicobar Islands	57.6	-12%↓	53.7	-13%↓	57.5	-12%↓
Chandigarh	60.1	-21%↓	-	-	60.3	-21%↓
Dadra & Nagar Haveli and Daman & Diu	62.6	6%↑	60.7	-	62.5	6%↑
NCT Delhi	50.2	-8%↓	42.2	-8%↓	49.9	-8%↓
Jammu & Kashmir	67.3	36%↑	44.1	-7%↓	65.9	33%↑
Ladakh	93.7	-	78.1	-	92.8	-
Lakshadweep	26	-44%↓	20.9	-46%↓	25.8	-44%↓
Puducherry	55.5	4%↑	42.5	53%↑	55.1	5%↑

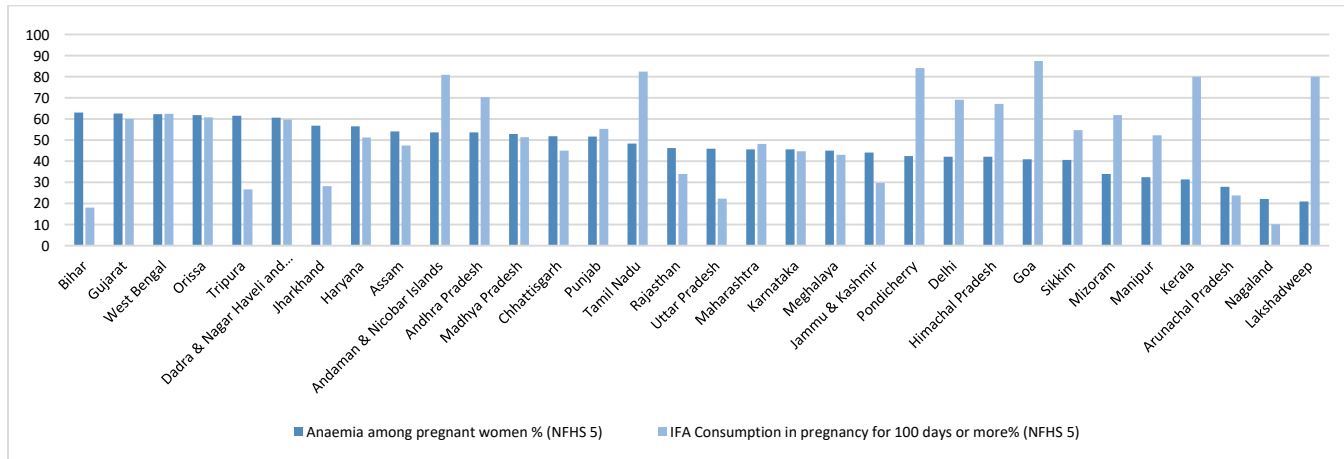
Figures

FIGURE 1 PERCENTAGE COMPARISON OF ANAEMIA IN PREGNANT WOMEN AGED 15-49, NON-PREGNANT WOMEN AGED 15- 49 YEARS, ALL WOMEN AGED 15- 49 YEARS AND MOTHERS WHO CONSUMED FOLIC ACID FOR 100 DAYS



Note: As per WHO, the prevalence of anaemia in ≥40% of the population falls under the severe category(11)

FIGURE 2. COMPARISON OF ANAEMIA AMONG PREGNANT WOMEN & WOMEN WHO CONSUMED FOLIC ACID FOR 100 DAYS OR MORE



Note: As per WHO, the prevalence of anemia in ≥40% of the population falls under the severe category (11)