Management of anaemia in pregnancy
Prevalence of anaemia
### Trends in prevalence of anaemia in pregnant women in India

<table>
<thead>
<tr>
<th>YEAR</th>
<th>AUTHOR</th>
<th>PLACE</th>
<th>PREVALENCE %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975</td>
<td>Sood et al</td>
<td>Delhi</td>
<td>80</td>
</tr>
<tr>
<td>1982</td>
<td>Prema</td>
<td>Hyderabad</td>
<td>75</td>
</tr>
<tr>
<td>1987</td>
<td>Agarwal et al</td>
<td>Bihar &amp; UP</td>
<td>87</td>
</tr>
<tr>
<td>1989</td>
<td>Christian et al</td>
<td>Chandrapur, Panchmahal</td>
<td>87,88</td>
</tr>
<tr>
<td>1988-92</td>
<td>Agarwal et al</td>
<td>Rural Varanasi</td>
<td>94</td>
</tr>
<tr>
<td>1989</td>
<td>ICMR</td>
<td>11 states</td>
<td>87</td>
</tr>
<tr>
<td>1994</td>
<td>Seshadri</td>
<td>Baroda</td>
<td>74</td>
</tr>
<tr>
<td>2000</td>
<td>NFHS 2</td>
<td>All India</td>
<td>52.0?</td>
</tr>
<tr>
<td>99-2000</td>
<td>ICMR</td>
<td>11 states</td>
<td>84.6</td>
</tr>
<tr>
<td>2002-04</td>
<td>DLHS –2</td>
<td>All districts</td>
<td>90.4</td>
</tr>
<tr>
<td>2006</td>
<td>NNMB</td>
<td>8 states</td>
<td>70.3</td>
</tr>
<tr>
<td>2007</td>
<td>NFHS 3</td>
<td>All India</td>
<td>57.9?</td>
</tr>
</tbody>
</table>

All surveys other than NFHS (problem Hb by Haemacue) show that over 70% of pregnant women in India are anaemic. There has been no decline in anaemia in the last three decades.
Among the southern states, prevalence of anaemia in pregnancy is lower in Kerala and Tamil Nadu due to better access to health care.
DLHS –2 showed that over 90% of pregnant women are anaemic both in urban and in rural areas.
Data from all national surveys have shown that there is no reduction in prevalence of anaemia either in preschool children or pregnant women.
Majority of children, adolescent girls and women are anaemic.


Prevalence of anaemia in children is high because of poor iron stores, low iron content of breast milk and complementary foods.

There is thus an intergenerational self-perpetuating vicious cycle of anaemia in all age groups.
Prevalence of anaemia in adolescent girls & pregnant women by education & standard of living index

Prevalence of anaemia is high even in high income groups and among well educated pregnant women.

Source: Ref 7.11.1.6
Consequences of anaemia
CAUSES OF MATERNAL MORTALITY

SRS-1998

- Hemorrhage: 30%
- Anemia: 19%
- Sepsis: 16%
- Abortion: 9%
- Obst. Lab: 10%
- Toxemia: 8%
- Others: 8%

Anaemia directly causes 20% of maternal deaths and indirectly accounts for another 20% of maternal deaths. These figures have remained unchanged in the last five decades.
Consequences of anaemia

Increased risk of maternal neonatal and infant mortality

Other consequences of anaemia are

Maternal: reduced ability to withstand blood loss, congestive cardiac failure, reduced immune capacity and consequent increased risk of infections and easy fatiguability and reduced work capacity

Infant: increased risk of low birth weight and prematurity
National programmes for Management of anaemia in pregnancy
National Anaemia Prophylaxis Programme

India was the first developing country to take up a National Nutritional Anaemia Prophylaxis Programme to prevent anaemia among pregnant women and children in 1973.

At that time AN care coverage under rural primary health care was very low and there was no provision for screening pregnant women for anaemia. Therefore an attempt was made to identify all pregnant women and give them 100 tablets containing 60mg of iron & 500μg of folic acid.
Right from 1950s, screening for anaemia and iron-folate therapy in appropriate doses and route of administration for the prevention and management of anaemia have been incorporated as an essential component of antenatal care in hospital settings.

Management of anaemia in pregnancy in hospital settings

Obstetric text books in India provided country specific protocols for management of anaemia, based on studies carried out in the country.

- Hb < 5 g/dL
  - Constitute 5-10% of anaemic women,
  - Admission and intensive care preferably in secondary or tertiary care institutions to ensure maternal and fetal salvage.
Management of anaemia in pregnancy in hospital settings

**Hb 5 to 7.9g/dL**
- Constitute 10 to 20% of anaemic women,
- Screen for systemic/obstetric problems and infections,
- If she has no other systemic or obstetric problems give her parenteral iron (IV or IM).

**Hb 8 – 10.9 g/dL**
- Constitutes about 50% of pregnant women
- Screen for systemic/obstetric problems
- If she has none give her IFA tablets twice or thrice a day

All Pregnant women who received treatment for anaemia had a repeat Hb estimation after about 4-6 weeks of therapy to see response; further management depended on Hb response.
Total Dose IV Iron (TDI) therapy

Safety and efficacy of Intravenous total dose iron therapy was proved by trials undertaken by Dr Menon.

Subsequently IV total dose iron therapy was used in several hospitals in Chennai and elsewhere.

Advantage: Only two day hospital admission

Disadvantage: On rare occasions anaphylactic reaction occurred; even in the tertiary care hospitals it was not possible to save all women who had anaphylactic reaction.

In view of this TDI was given up and intramuscular iron therapy was preferred.
IM iron therapy

IRON DEXTRAN - Following initial successful trials by Dr. Menon, Dr. Bhatt and others, IM iron dextran injections were widely used in hospital settings often on out-patient basis; about 1/3\textsuperscript{rd} develop fever arthralgia or myalgia.

IRON SORBITOL COMPLEX: Initial trials by Dr. Menon showed promising results but it was not so widely used because 1/3\textsuperscript{rd} of the drug gets excreted in urine and higher dose of elemental iron is required.

Side effects are mild: nausea, giddiness.

<table>
<thead>
<tr>
<th>Effect of IM iron dextran on Hb &amp; birth weight (Prema 1982)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
</tr>
<tr>
<td>Hb &lt; 8g/dl untreated</td>
</tr>
<tr>
<td>IM iron from 20 weeks</td>
</tr>
<tr>
<td>IM iron from 28 weeks</td>
</tr>
</tbody>
</table>

None of the women who received 1gm of IM iron dextran had Hb less than 11g/dl at delivery.
IM iron therapy

IM iron therapy mainly iron dextran was used in some medical colleges and rarely at district hospitals. It never reached primary health care level.

There were problems in ensuring continuous supply of drugs even at medical colleges.

Some women found it difficult to come to OPD daily for ten days for IM injections.

Though women who were counseled agreed to IM therapy, those who developed troublesome side effects like arthralgia wanted to discontinue; convincing them to continue was difficult.
### Impact of IM iron sorbitol on Maternal Hb & birth-weight 2005

<table>
<thead>
<tr>
<th>NIHFW</th>
<th>IM Jectocos</th>
<th>Tab. IFA</th>
<th>Chi-square Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight</td>
<td>Count</td>
<td>%</td>
<td>Count</td>
</tr>
<tr>
<td>&lt;2.2 kg</td>
<td>5</td>
<td>2.4%</td>
<td>15</td>
</tr>
<tr>
<td>2.2 to 2.49 kg</td>
<td>20</td>
<td>9.4%</td>
<td>26</td>
</tr>
<tr>
<td>&gt;2.5 kg</td>
<td>187</td>
<td>88.2%</td>
<td>118</td>
</tr>
<tr>
<td>Total (N)</td>
<td>212</td>
<td>100</td>
<td>159</td>
</tr>
</tbody>
</table>

### NFI 2004

<table>
<thead>
<tr>
<th>Maternal Hb (g/dl)</th>
<th>N</th>
<th>Birth weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I - &lt; 8.0</td>
<td>97</td>
<td>2577±378.3</td>
</tr>
<tr>
<td>II - 8.0 – 11.0</td>
<td>645</td>
<td>2796±394.7</td>
</tr>
<tr>
<td>III - &gt; 11.0</td>
<td>103</td>
<td>2921±418.1</td>
</tr>
<tr>
<td>Total</td>
<td>845</td>
<td>2786±4055</td>
</tr>
<tr>
<td>All women who had IM iron therapy</td>
<td>340</td>
<td>2805±379.3</td>
</tr>
</tbody>
</table>
NIHFW and NFI study showed that IM iron sorbitol therapy is feasible in primary care institutions. Mean Hb rose and there was significant improvement in birth weight. **BUT** majority of women who received 900 mg of iron sorbitol had Hb levels around 10 g/dl and birth weight was lower than the birth weight in non-anaemic women.

It would appear that 1500 mg of iron sorbitol citric acid complex would be required for optimal results.
Side effects of IM iron sorbitol citric acid complex

Metallic taste in the mouth 32.4%
Nausea/vomiting 15.3%
Pain at the site of injection 38.3%
Infection at the injection site 0.3%

None had muscle or joint pain which is commonly seen with iron dextran injections.

Nausea and vomiting was treated with anti-emetics.

Patients with pain at injection site were given paracetamol and IM iron therapy continued; one patient who developed infection responded to antibiotics.
Problems in implementation of anaemia prevention and control programmes
Proportion of pregnant women who receive IFA tablets is not high even among well-performing states like Tamil Nadu, Kerala and Maharashtra.

Many of those who received IFA did not receive 100 tablets.

Many of those who received did not take the tablets regularly.
<table>
<thead>
<tr>
<th>No of tablets ingested</th>
<th>No.</th>
<th>Hb (g/dL)</th>
<th>Mean</th>
<th>S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-15</td>
<td>310</td>
<td>8.8</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>16-30</td>
<td>251</td>
<td>9.2</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>31-60</td>
<td>196</td>
<td>9.3</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>61-90</td>
<td>99</td>
<td>9.2</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>&gt;90</td>
<td>74</td>
<td>9.1</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td>Total who had IFA</td>
<td>930</td>
<td>9.1</td>
<td>2.2</td>
<td></td>
</tr>
<tr>
<td>B. Not known</td>
<td>16</td>
<td>9.1</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>C. Not had IFA</td>
<td>3829</td>
<td>9.1</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>A+B+C</td>
<td>4775</td>
<td>9.1</td>
<td>3.5</td>
<td></td>
</tr>
</tbody>
</table>

ICMR study confirmed that most women received 90 tablets without Hb screening. Many did not take tablets regularly. Even among small number of women who took over 90 tablets rise in Hb was low and many continued to be anaemic.
DLHS 1 (1998-99) showed that pregnant women were not being screened for anaemia and given appropriate therapy.

Most pregnant women who were given antenatal check up were given tablets containing iron (100mg) and folic acid 500 μg.

Most women in poorly performing states did not come for antenatal check up. Many of those who came, did not get IFA through out pregnancy. Majority did not consume even the tablets that they got.
DLHS 2 (2006) showed that there was some improvement in coverage and content of antenatal care. About 40% women had blood examination – which might include Hb estimation.
DLHS 2 also showed that there has been some improvement in % of pregnant women receiving IFA tablets. There has been a significant reduction in the % of women who received but did not consume the tablets. These data suggest that if all pregnant women are screened for anaemia and provided appropriate therapy it might be possible to achieve substantial reduction in prevalence of anaemia in pregnancy.
While there has been marginal improvement in the proportion of women who had blood tested in DLHS III (46.6% vs 43.8%) a large number of women who are more likely to be anaemic eg multipara are not having blood tests done as part of ANC. This needs to be corrected.
Challenges in the Twelfth Plan period
Challenges in anaemia prevention & control programmes

- Majority of Indians are anaemic,
- Over $\frac{3}{4}$ of pregnant women are anaemic,
- There has not been any decline in the prevalence of anaemia or its adverse consequences on mother child dyad over the last six decades.
Opportunities in the Twelfth Plan period
MoHFW has come out with guidelines for the management of anaemia in pregnancy explicitly stating the measures for diagnosis – mandatory estimation of Hb during ANC - prevention of anaemia in non-anaemic women by prophylactic IFA and treatment of mild moderate and severe anaemia based on cutoffs of Hb levels. It gives the protocol for follow up after treatment and indications for referral.

The guidelines also states the responsibilities ASHA, ANM, MO and CMO for management of anemia in pregnancy including line listing of severe cases of anaemia based on Hb levels. It explicitly states that PHCs need to take on the role of IM iron administration for moderate anaemia.

The guidelines also outlines the management of anaemia in children and adolescent girls.
Strategy for prevention of anaemia in pregnancy

- health and nutrition education to improve over all dietary intakes and promote consumption of iron and folate-rich foodstuffs - possible through NRHM’s Village Health and Nutrition Days,
- dietary diversification and inclusion of iron folate rich foods as well as food items that promote iron absorption - possible with proper linkages with National Horticultural Mission,
- introduction of iron and iodine-fortified salt universally to improve iron intake - possible with NIN technology,

Opportunity:
Affordable & sustainable interventions to improve iron and folate intake of the entire family and prevent anaemia are readily available.
Strategy for prevention of anaemia in pregnancy

- Focus on Hb estimation for detection and treatment of anemia in adolescent school girls as a part of school health check – possible through school health system.

- Focus on Hb estimation in girls/women who are married, for detection and treatment of anemia prior to pregnancy - can be attempted through coordination with AWW.

- Screening all pregnant women for anemia - Possible using filter paper blood collection for Hb estimation by cyanmethaemoglobin technique

- Providing one tablet of IFA to prevent any fall in Hb levels in non-anaemic pregnant women - possible through NRHM.

Opportunity:
All these interventions are feasible & affordable for the individual and health system. With universal coverage and monitored supplementation it is possible to ensure that non-anaemic women do not become anaemic.
Strategy for detection & management of anaemia in pregnancy

- Diagnosis of anaemia by a gold standard time tested method of estimating Hb eg cyanmethaemoglobin possible by upgrading equipment in hospitals and peripheral health facilities.
- Iron folate oral medication at the maximum tolerable dose throughout pregnancy for women with Hb between 8 – 10.9 g/dL – possible through convergence between ASHA, AWW and ANM.
- IM iron therapy for women with Hb between 5 and 7.9 g/dL if they do not have any obstetric or systemic complication - possible with urban & rural PHCs taking the major responsibility,
hospital admission and intensive personalised care for women with haemoglobin less than 5 g/dl - possible with referral to tertiary care centres using emergency transport funds and ASHA,

screening and effective management of obstetric and systemic problems in anaemic pregnant women - possible in hospitals,

improvement in health education to the community to promote utilisation of available care - possible through AWW, ASHA, ANM and local self government representatives.

**Opportunity:**
All these interventions are feasible & affordable for the individual and health system.
Opportunities for detection and appropriate management of anemia in pregnant women

India currently has the necessary infrastructure, manpower, technology and funds for this task;

Indians are rational and responsive; people’s institutions are in place for providing the necessary community support;

Detection and appropriate management of anemia in pregnant women and preventing the adverse consequences of anaemia on the mother child dyad is feasible under NRHM and its urban counterpart.

India should take this opportunity to showcase how it can cope with a major challenge effectively.