Information Brief

Anaemia: Impact on the Lives of Women and Girls in Bihar

Centre for Catalyzing Change
EveryGirl, EveryWoman, EveryWhere

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Anaemia is a condition in which the number and size of red blood cells, or the haemoglobin concentration, falls below an established cut-off value, consequently impairing the capacity of blood to transport oxygen around the body. Anaemia and iron deficiency reduce individuals' well being, cause fatigue and lethargy, and impair physical capacity and work performance. It is an indicator of both poor nutrition and poor health.

Minimum Desirable Hemoglobin Levels (Grams Per Decilitre, G/DL)

Children 6-59 Months of Age : 11.0
Children 5-11 Years of Age: 11.5
Children 12-14 Years of Age: 12.0
Non - Pregnant Woman (Age 15+): 12.0
Pregnant Woman: 11.0
Man (Age 15+): 13.0

Source: WHO

Pregnant women, non-pregnant women of childbearing age and children are particularly vulnerable to the condition. Among pregnant women, it increases the risk of maternal and infant mortality.

It is one of the major causes of maternal deaths, so much so that one in every five maternal deaths in India is from anaemia. It is also an underlying factor for maternal deaths caused by haemorrhage, septicaemia and eclampsia. Further, anaemia causes weakness, fatigue, drowsiness and dizziness, affecting the productivity of women and their healthy participation in public life.

Causes of Anaemia

The causes of anaemia are varied, and often dependent on the environment an individual is situated in. In developing countries, there is seldom just one cause of anaemia, while in industrialized countries anaemia may primarily be caused by poor dietary intake of nutrients. As such, the causes of anaemia can be classified as immediate and intermediate.

Immediate Causes

Iron deficiency: Iron deficiency causes 50 percent of anaemia worldwide, making it the single largest cause of anaemia. While iron deficiency causes anaemia by reducing red blood cell production, iron deficiency itself may be exacerbated by excessive red blood cell loss (from menstruation, for example).

Deficiencies in other nutrients: Anaemia is also caused by poor dietary intake and poor absorption of other key nutrients needed for red blood cell production. In conjunction with iron deficiency, deficiencies of folic acid, vitamins A and B-12 cause nutritional anaemia. Deficiencies of vitamins B-6 and C, riboflavin, and copper are also associated with anaemia.

Chronic diseases and Parasitic Infections: Cancer, HIV/AIDS, kidney disease and rheumatoid arthritis can interfere with production of red blood cells. Parasitic infections – like hookworms, schistosomes, and whipworms cause chronic loss of blood, which can develop into anaemia.

Malaria: Malaria parasites destroy red blood cells and suppress red blood cell production. All persons living in or visiting areas with endemic malaria transmission are at risk of anaemia from malaria.

Genetic conditions: Genetically linked blood diseases and haemoglobin abnormalities such as sickle cell and thalassemia cause abnormal haemoglobin production that can cause anaemia.

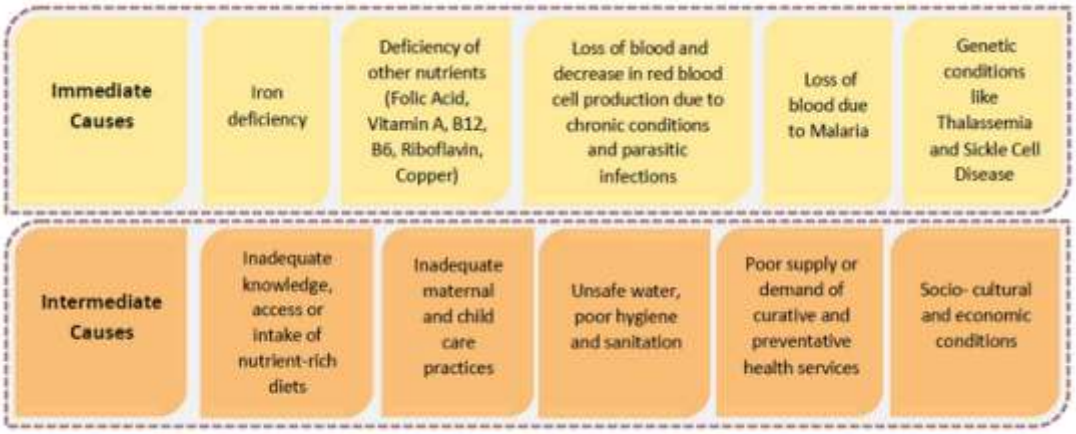
Intermediate Causes

Poor knowledge and behaviours: Lack of knowledge contributes to high anaemia prevalence worldwide. Inadequately trained health workers may not know or believe anaemia is important and thus may fail to promote preventive behaviours. People at risk of anaemia may not know it is an important contributor to poor health and may not be aware of preventive behaviours such as good nutrition and dietary practices, good infant feeding practices, sanitation- related practices, and sleeping under bed-nets for malaria protection. Cultural biases and taboos (such as those prohibiting certain foods or requiring women to eat after others have finished) also contribute to anaemia risk, as does non-compliance with IFA (iron and folic acid) supplementation, and malaria or hookworm medications.

Lack of access to health services and poor sanitation: Poor access to health services and poor sanitation conditions and practices also contribute to higher anaemia rates. Antenatal care services are an appropriate venue for delivering anaemia interventions. However, access to these services is low in many countries, with many women having few visits or beginning them late in pregnancy. Additionally, in many countries, women do not have trained attendants during delivery to manage severe bleeding if it occurs. Poor sanitation increases the risk of parasitic infections that can cause anaemia.

Socio-economic marginalization: Socio-economically weaker groups are at greater risk of anaemia due to lack of income and other resources that prevents them from consuming a diet with adequate, well-absorbed iron. Iron is a highly income elastic micronutrient. As family incomes rise, families tend to purchase more meat, which contains a type of iron that is better absorbed than the iron in most plant products. In addition, lack of income may prevent the poor from utilizing health services. Anaemia risks are intensified by the inability to pay for maternal and child health services, iron supplements, malaria and deworming medications, bed-nets, and other preventative interventions.

Figure 1. Causes of Anaemia

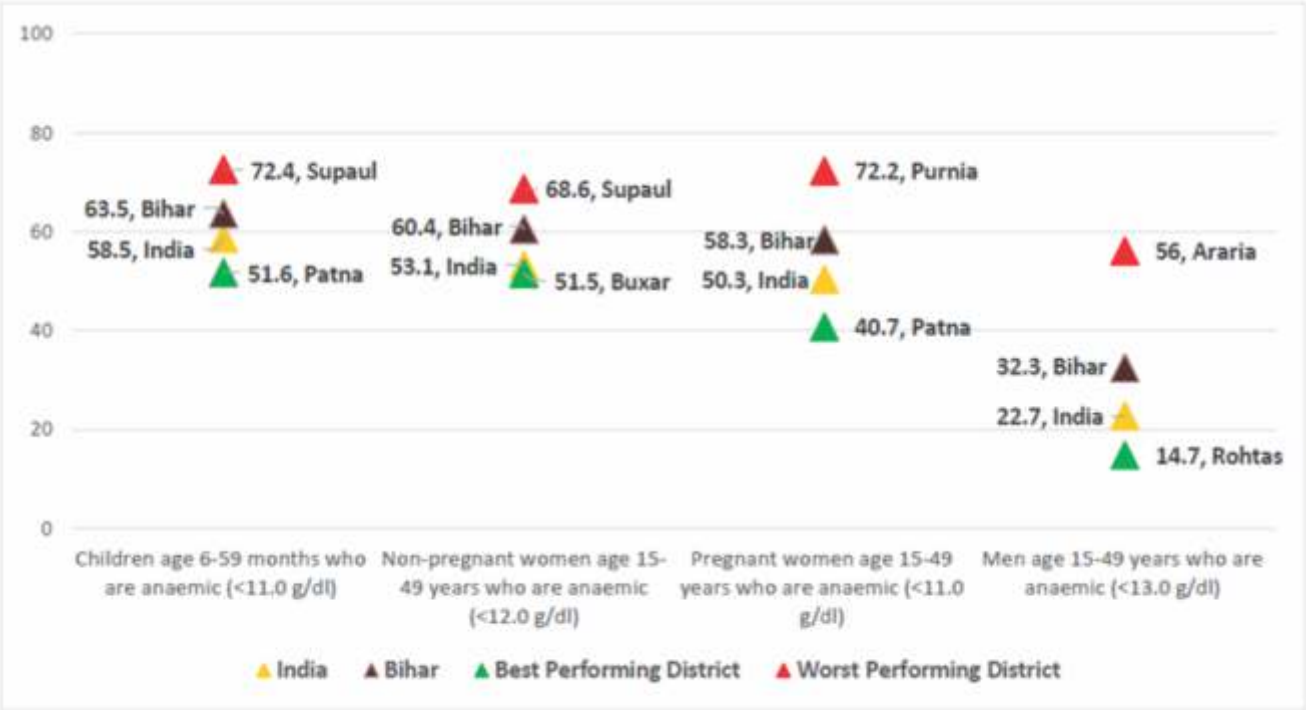


Adapted from WHO SEARO. Expert Group Consultation, Strategies to Prevent Anaemia. New Delhi, 2016. http://www.searo.who.int/entity/nutrition/recommendations_on_anaemia1.pdf?ua=1

Anaemia Prevalence in Bihar

More than half of children (aged 6-59 months), pregnant women and non-pregnant women (aged 15-49 years) in India are anaemic (Figure 2). This is also true for Bihar, where anaemia prevalence is higher than the national average. 63.5 percent of children (aged 6-59 months), 58.3 percent pregnant women (aged 15-49 years) and 60.4 percent non-pregnant women (aged 15-49 years) in Bihar suffer from anaemia. While there is a wide disparity in anaemia prevalence across Bihar's districts among these susceptible groups, the frequency is high (above 40 percent) even in the best performing districts (Figure 2).

Figure 2. Anaemia Presence in India and Bihar (%)

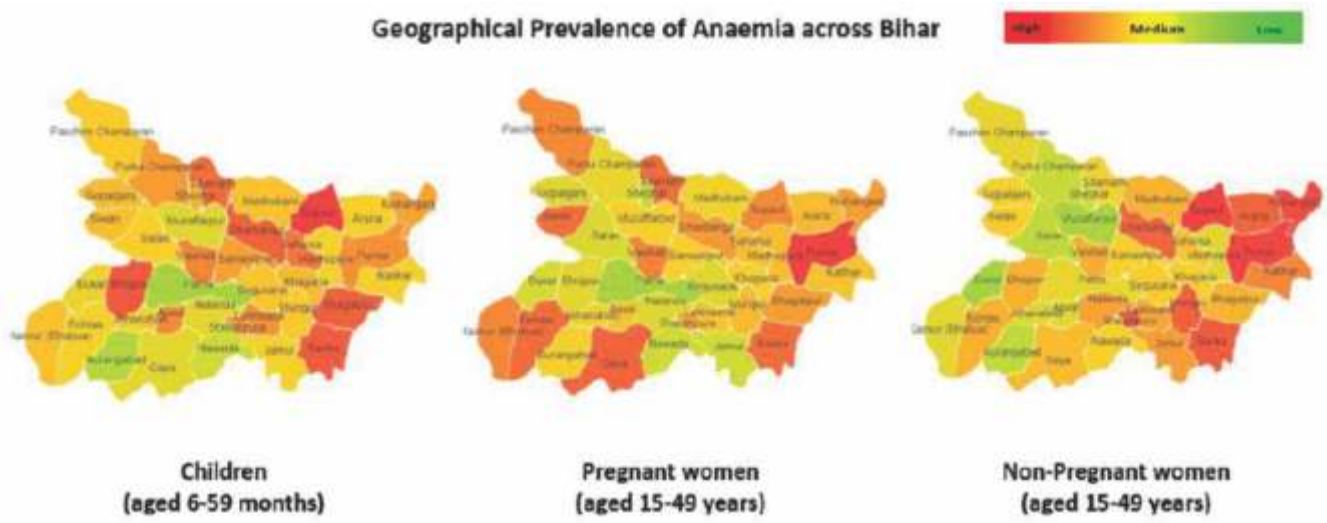


Source: NFHS 4, 2015-16

Geographically, anaemia prevalence among the most vulnerable groups varies across Bihar, with few obvious patterns emerging. Interestingly, while districts that border Nepal and West Bengal see a concentration of anaemia prevalence among nonpregnant women and children aged 6-59 months, anaemia among pregnant women has a wider geographic spread, with districts in the south and east (Gaya, Kaimur, Rohtas, Siwan, Paschim Champaran) showing high incidence as well (Figure 3).

A deeper assessment of National Family Health Survey data from 2015-16 finds that 7 districts – Supaul, Purnia, Banka, Sitamarhi, Darbhanga, Kishanganj, Sheikhpura– have high anaemia prevalence, above 65 percent, among at least two out of the three aforementioned vulnerable groups.

Figure 3. Heat Maps Showing Anaemia Prevalence among Vulnerable Groups



[1] Children (aged 6-59 months): Supaul- 72.4%, Purnia- 66.5%, Banka- 70.4%, Sitamarhi- 69%, Darbhanga- 69.9%, Kishanganj- 65.2%, Sheikhpura- 66%; Pregnant Women: Supaul- 63.9%, Purnia- 72.2%, Banka- 67.4%, Sitamarhi-67.3%, Darbhanga- 62.3%, Kishanganj- 62%, Sheikhpura- 61%; Non-Pregnant Women: Supaul-68.6%, Purnia- 68.4%, Banka- 67%, Sitamarhi- 59.1%, Darbhanga-66.4%, Kishanganj- 67.9%, Sheikhpura- 67.2%

Figure 4. Anaemia-Sensitive Indicators across Seven High Prevalence Districts and Bihar

	Women with 10+ years of schooling	Women married before age 18	ANC in first trimester	ANC4	100+ IFA consumption	EBF	Adequate diet	HHs with proper sanitation	U5 Stunted	U5 Wasted	U5 Under-weight	Women with low BMI
Banka	17.4%	48.0%	40.9%	16.8%	17.0%	54.3%	5.7%	14.3%	49.6%	26.0%	48.5%	32.0%
Darbhanga	18.7%	44.3%	25.4%	9.4%	6.6%	61.4%	6.5%	27.7%	49.0%	16.6%	41.1%	31.2%
Kishanganj	12.1%	25.7%	38.0%	15.5%	15.4%	66.8%	9.5%	15.9%	46.9%	22.8%	45.4%	34.5%
Purnia	15.1%	39.0%	35.5%	12.2%	9.6%	60.0%	11.7%	14.4%	52.1%	20.8%	47.0%	38.8%
Sheikhpura	22.1%	50.8%	42.4%	13.4%	10.4%	41.2%	16.9%	33.6%	46.4%	28.9%	51.7%	35.6%
Sitamarhi	12.2%	51.3%	32.5%	16.6%	4.7%	38.4%	8.8%	20.2%	57.3%	15.8%	47.7%	33.6%
Supaul	13.4%	60.8%	32.4%	11.0%	8.2%	68.3%	4.4%	15.8%	48.1%	20.9%	43.4%	38.6%
Bihar	22.8%	42.5%	34.6%	14.4%	9.7%	53.5%	7.5%	25.2%	48.3%	20.8%	43.9%	30.4%

ANC4: Mothers who have completed 4 antenatal care visits, EBF: Exclusive Breastfeeding, Adequate diet consumed by children aged 6-23 months, U5: Under five, BMI: Body Mass Index below 18.5 kg/m²; Source: NFHS 4, 2015-16

In a striking finding, the percentage of women who have completed more than ten years of schooling is lower than the state average in all seven high prevalence districts. Majority of these districts also have higher than state average levels of early marriage. Crucially, many of them also show poor levels of improved sanitation facilities in households, all factors that may be contributing to their high anaemia prevalence. Additionally, the impact of anaemia is also higher in these districts, with many showing higher than state average prevalence of stunted and underweight children, and women with low BMI (Figure 4).

Table 1. Anaemia Prevalence among Socio-economic Groups in Bihar (%)

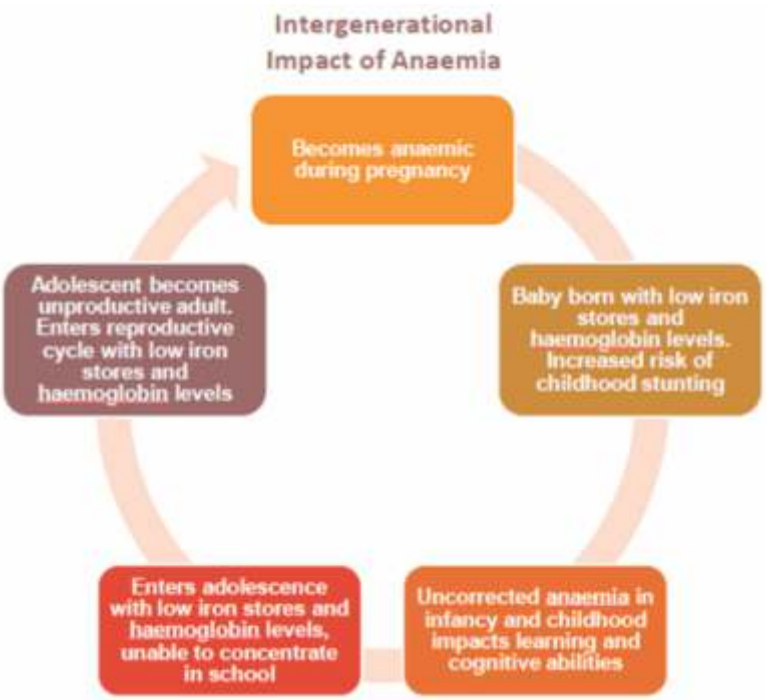
Background Characteristics		Children (aged 6-59 months)	Women (aged 15-49 years)
Sex	Male	62.0	-
	Female	65.0	-
Residence	Urban	58.8	58.7
	Rural	64.0	60.5
Education*	No schooling	66.6	61.5
	< 5 years	63.6	60.7
	5 - 9 years	60.6	59.7
	10 -11 years	58.2	59.1
	12 or more years	54.4	57.4
Religion	Hindu	63.4	60.9
	Muslim	63.7	57.1
Caste	Scheduled Caste	67.3	62.9
	Scheduled Tribe	68.0	64.4
	Other Backward Caste	62.3	59.7
	Other	60.9	58.2
	Don't know	67.8	65.0

*Mothers education for children between 6- 59 months
Source: NFHS 4. 2015-16

Socio-economically marginalized groups have a greater susceptibility to aneamia, which is reflected in Bihar's population as well. The prevalence of anaemia among women is 28 percenage points higher than the prevalence among men of the same age group (15-49 years). However, women with lower education levels, residing in rural areas, and belonging to scheduled castes or tribes are even more likely to be anaemic. This is also true for children aged 6-59 months, where occurence of anaemia is higher among girls, children of uneducated mothers, those residing in rural areas, and those belonging to marginalized caste groups (Table 1).

Impact of Anaemia

Anaemia makes it more difficult for women and men to earn incomes, carry out daily tasks, and care for their families. It makes women weaker during pregnancy and delivery, reducing their chances of having healthy babies and surviving blood loss during and after childbirth. Anaemic infants and children grow more slowly than non-anaemic infants and children. They are apathetic and anorexic, do not have enough energy to play, and have trouble learning. The impact of anaemia is also intergenerational.



Maternal anaemia is associated with poor intrauterine growth and increased risk of preterm births and low birth weight rates. Foetal growth retardation and low birth weight inevitably lead to poor growth trajectory in infancy, childhood and adolescence, contributing to low adult height. Parental height and maternal weight are established determinants of foetal growth and birth weight. Thus, maternal anaemia contributes to intergenerational cycle of poor growth and lower cognitive abilities in children.

Given the magnitude of the condition, a 2002 World Health Organization report listed iron deficiency, a major cause of anaemia, as one of the top 10 risk factors in developing countries for "lost years of healthy life."

Maternal Health: Anaemia reduces a woman's ability to survive bleeding during and after childbirth. Women with severe anaemia are particularly at risk and have a 3.5 times greater chance of dying from obstetric complications during or after pregnancy than women who do not have anaemia. Anaemia-related fatigue also makes the effort of labour more difficult, thus prolonging delivery.

Young child development and learning: Anaemia is associated with premature births, intrauterine growth retardation, and low birthweight in infants. In turn, **premature, underdeveloped, and underweight infants have decreased chances of survival.** If they survive, they may have (both as infants and later as children) physical and mental developmental problems, including learning deficits, eating disorders, and poor growth. Anaemic children of all ages are apathetic, which affects their social and cognitive development.

Adolescent development: Because they are undergoing rapid growth, adolescents have high requirements for iron and are particularly vulnerable to anaemia caused by multiple nutritional deficiencies. Both boys and girls are at risk, although prevalence peaks at different ages for each since growth spurts of boys and girls occur at different ages. Iron requirements for boys decrease after they stop growing, while those for girls remain high throughout the reproductive years because of menstrual blood loss, the iron demands of the developing foetus, and blood loss during delivery. **Anaemia during adolescence also reduces girls' and boys' learning capacity and physical performance, hampering their future economic opportunities.**

Adult productivity: In adults, one of the first signs of anaemia is fatigue, which occurs when there is not enough oxygen in the body to support physical activity. Work productivity and earned income suffer accordingly, which has a larger economic impact on national development. International evidence shows that the annual physical productivity loss due to iron deficiency is around USD 2.32 per capita, or 0.57% of GDP. Median total losses (physical and cognitive combined) are $16.78 per capita, or 4.05% of GDP (Horton and Ross 2003). In India, productivity losses due to anaemia are estimated at 1.18% of the GDP (MoHFW 2013). However, research shows that preventing and treating all causes of anaemia improves work output. **Global evidence suggests that a 10 percent increase in haemoglobin levels can lead to a 10- 20 percent increase in work output.**

Approaches To tackle Anaemia

Anaemia is a multi-dimensional condition, whose prevention and treatment requires a multi-pronged strategy. **Prevention of both iron deficiency and anaemia require approaches that address all potential causative factors.** The timing of these interventions is also crucial. The importance of early life experiences to subsequent health outcomes is increasingly being researched and recognised, with special attention often paid to nutrition and growth. **Early nutritional deficiencies can lead to irreversible linear growth restriction particularly in the first two years of life.** Together with pregnancy, this critical period of "1000 days" is associated with adverse effects much later in the life, such as increased risk of non-communicable disease, as well as reduced cognitive capacity and economic productivity. Given that iron deficiency in the first two years can also cause irreversible deficits in cognitive development, among other potential adverse effects, **the "first 1000 days" framework can be useful for the identification, prevention and treatment of iron deficiency as well** (Burke 2014). Interventions to prevent and correct iron deficiency and anaemia must include measures to increase iron intake through food-based approaches, namely dietary diversification and food fortification with iron; iron supplementation and improved health services and sanitation.

Notable Measures Under The National Iron+initiative to Prevent and Control Anaemia

- IFA Supplementation throughout the Life Cycle- based on WHO recommendation age specific interventions were introduced. These are:
- Children 6-60 months – 1 ml of IFA syrup containing 20 mg of elemental iron and 100 mcg of folic acid biweekly
- Children 5 –10 years- Tablet containing 45 mg elemental iron and 400 micrograms of folic acid weekly
- Weekly Iron and Folic Acid Supplementation (WIFS) Programme for Adolescent Girls and Boys (10–19 Years)- 100 mg elemental iron and 500 mcg of folic acid weekly
- Pregnant Women and Lactating Mothers- 100 mg elemental iron and 500 mcg of folic acid daily for 100 days in pregnancy. Followed by similar dose of IFA supplementation for 100 days in post-partum period
- Women in Reproductive Age Group (WRA) (15–45 Years) - 100 mg elemental iron and 500 mcg of folic acid weekly Deworming of pregnant women after the first trimester to tackle anaemia caused by parasitic infections Distribution of Long Lasting Insecticide Nets (LLINs) and Insecticide Treated Bed Nets (ITBNs) in endemic areas to control malarialinked anaemia among pregnant women and children

Dietary diversification is encouraging the consumption of micronutrient rich foods – dark green leafy vegetables, lentils and vitamin C rich fruits – that may be available but are underutilised by the deficient population. Promoting year-round production and collection of micronutrient-rich foods is also an important element of this approach. Public messaging about adequate dietary intake of energy and micronutrients (particularly vitamin A, folic acid, vitamin B-12, and iron), especially to adolescents, pregnant women, and mothers of 6- to 24-month-old children, and counselling mothers that infants less than 6 months old should be exclusively breastfed to ensure adequate energy and micronutrient intake are significant measures as well.

Food supplements are highly concentrated vitamins and minerals produced by pharmaceutical manufacturers in the form of capsules, tablets or injections and administered as part of health care or specific nutrition campaigns. Ensuring adequate supply of IFA tablets at health centres, Anganwadi centres, village health and sanitation days (VHSNDs), at schools and through door-to-door delivery by ASHAs, combined with robust monitoring of their consumption are essential strategies in this regard. Comprehensive public messaging around the consumption of iron and other supplements targeted at pregnant women and adolescents is an important measure to increase adherence to supplements. This is particularly relevant for Bihar, where consumption of IFA tablets by pregnant women remains below 10 percent (NFHS 4).

Food fortification refers to the addition of micronutrients to processed foods. In many situations, this strategy can lead to relatively rapid improvements in the micronutrient status of a population, and at a very reasonable cost, especially if existing technology and local distribution networks are utilised. The addition of iodineto salt in India is a successful example of this approach.

Conclusion

The prevalence of anaemia is a pressing public health concern facing Bihar and India at large. Low haemoglobin levels hamper productivity, cause illness and death, and thus impose a heavy economic cost. Comprehensive strategies that emphasise IFA supplementation and consumption, increase dietary diversity, improve water and sanitation services and enhance access to quality health services are indispensable to prevent and control anaemia among women and children. Moreover, **robust monitoring of existing interventions and creating an enabling environment for anaemia control are also crucial to achieve progress in improving other nutrition targets,** like stunting, wasting, and low-birth weight, and halt the inter-generationalimpact of undernutrition.

Call to Action

For People's Representatives

- **Understand the issue:** it is intergenerational in nature, its impacting on life, productivity and women's empowerment
- **Monitor** the functioning of programmes for **IFA supplementation and deworming**
- As a prevention strategy, **promote hygiene, sanitation and safe water** in your constituency
- **Speak** about consumption of iron rich food **by all, especially women**
- **Advocate** for **identification and measurement of anaemia among women of reproductive age group**
- **Ensure pregnant women, lactating women, adolescent girls** are receiving **IFA tablets from Anganwadi and health centres, ASHAs, and at schools**
- **Prioritise consumption of IFA tablets-** speaking about IFA consumption can encourage adherence among women and children minimising ill-effects of anaemia
- **Promote locally grown foods** including grains, vegetables and fruits to adopt dietary diversity in daily life
- **Promote exclusive breastfeeding** of infants
- **Speak about malaria prevention** and its interconnectedness to anaemia

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