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Anaemia Prevalence Trends Among Indian Women: A Study Based on National Family Health Survey Data

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Abstract:

Objective: To compare the prevalence of anaemia in India's different states and union territories (UTs) and assess the changing trends in the prevalence and severity of anaemia in women of reproductive age over the past 15 years. The study looked at data from the National Family Health Survey factsheets. The factsheets from the National Family Health Survey 3, 4, and 5 have been cited for the same purpose.

Material and Methods: This study is a secondary data analysis that reviewed the pertinent secondary literature and used data from National Family Health Survey (NFHS)-3, 4, and 5.

Results: Between the NFHS 4 and 5, the prevalence of anaemia in all women aged 15–49 years increased from 53% to 57%, in pregnant women from 50.4% to 52.2%, and in non-pregnant women from 53.2% to 57.2%. Among women aged 15 to 49, the greatest rates of anaemia are seen in West Bengal, Assam (65.9%), and Tripura (67.2%).

Conclusion: The Anaemia Mukt Bharat campaign was initiated in 2019 with the objective of mitigating the anaemia burden. However, over the course of the last 5 years, NFHS 5 shows a noteworthy increase in anaemia in women. This emphasizes the necessity of giving current programs a more effective makeover and implementation.

Keywords: anaemia, anemia-mukt-bharat, pregnant lactating women, prevalence, treatment

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Introduction

As per the World Health Organisation, anaemia is a disorder where there are fewer red blood cells than usual or there is a lower-than-normal concentration of haemoglobin. Around 40% of pregnant women and 42% of young children worldwide suffer from anaemia, a severe public health issue[1]. With a prevalence of 29.9% among women of reproductive age globally, anaemia affected more than half a billion women aged between 15 and 49 in 2019[2].

In countries where anaemia prevalence is more than 40%, the World Health Organization recommends that non-pregnant women of reproductive age should take 30–60 mg of elemental iron in the form of tablets daily for 3 months[3]. National studies referenced in the sixth report on the global nutrition situation by the United Nations Committee on Nutrition indicate that in certain countries, the prevalence of anaemia in non-pregnant women has decreased: in some nations, it has been demonstrated that the prevalence of anaemia in non-pregnant individuals can drop by 4% to 8% every year[4].

Anaemia prevalence has significantly declined in several countries over the years. For example, it dropped in China (50% to 19.9%, 1981–2002), Vietnam (40% to 24.3%, 1987–2001), Sri Lanka (59.8% to 31.9%, 1988–2001), Nepal (65% to 34%, 1998–2006), Guatemala (35% to 20.2%, 1995–2002), and Cambodia (56.2% to 44.4%, 2000–2006)[5]. Studies show that low iron and folate intake is a major contributor to India's high prevalence of anaemia among women. Anaemia affects 57% of Indian women aged 15–49, according to the National Family Health Survey 5[6].

Aims and objectives

To analyze national state/union territory level data from the National Family Health Survey factsheets in order to determine how the prevalence and severity of anaemia in women of reproductive age have evolved over time. The prevalence of anaemia in both pregnant and non-pregnant women aged 15 and over in both rural and urban populations in various Indian states and union territories (NFHS 3, 4 and 5).

Material and Methods

The article highlights that anaemia is prevalent in both urban and rural communities. National and state factsheets (NFHS 3, 4 and 5) have been examined to show the prevalence of anaemia in different states. We could learn the trends of a number of important variables via the National Family Health Survey factsheets. The National Family Health Survey fieldwork was divided into 2 phases. Data were gathered by field agencies from 6,39,699 households and 7,24,115 women in 2 phases: the first took place between June 17, 2019 and January 30, 2020, and the second took place between January 2, 2020 and April 30, 2021. Computer-assisted personal interviewing was used to conduct these surveys in the local languages on a mini-notebook. Following that, a scientific sample of households was selected from each cluster's list to take part in the survey. The survey employed a consistent sample design, field techniques, biomarker assessment protocols nationwide, and questions translated into 18 regional languages. Each of these cross-sectional surveys was carried out in a chosen sample of households across the nation. The field survey was carried out by a few chosen survey agencies. New clinical, anthropometric, and biochemical components of anaemia were tested with portable devices; haemoglobin was tested utilising an enhanced hemo-cue instrument model.

Results

Table 1 shows that 14 states (Assam, Bihar, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Manipur, Mizoram, Nagaland, Sikkim, Telangana, Tripura, West Bengal, and

the Union Territories of Jammu and Kashmir) have shown an increase in the prevalence of anaemia among women aged 15 to 49.

In Himachal Pradesh, Andhra Pradesh, and Meghalaya, the prevalence of anaemia among all women decreased by 1%, 2%, and 4%, respectively. Lakshadweep is down 12.2%, 10.4%, and 44% in the Andaman and Nicobar Islands Union Territories of Daman and Diu, respectively. Anaemia amongst pregnant women dropped by 13% and 46% in the Andaman and Nicobar Islands and Lakshadweep, respectively, while it dropped by 16%, 26%, and 16% in the states of Himachal Pradesh, Arunachal Pradesh, and Meghalaya.

The National Family Health Survey–5 highlights varying anaemia prevalences in women of reproductive age (15–49 years) across states. Severe anaemia is found in Assam, Goa, Gujarat, Mizoram, Tripura, West Bengal, and Jammu and Kashmir; moderate anaemia in Telangana, Delhi, Haryana, Punjab, Rajasthan, Maharashtra, Madhya Pradesh, and Tamil Nadu; and mild anaemia in Kerala, Mizoram, Manipur, Chandigarh, and Sikkim. Despite improved antenatal care, better access to Auxiliary Nurse Midwives, increased distribution of iron–folic acid, and higher institutional births, anaemia's frequency and severity have increased.

With significant differences between states and union territories, the NFHS–5 data show a worrying rise in the frequency of anaemia among Indian women. Nationally, the prevalence increased to 57.2% among women aged 15–49 who were not pregnant (a rise of 8% from NFHS–4), 52.2% among pregnant women (a 4% increase), and 57% among all women in this age range (a 7% increase). Significant increases occurred in states like West Bengal, Odisha, and Assam; in Assam, the number of pregnant women increased by 18%, while the number of non–pregnant women increased by 44%. Conversely, in certain areas, such as Lakshadweep, anaemia among women who were not pregnant decreased by 44%. These patterns seem to be influenced by variables including socioeconomic status, healthcare access, and eating habits.

India had witnessed a declining trend in anaemia from 2000 to 2016, but the NFHS–5 raised several concerns. There has been a rise in the prevalence of anaemia (57%) among women of reproductive age group (15 to 49 years) in NFHS–5 as compared to the previous surveys (Table 1). Along similar lines, Anaemia among pregnant women aged 15–49 increased to 52.2%, which is 1.8% higher than the NFHS–4 data (Figure 1). Though we initiated the National Nutritional Anaemia Prophylaxis Program in 1970, anaemia continues to remain a public health concern.

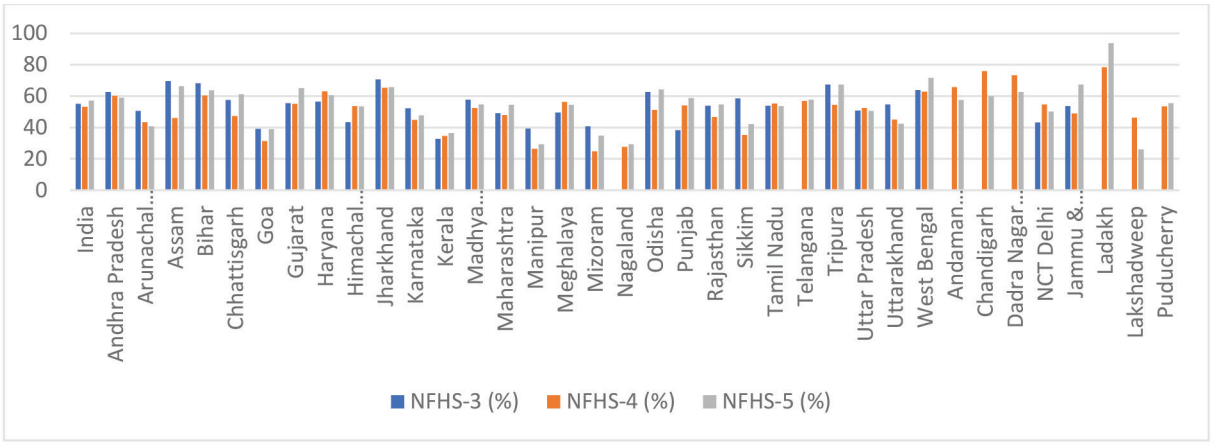
Data from NFHS–3, NFHS–4, and NFHS–5 show that anaemia remains a significant public health issue among Indian women of reproductive age (15–49 years), exacerbated by the physiological demands of menstruation, pregnancy, and nursing. It affects physical health, quality of life, productivity, and cognitive function, and is a major cause of maternal illness and death. Despite efforts like the Anaemia Mukt Bharat program, prevalence remains high in states like Bihar and Odisha, while it is lower in Kerala and Goa (Figure 1). Addressing this requires targeted interventions, improving health services, promoting dietary diversity, and increasing community awareness.

Variable prevalence rates over time are revealed by the National Family Health Surveys, which represent both continuous difficulties and advancements. There are clear regional differences; Kerala continuously displays lower anaemia rates (31.4%), while places like Ladakh record startlingly high rates (78.1% in NFHS 5). However, the prevalence of anaemia among pregnant women in India dropped from 57.9% in NFHS–3 (2005–06) to 50.4% in NFHS–4 (2015–16), demonstrating the effectiveness of several treatments (Figure 2).

Table 1 Percentage change between NFHS 4 & 5 – state/union territory-wise distribution of various indicators of anaemic women

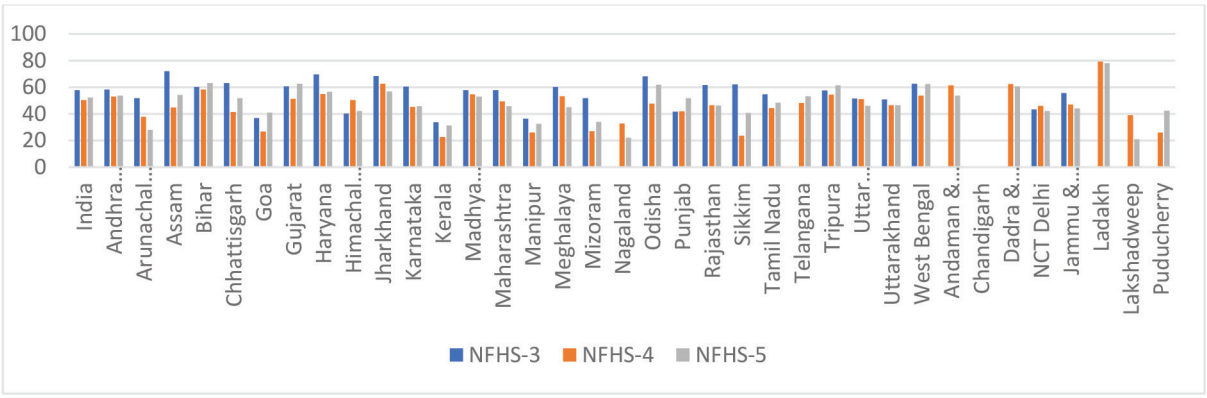
State/UT	Non-pregnant women (15-49 years) anaemic (%)	% Change (NFHS 4 to 5)	Pregnant women (15-49 years) anaemic (%)	% Change (NFHS 4 to 5)	All women (15-49 years) anaemic (%)	% Change (NFHS 4 to 5)
India	57.2	↑ 8	52.2	↑ 4	57	↑ 7
Andhra Pradesh	59	↓ 2	53.7	↑ 2	58.8	↓ 2
Arunachal Pradesh	40.8	↓ 6	27.9	↓ 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	No change	42.2	↓ 16	53	↓ 1
Jharkhand	65.7	↑ 1	56.8	↓ 9	65.3	No change
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	No change	54.4	↑ 16
Sikkim	42.1	↑ 20	40.7	↑ 72	42.1	↑ 21
Tamil Nadu	53.6	↓ 3	48.3	↑ 9	53.4	↓ 3
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	No change	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

NFHS=national family health survey



NFHS=national family health survey

Figure 1 Prevalence of anaemia among reproductive age group, 15–46 years (%)



NFHS=national family health survey

Figure 2 Prevalence of anaemia among pregnant women (%)

Treatment of anaemia

India's anaemia management has expanded over time, introducing iron and folic acid supplementation for vulnerable groups, as shown in Table 2. Programs like the National Nutritional Anaemia Prophylaxis (1970) and Control (1991) targeted pregnant women and young children. WIFS (2012) introduced weekly IFA for adolescents, while the National Iron Plus Initiative (2013) covered women (15–49 years) and children (6 months–19 years). Anaemia Mukt Bharat – POSHAN Abhiyaan (2018) – improved control by optimizing age-specific iron folic acid dosages. The plan recommends 60 mg iron and 500 mcg folic acid daily for pregnant women for 180 days, alongside dietary counselling, prenatal care, deworming, and intravenous iron sucrose for severe cases (Table 2).

Table 2 Expansion of national anaemia control programmes of iron supplementation

Sl. No.	Year	Program	Beneficiaries	Treatment (Iron Doses)
1	1970	National Nutritional Anaemia Prophylaxis Programme (NNAPP)	• Expectant mothers • Women who are nursing • Acceptors of intrauterine devices (IUDs)	• Children aged 1 to 5: 20 mg of elemental iron and 100 mcg of folic acid each day for 100 days • Women who are pregnant or lactating, IUD acceptors: 500 mcg folic acid plus 60 mg elemental iron
2	1991	National Nutritional Anaemia Control Programme (NNACP)	• Children (1–5 years) • Pregnant women • Lactating women • Intrauterine device (IUD) acceptors	• Children aged 1 to 5: 100 mcg of folic acid plus 20 mg of elemental iron • IUD acceptors for women who are pregnant or lactating: 500 mcg of folic acid plus 100 mg of elemental iron
3	2012	Weekly Iron and Folic Acid Supplementation (WIFS) programme	• Boys and girls between the ages of 10 and 19, enrolled in government or municipal schools in grades 6 through 12 • Out-of-school girls aged 10 to 19	• 100 mg elemental iron + 500 mcg folic acid
4	2013	National Iron Plus Initiative (NIPI)	• Children (6–59 months) • Children (5–9 years) • Adolescents (10–19 years, in school/out-of-school) • Women (15–49 years) • Pregnant/lactating women	• Children aged 6 to 59 months: 1 milliliter of IFA syrup (20 milligrams of elemental iron and 100 micrograms of folic acid) • Children aged 5 to 9: 400 mcg of folic acid plus 45 mg of elemental iron • Women and adolescents aged 15–49, as well as those who are pregnant or nursing: 500 mcg of folic acid plus 100 mg of elemental iron
5	2018	Anaemia Mukt Bharat (AMB), Prime Minister's Overarching Scheme for Holistic Nourishment (POSHAN Abhiyaan)	• Children (6–59 months) • Children (5–9 years) • Adolescents (10–19 years, in school/out-of-school) • Women (15–49 years) • Pregnant/lactating women	• Children aged 6 to 59 months: 20 mg of elemental iron and 100 mcg of folic acid in 1 milliliter of IFA syrup • Children aged 5 to 9 years: 45 mg of elemental iron and 400 mcg of folic acid • Women and adolescents aged 15–49, as well as those who are pregnant or nursing: 600 mcg of folic acid and 60 mg of elemental iron

AMB=anaemia mukt bharat Report, 2018

Table 3 Factsheet: prevalence of anaemia among women by state, category, and year

Factsheet: prevalence of anaemia among women by state, category, and year						
State/UT	**Pregnant women (2005–2006)**	**Pregnant women (2015–2016)**	**Pregnant women (2019–2021)**	**Non-pregnant women (2005–2006)**	**Non-pregnant women (2015–2016)**	**Non-pregnant women (2019–2021)**
Andhra Pradesh	58.2	50.9	**	63.1	58.8	**
Arunachal Pradesh	51.8	37.8	27.9	50.6	43.5	40.8
Assam	72	44.8	54.2	69.1	46.1	66.4
Bihar	60.2	58.3	63.1	68.2	60.4	63.6
Chhattisgarh	63.1	41.5	51.8	57.1	47.3	61.2
Delhi	29.9	46.1	42.2	45	54.7	50.2
Goa	36.9	26.7	41	37.9	31.4	38.9
Gujarat	60.8	51.3	62.6	55.2	55.1	65.1
Haryana	69.7	55	56.5	55.2	63.1	60.6
Himachal Pradesh	38.1	50.4	42.2	43.2	53.6	53.4
Jammu & Kashmir	55.7	47.5	**	51.9	49.5	**
Jharkhand	68.5	62.6	56.8	69.4	65.3	65.7
Karnataka	60.4	45.4	45.7	50.8	44.8	47.8
Kerala	33.8	22.6	31.4	32.8	34.7	36.5
Madhya Pradesh	57.9	54.6	52.9	55.8	52.4	54.7
Maharashtra	57.8	49.3	45.7	48	47.9	54.5
Manipur	36.3	26	32.4	35.7	26.4	29.3
Meghalaya	58.1	53.3	45	45.4	56.4	54.4
Mizoram	48.3	27	34	37.6	24.7	34.8
Nagaland†	**	32.7	22.2	**	27.7	29.3
Odisha	68.1	47.6	61.8	60.9	51.2	64.4
Punjab	41.6	42	51.7	37.9	54	58.8
Rajasthan	61.7	46.6	46.3	52.6	46.8	54.7
Sikkim	62.1	23.6	40.7	59.4	35.2	42.1
Tamil Nadu	54.7	44.4	48.3	53.1	55.4	53.6
Tripura	57.6	54.4	61.5	65.6	54.5	67.4
Uttar Pradesh	51.5	51	45.9	49.7	52.5	50.6
Uttarakhand	50.8	46.5	46.4	54.8	45.1	42.4
West Bengal	62.6	53.6	62.3	63.2	62.8	71.7
Andaman & Nicobar Islands	**	61.4	53.7	**	65.8	57.6
Chandigarh	**	76.8	**	**	75.9	60.1
Dadra & Nagar Haveli	**	67.9	***	**	80.1	***
Daman & Diu	**	39.7	***	**	59.3	***
Lakshadweep	**	39	20.9	**	46.3	26
Puducherry	**	26	42.5	**	53.4	55.5
Andhra Pradesh†	nr	52.9	53.7	nr	60.2	59
Telangana†	nr	48.2	53.2	nr	56.9	57.8
Jammu & Kashmir	nr	46.9	44.1	nr	49	67.3
Ladakh	nr	79.3	78.1	nr	78.4	93.7
India	57.9	50.4	52.2	55.2	53.2	57.2

*Data not available, **Data not reported, UT=union territory

Discussion

India has one of the highest incidences of anaemia during pregnancy in the world. According to data, the prevalence of anaemia has gone up by 4% for all women, down by 6% for non-pregnant women, and up by 1.8% for pregnant women. India's rural (54.3%) and urban (45.7%) populations differ significantly. West Bengal has the highest rate of anaemia among all states, with 71.4% of women assessed having the condition. In comparison to the previous census, anaemia among reproductive age groups of 15–49 years rose by 17% in Jammu and Kashmir, 14.4% in Ladakh, 19.9% in Assam, 12.7% in Gujarat, and 10.1% in Mizoram (NFHS 4). Other studies also reflected similar findings[7–9]. Studies found that deficiencies in folic acid and insufficient iron intake were the main causes of anaemia[10–13]. The National Iron Plus Initiative's guidelines include specifics on how the program should be carried out. Poor adherence to the National Iron Plus Initiative and National Anaemia Control Programme guidelines was the reason for the small decrease in the prevalence of anaemia percentage[14,15].

Differences in findings may stem from the National Family Health Survey and district-level household and facility surveys, such as the Annual Health Survey, using different Hb estimation techniques[16]. While HemoCue provides quick results for emergency situations, it should be used alongside a reliable Hb estimation method. Indian research found that HemoCue overestimated haemoglobin, understated anaemia, and lacked a linear relationship with the cyanmethemoglobin method. A key strength of the study was its use of 20 years of nationwide survey data on pregnant women's haemoglobin levels, though its reliance on cross-sectional surveys was a limitation.

Several recent studies align with the findings of this report, demonstrating both the persistence of the issue and the challenges in addressing it. For instance, a study conducted in Assam found a 19.9% increase in anaemia among women of reproductive age, emphasizing the slow progress in reducing anaemia despite national interventions like the National Iron Plus Initiative[17]. Similarly, another study indicated that poor adherence to the National Iron Plus Initiative and the National Anaemia Control Programme guidelines was a significant factor contributing to the small decrease in the prevalence of anaemia in India[18]. Studies also found that despite the availability of iron and folic acid supplements, socio-economic factors and poor health literacy in rural areas hinder the effective implementation of these programs[19–22].

The findings are further corroborated by recent cross-sectional studies conducted in Uttar Pradesh, Gujarat, and Mizoram, which report significant rises in anaemia among childbearing women, with increases of 12.7% in Gujarat and 10.1% in Mizoram[23]. This highlights the need for stronger enforcement of nutritional supplementation programs and greater health education to improve iron and folic acid intake. The effectiveness of the HemoCue device, often used for rapid Hb estimation, has also been debated, with studies suggesting that HemoCue may overestimate haemoglobin levels and underestimate anaemia severity[24]. This discrepancy calls for the use of more accurate methods, such as the cyanmethemoglobin method, for diagnosing anaemia, especially in large-scale surveys.

Research pointed out that the government's focus on iron supplementation through Anaemia Mukt Bharat and other programs needs to be coupled with increased access to maternal healthcare, improved dietary diversity, and better public awareness campaigns[17]. Additionally, studies emphasize that improving maternal nutrition should be integrated into broader public health strategies to reduce anaemia. Furthermore, national surveys are methodologically rigorous, incorporating longitudinal data that could provide a deeper understanding of the temporal shifts in anaemia prevalence[15,18].

Despite these efforts, challenges remain, such as inadequate follow-up on iron supplementation and inconsistent deworming programs, which continue to contribute to the high prevalence of anaemia[25]. Focused research is needed to evaluate the long-term effectiveness of the Anaemia Mukt Bharat Initiative.

Limitations of the study: As the current study relies on data analysis from NFHS-3, NFHS-4, and NFHS-5 factsheets, it may be subject to bias and sampling errors.

Conclusion

The incidence of anaemia has increased dramatically over the past 5 years among women of all ages, according to the National Family Health Survey-5 data. Due to the Anaemia Mukt Bharat campaign in 2019, it was anticipated that the burden of anaemia would decrease or remain unchanged. However, the NFHS-5 factsheet clearly showed increased incidences, contrary to predictions. Anaemia is a complex condition; a multifaceted strategy is needed. Ground-level improvements should be made in the laboratory services used to detect all forms of anaemia. Additionally, it is necessary to improve the monitoring of iron folic acid supplementation compliance. The plan should be redesigned, and the programs must be carried out more effectively.

Conflict of interest

No conflict of interest.

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