IRON^{+} INITIATIVE

What is anaemia?
Anaemia is a condition in which the number of red blood cells (RBCs), and consequently their oxygen-carrying capacity, is insufficient to meet the body's physiological needs.

What is the role of RBCs and haem in the body? How does it get affected during anaemia?
The function of the RBCs is to deliver oxygen from the lungs to the tissues and carbon dioxide from the tissues to the lungs. This is accomplished by using haemoglobin (Hb), a tetramer protein composed of haem and globin. Anaemia impairs the body's ability for gas exchange by decreasing the number of RBCs transporting oxygen and carbon dioxide.

What are the causes of anaemia?
Anaemia results from one or more of the following process: defective red cell production, increased red cell destruction or blood loss.

Iron deficiency is thought to be the most common cause of anaemia globally, but other nutritional deficiencies (including folate, vitamin B12 and vitamin A), acute and chronic inflammation, parasitic infections, and inherited or acquired disorders that affect Hb synthesis, red blood cell production or red blood cell survival can all cause anaemia.

Iron deficiency anaemia results in impaired cognitive and motor development in children and decreased work capacity in adults. The effects are most severe in infancy and early childhood. In pregnancy iron deficiency anaemia can lead to perinatal loss, prematurity and low birth weight (LBW) babies. Iron deficiency anaemia also adversely affects the body's immune response.

What is the aetiology of anaemia?
The commonest causes of anaemia in developing countries, particularly among the most vulnerable groups (pregnant women and preschool age children), are nutritional disorders and infections. Hence the causes of anaemia could be segregated as nutritional and non-nutritional, underscoring the aetiological importance of dietary deficiency as the major causative factor.

What is iron deficiency anaemia? What are its affects?
Iron deficiency is the result of long-term negative iron balance. Iron deficiency anaemia (IDA) should be regarded as a subset of iron deficiency, that is, it represents the extreme lower end of the distribution of iron deficiency.

Iron deficiency is a consequence of:
- Decreased iron intake
- Increased iron loss from the body
- Increased iron requirement

Iron deficiency adversely affects

• The cognitive performance, behaviour and physical growth of infants, preschool and school-age children;
• The immune status and morbidity from infections of all age groups;
• The use of energy sources by muscles and thus the physical capacity and work performance of adolescents and adults of all age groups.

What are the other causes of anaemia?

Vitamin B12:
It is necessary for the synthesis of RBCs and its deficiency has been associated with megaloblastic anaemia. Diets with little or no animal protein, as is often the case in our country, coupled with malabsorption related to parasitic infections of the small intestine, might result in Vitamin B12 deficiency and anaemia.

Folic acid:
It is also essential for the formation and maturation of RBCs and is necessary for cell growth and repair. Deficiency of folate reduces the rate of DNA synthesis with consequent impaired cell proliferation and intramedullary death of resulting abnormal cells; this shortens the lifespan of circulating RBCs and results in anaemia.

Helminthic infestation:
Helminths such as hookworm and flukes cause chronic blood loss and consequently iron loss from the body, resulting in the development of anaemia. A hookworm burden of 40–160 worms (depending on the iron status of the host) is associated with IDA.

Malaria:
Malaria especially by the protozoa *Plasmodium falciparum* and *vivax,* causes anaemia by rupturing RBCs and suppressing production of RBCs. Decreased RBC production results from marrow hypoplasia seen in acute infection. *Plasmodium falciparum* is the primary cause of severe malaria in regions where malaria is endemic. Malarial anaemia can cause severe morbidity and mortality especially in children and pregnant women infected with *Plasmodium falciparum*. Malaria in pregnancy increases the risk of maternal anaemia, stillbirth, spontaneous abortion, LBW and neonatal deaths.

Sickle cell disease and thalassemia:
Sickle cell disease is an inherited disorder of haemoglobin. It is among the most common genetic diseases in the world and results in recurrent haemolytic anaemia.
Thalassemia is one of the major haemoglobinopathies among the population all over the world. It is caused due to decreased or negligible amount of globin chain of haemoglobin. About 10 per cent of the world's thalassemia patients belong to the Indian subcontinent and 3.4 per cent of them are carriers. In India, about 32,400 infants are born with haemoglobinopathies every year1.

Infections:
Certain chronic diseases, such as cancer, HIV/AIDS, rheumatoid arthritis, Crohn's disease and other chronic inflammatory diseases, can interfere with the production of RBCs, resulting in chronic anaemia. Kidney failure can also cause anaemia.

What are the causes of nutritional anaemia in children?

Causes of anaemia in children are:

- Low iron stores at birth due to anaemia in mother
- Non-exclusive breastfeeding
- Too early introduction of inappropriate complementary food (resulting in diminished breast milk intake, insufficient iron intake, and heightened risk of intestinal infections)
- Late introduction of appropriate (iron-rich) complementary foods
- Insufficient quantity of iron and iron enhancers in diet, and low bioavailability of dietary iron (e.g. non-haem iron)
- Increased iron requirements related to rapid growth and development during infancy and childhood
- Iron loss due to parasite load (e.g. malaria, intestinal worms)
- Poor environmental sanitation, unsafe drinking water and inadequate personal hygiene

What are the causes of nutritional anaemia in women?

Major causes of anaemia in children are:

- Insufficient quantity of iron-rich foods and "iron enhancers" in the diet (foods rich in vitamin C such as citrus fruits), and low bioavailability of dietary iron (e.g., foods containing only non-haem iron)
- Excessive quantity of "iron inhibitors" in diet, especially during mealtimes (e.g., tea, coffee; calcium-rich foods)
- Iron loss during menstruation
- Poor iron stores from infancy, childhood deficiencies and adolescent anaemia
- Iron loss from post-partum haemorrhage
- Increased iron requirement due to tissue, blood and energy requirements during pregnancy
- Teenage pregnancy
- Repeated pregnancies with less than 2 years' interval
- Iron loss due to parasite load (e.g., malaria, intestinal worms)
- Poor environmental sanitation and unsafe drinking water

What are the health outcomes of anaemia?

Anaemia has major consequences on human health as well as social and economic development. Anaemia is the world's second leading cause of disability and is responsible for about 1 million deaths a year, of which three-quarters occur in Africa and South-east Asia.

In young children, iron deficiency is due to increased iron requirement during periods of rapid growth, which are almost 10 times higher per kilogram of body weight than that of an adult male. In addition, infant and toddler diets are often poor in bio-available iron, particularly post weaning.

Children who suffer from anaemia have delayed psychomotor development and impaired performance; in addition, they experience impaired coordination of language and motor skills. Even though retarded psychomotor and cognitive development may be subtle in an individual child and therefore not really a presenting symptom as such, there is

increasing evidence that marked iron deficiency can cause significant central nervous system (CNS) damage even in the absence of anaemia.
There seems to be a vulnerable period for these damages particularly between 9 and 18 months of age. An even more important issue is that some research has suggested that this damage may not always be reversible even when iron stores are corrected in the early stages of iron deficiency.

The consequences of anaemia in women are enormous as the condition adversely affects both their productive and reproductive capabilities. Among women, iron deficiency prevalence is higher than among men due to menstrual iron losses and the extreme iron demands of a growing foetus during pregnancies, which are approximately two times the demands in the non-pregnant state. Worldwide, it is estimated that about 20 per cent of maternal deaths are caused by anaemia; in addition, anaemia contributes partly to 50 per cent of all maternal deaths.

First, anaemia reduces women's energy and capacity for work and can therefore threaten household food security and income. Second, severe anaemia in pregnancy impairs oxygen delivery to the foetus and interferes with normal intra-uterine growth, resulting in intrauterine growth retardation, stillbirth, LBW and neonatal deaths. Therefore, anaemia is a major contributor to poor pregnancy and birth outcomes in developing countries as it predisposes to premature delivery, increased perinatal mortality and increased risk of death during delivery and postpartum.

What are the Existing Policies and Strategies for iron supplementation?
A National Nutrition Policy was adopted in 1993, with the objective of operationalizing multi-sectoral strategies to address the problem of under-nutrition/malnutrition.

	Children		**Adolescents 10–19 years Recently introduced**	**Pregnant and lactating women**
	0–5 years	**6–10 years**		
IFA Supplementation	20 mg elemental iron and 100 microgram (mcg) folic acid per ml of liquid formulation and age appropriate de-worming for 100 days	30 mg elemental iron and 250 mcg folic acid per child per day for 100 days in a year	Weekly dose of 100 mg elemental iron and 500 mcg folic acid with biannual de worming	100 mg of elemental Iron and 500 mcg of folic acid daily for 100 days during pregnancy. Followed by same dose for 100 days in the post-partum period
Long Lasting Insecticide Nets (LLINs)/Insecticide Treated Bed Nets (ITBNs) are also provided to pregnant women.				

What are the Key Programmes and Schemes of Other Ministries?

- Under the Integrated Child Development Services (ICDS) Scheme of MWCD, supplementary nutrition is provided to pregnant and lactating women at the rate of Rs. 5 per day per woman. This is meant to provide 600 Kcal and 18–20 grams of protein. Children in the age group 0–6 years receive supplementary nutrition, immunisation, preschool education, etc.
- Supplementary food is also provided to primary school children through the National Programme of Nutritional Support to Primary Education (Mid-day Meal programme).

Other schemes of the MWCD, for example SABLA, where supplementary nutrition is provided to adolescent girls (AGs) in the form of take home rations (THR) or hot cooked meals. Under SABLA, each AG will be given at least 600 calories and 18–20 grams of protein and the recommended daily intake of micronutrients, at Rs 5 per day per beneficiary, for 300 days in a year.

Even though supplementation of diet with iron and folic acid (IFA) has been a part of Government of India programming for over three decades, NFHS data shows that the levels of IFA intake remain low. For example, less than 20 per cent of women below 20 years took IFA supplements, and only 22 per cent of pregnant women reported consuming IFA for 90 days or more when they were pregnant. There are significant challenges in reaching the at-risk population as well as improving compliance.

What is National Iron+ Initiative?

Taking cognizance of ground realities discussed above the Ministry of Health and Family Welfare took a policy decision to develop the National Iron+ Initiative. This initiative will bring together existing programmes (IFA supplementation for: pregnant and lactating women and; children in the age group of 6–60 months) and introduce new age groups.

Thus National Iron+ Initiative will reach the following age groups for supplementation or preventive programming:

- Bi-weekly iron supplementation for preschool children 6 months to 5 years
- Weekly supplementation for children from 1st to 5th grade in Govt. & Govt. Aided schools
- Weekly supplementation for out of school children (5–10 years) at Anganwadi Centres
- Weekly supplementation for adolescents (10–19 years)
- Pregnant and lactating women
- Weekly supplementation for women in reproductive age

Establishing a continuum of care, the National Iron+ Initiative also defines a minimums service of packages for treatment and management of anaemia across levels of care. Platforms and services at each level have also been mapped out and service providers' roles and responsibilities detailed.

Since anaemia is not just about medical interventions but to a great degree about behaviour change (both in terms of dietary habits and compliance) an extensive communication campaign will be developed. A conscious effort has already been made under WIFS programme to position the supplementation positively in order to reach out to both boys and girls and ensure compliance. IFA tablet has been made blue ('*Iron ki nili goli*')

to distinguish it from the red IFA tablet for pregnant and lactating women. The campaign has been built around benefits of IFA supplementation and healthy eating. The scope of this communication campaign will be enhanced to address all target segments.

What are Diet Diversification, Food Fortification and Supplementation?

Dietary diversification

Dietary diversification is encouraging the consumption of micronutrient rich foods – dark green leafy vegetables, lentils and vitamin C rich fruits – which may be available but are underutilised by the deficient population.

Food fortification

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 advantage can be taken of existing technology and local distribution networks.

Supplementation

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.

What is the policy of government for supplementation of iron through the Life Cycle?

An anaemia supplementation programme across the life cycle is proposed in which beneficiaries will receive iron and folic acid supplementation irrespective of their iron/Hb status. The age-specific interventions are based on WHO recommendations, synthesis of global evidence on IFA supplementation and the recommendations of national experts.

IFA supplementation programme and service delivery

Age group	Intervention/Dose	Regime	Service delivery
6–60 months	1ml of IFA syrup containing 20 mg of elemental iron and 100 mcg of folic acid	Biweekly throughout the period 6–60 months of age and de-worming for children 12 months and above.	Through ASHA Inclusion in MCP card
5–10 years	Tablets of 45 mg elemental iron and 400 mcg of folic acid	Weekly throughout the period 5–10 years of age and biannual de worming	In school through teachers and for out-of school children through Anganwadi centre (AWC) Mobilization by ASHA
10–19 years (Weekly Iron & Folic Acid Supplementations-WIFS)	100 mg elemental iron and 500 mcg of folic acid	Weekly throughout the period 10–19 years of age and biannual de-worming	In school through teachers and for those out-of-school through AWC Mobilization by ASHA
Pregnant and lactating women	100 mg elemental iron and 500 mcg of folic acid	1 tablet daily for 100 days, starting after the first trimester, at 14–16 weeks of gestation. To be repeated for 100 days post-partum.	ANC/ ANM /ASHA Inclusion in MCP card
Women in reproductive age (WRA) group	100 mg elemental iron and 500 mcg of folic acid	Weekly throughout the reproductive period	Through ASHA during house visit for contraceptive distribution

Source: Guidelines for control of Iron Deficiency Anaemia (National iron $^{+}$ Initiative)