

# Anaemia in Nepal

## Review Report



Prepared by

**Dr. Sabita Malla**  
Consultant

**The Micronutrient Initiative (MI)**

for the  
**Nutrition Section, Child Health Division**  
**Department of Health Services**  
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## TABLE OF CONTENT

<b>1. BACKGROUND .....</b>	<b>5</b>
<b>2. SITUATION ANALYSIS OF THE PREVALENCE OF ANAEMIA IN NEPAL .....</b>	<b>8</b>
<b>3 ETIOLOGY OF ANEMIA .....</b>	<b>10</b>
3.1. DIETARY INTAKE .....	10
3.2. PARASITIC INFESTATIONS.....	11
3.3. VITAMIN A.....	13
3.4. MALARIA .....	14
3.5. VISCERAL LEISHMANIASIS (KALA-AZAR).....	16
3.6. OTHER NUTRITIONAL DEFICIENCIES .....	16
3.7. CONCLUSION: .....	17
<b>4. HMG'S IRON SUPPLEMENTATION PROGRAMME.....</b>	<b>18</b>
4.1. CURRENT POLICES AND GUIDELINES REGARDING IRON SUPPLEMENTATION .....	19
4.2. IRON SUPPLEMENTATION PROGRAM AND ITS CONSTRAINTS .....	20
4.2.1. <i>Tablet supply &amp; utilisation</i> .....	20
4.2.2. <i>Delivery system and monitoring</i> .....	23
4.2.3. <i>Coverage and acceptability (demand) of iron supplementation programme</i> .....	24
4.2.4. <i>Access to iron supplements</i> .....	24
4.2.5. <i>Quality and dispensing of iron supplements</i> .....	26
4.3. CURRENT IEC EFFORTS.....	27
4.4. KNOWLEDGE AND EXISTING PERCEPTION ABOUT ANEMIA AND IRON TABLETS.....	28
4.5. EFFORTS TO ADDRESS THE PROBLEM OF ANAEMIA IN OTHER AGE GROUP.....	28
<b>5. MODELS OF SUCCESSFUL SUPPLEMENTATION DELIVERY ACTIVITIES ...</b>	<b>30</b>
5.1. INTENSIFICATION OF ANTENATAL SUPPLEMENTATION PROGRAM: .....	30
5.2. POSTPARTUM VITAMIN A SUPPLEMENTATION .....	31
5.3. DECENTRALIZED PLANNING FOR CHILD PROGRAMME (DPCP) .....	33
<b>6. CONCLUSIONS .....</b>	<b>34</b>
<b>7. RECOMMENDATIONS.....</b>	<b>36</b>



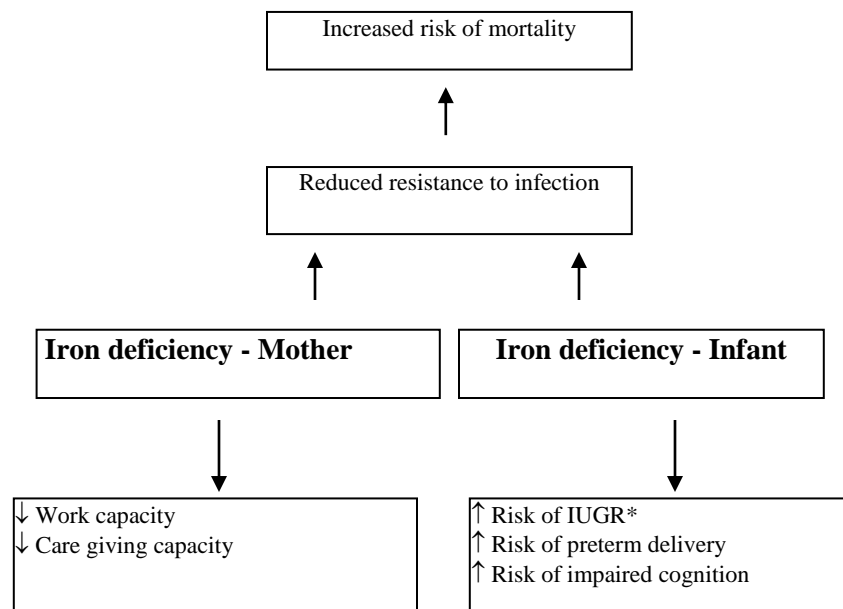
# 1. Background

Anaemia has many important consequences with respect to both health and economic development. These consequences are most severe in developing countries. Iron deficiency (ID) affects over one billion people worldwide, particularly children and women. If uncorrected, iron deficiency leads to anemia, reduced work capacity, diminished learning ability, increased susceptibility to infection, and a greater risk of maternal and childhood mortality. Therefore, anaemia has a serious repercussion on social and economic development of a country.

Severe anemia is associated with many as 20% of all maternal deaths and is a major cause of childhood mortality in many developing countries [1]. Other consequences of iron deficiency include impaired physical growth, potentially permanent effects on neurological functions involving cognition, emotional behavior, reaction to and reception of stimuli, attention span, learning capacity, and neuromotor development and function; decreased capacity for physical work; lowered immunity resulting in increased susceptibility to infections; and alterations in the reproductive process [37,38].

Anaemia is an extremely serious public health problem in Nepal. The 1998 Nepal Micronutrient Status Survey reported an overall anaemia prevalence of 68% among women. The prevalence of anaemia among pregnant women was even higher i.e. 75%. In other words, three out of four pregnant in Nepal are anaemic. Furthermore, the survey also found a prevalence of 78% among pre-school children and virtually all children (90%) between 6-12 months of age, a period of rapid physical and mental growth, were anaemic.

*Fig. 1: Consequences of Iron deficiency and Anaemia in mothers and their offspring*



- *IUGR= Intra-uterine growth retardation*

Strategies to control anaemia include improvement in dietary intake of iron, food fortification, supplementation and control of parasitic infections. Unless feeding behaviors are changed or food fortification is adopted, oral supplementation remains the only course of anaemia prevention and treatment.

Iron supplementation during pregnancy has been recognized as a major health initiative in Nepal, and is the primary intervention in place to control anemia in the country. According to the present policy of the Ministry of Health, a pregnant woman is supposed to start taking iron tablets from the beginning of the second trimester of pregnancy and continue until 45 days postpartum. For the past two decades the Ministry of Health has been providing iron tablets to pregnant women through primary health care facilities such as Health Post (HP), Sub-health posts (SHP), and Outreach clinics (ORC). There have been efforts to raise awareness about anaemia and iron supplementation through a series of systematic training of health workers at all levels, and various IEC activities such as printing and distribution of IEC materials regarding anaemia, as well as through other media channels e.g. UNICEF/HMG has recently started a nation wide radio/TV campaign for intensifying the iron supplement intake in pregnant women throughout the country

However, coverage and adherence of iron supplementation has been extremely poor. It has been reported that less than ten per cent of women receive iron tablets at any time during their pregnancy and less than one percent take as per the recommendation. The Ministry of Health has acknowledged reducing anaemia is a great challenge that cannot be left ignored [29].

To improve the existing situation there is a need to enhance the current supplementation activity and identify ways to improve demand, outreach and compliance. In order to do this, it is important to get a better understanding of the constraints and shortcomings of the programme. It is also important to develop an understanding of the etiology of anemia in Nepal so that effective interventions could be developed and implemented to enhance the impact of the supplementation programme. To intensify iron supplementation, successful community based antenatal care approaches need to be identified and extended on a broad scale.

While reducing the prevalence of anaemia during pregnancy is key priority, there is also need to address the problem in young children and adolescents through identification and implementation of appropriate intervention strategies.

As a participant in the "World Summit for Children" Nepal committed itself to the goal of reducing the prevalence of iron deficiency anaemia in pregnant women to at least one-third of the 1990 level by the year 2000: but little has changed. In comparison to vitamin A deficiency and iodine deficiency disorders, there has been little improvement in the situation of anaemia in Nepal.

To facilitate the reduction of anaemia in Nepal, an extensive review was conducted to document the etiology of anaemia in Nepal, as well as the current status of anaemia control efforts. Questionnaires were distributed to different INGOs, NGOs, donor agencies, and government agencies to learn about their current efforts on the field of anaemia [Appendix 1]. The review also examined successful models of delivery of antenatal service in various parts of the world, including Nepal. This document summarizes the key findings of the review. The review specifically looked into the following issues:

- 1.1. Situation analysis of the prevalence of anaemia in Nepal
- 1.2. Etiology of anemia
- 1.3. Review of iron supplementation programme
  - Current polices/protocols/guidelines and activities being implemented in the country;
  - Current status of the programme: low coverage and compliance
  - Review logistic management and supply of iron tablets and existing PHC infrastructure
  - Review the existing IEC strategy on anemia and iron supplementation
  - Existing KAP about anaemia and iron supplementation

- 1.4. Models of successful supplementation delivery activities such as ANS program, postpartum vitamin A supplementation program, DPCP etc.

## 2. Situation analysis of the prevalence of anaemia in Nepal

In Nepal, anaemia is an extremely serious public health problem. Despite efforts to reduce the high prevalence of anaemia over the past two decades, there has been little improvement in the situation. Data collected in the early 1970s indicated anemia to be a major nutritional problem among women and children in Nepal [19,39]. A hospital-based study in Kathmandu in 1972 reported that more than one third of pregnant women had hemoglobin levels below 11.5 g/dl. In 1975, the first nationwide nutrition survey was conducted, and reported that 24% of children aged 6-72 months were anaemic [32]. However, the survey did not assess the prevalence of anaemia in women or pregnant women.

A series of small-scale surveys conducted in 1980s and mid 1990s all provided updated figures of the high prevalence of anaemia, both in children and women. The Joint Nutrition Support Programme (JNSP) baseline survey in 1986 reported a very high prevalence of anaemia throughout Nepal ranging from 71% in Sindhupalchowk to 95% in Nawalparasi among mothers with children 6 to 36 months of age.

In 1997, Nepal Nutritional Intervention Project, Sarlahi (NNIPS) found 71% of pregnant women, 82% of lactating mothers, and 58% of infants (<3 mths) with anaemia in Sarlahi District. Over half of all anaemia of pregnancy was moderate to severe (Hb <10g/dL), compared to one-third among lactating women. Even among young girls before pregnancy, anemia appeared to be a significant problem. Table 1 below presents the findings of some of the surveys.

**Table 1: Prevalence of anaemia in Nepal (NMSS)**

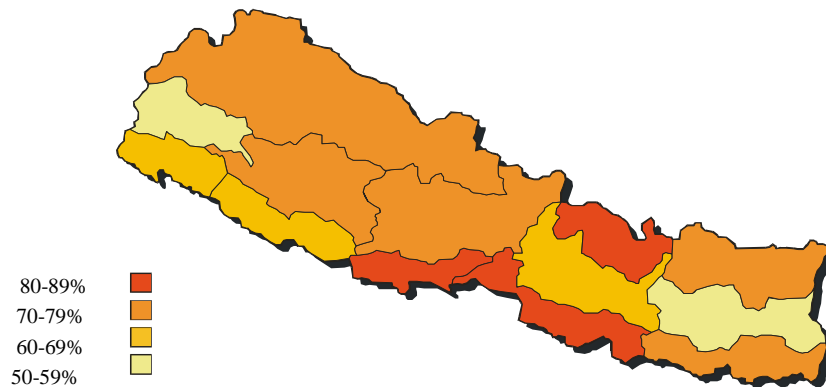
Survey	Year	Age Group	Prevalence of anaemia %	HB cutoff g/dl
Anaemia of pregnancy Kathmandu	1972	Pregnant women	33	<11
National Nutrition Survey	1975	6-23 months	20	<10
		24-71 months	26	<11
Joint Nutrition Support Programme (JNSP)	1986	Mothers of children 3-36 months	71-95	<12
Adolescent Study	1994	Adolescents	47	<11
NNIPS	1997	Pregnant women	71	<10.9
		Lactating mothers	82	<11.9
		Infants (3 months)	58	<10.9
Nepal Micronutrient Status Survey (NMSS)	1998	6-23 months	87-90	<10.9
		48-59 months	59.3	<10.9
		Pregnant women	76.5	<10.9
		Nonpregnant women	68.6	<11.9

In 1998, the National Micronutrient Status Survey (MNSS) provided updated figures on the magnitude and distribution of the problem, highlighting that anemia was throughout the country, both in children and women. The survey reported an overall anaemia prevalence of 68% among

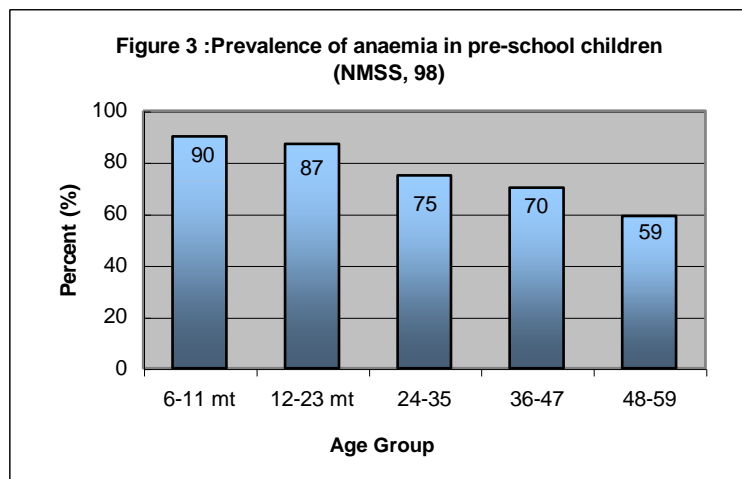


women. The prevalence of anaemia among pregnant women was even higher at 75%. The survey also reported that 5.7% of pregnant women suffered from severe anaemia (Hb < 7 g/dl), about three times higher than non-pregnant women. The overall prevalence of anaemia among pregnant women was highest in the Terai, particularly in the central and western Terai, while the prevalence was lowest in the Hills [Fig.2].

**Fig.2: Anaemia among Pregnant Women (NMSS)**



The survey also reports a 78% prevalence of anaemia among pre-school children. Nearly all children between 6-12 months were anaemic (90%), which indicated that they were born with very low iron stores due to the poor iron status of the mother, and also suggested low iron content in complementary foods consumed [Fig.3].



The problem of anaemia in preschool children cannot be left ignored, and there is a need to identify effective mechanisms to address the high prevalence in children. The alarming rate of anaemia in this age group is extremely concerning because this period is most critical for physical as well as mental growth. The severe implications and magnitude of the deficiency strongly warrants an urgent need to develop appropriate interventions that may address this problem. In order to do this, it is first essential to understand the major factors associated with anemia among young children and how these factors vary in different areas of the country

### **3 Etiology of anemia**

The etiology of anaemia is complex with multiple interacting causes. While an inadequate consumption of iron rich foods and bioavailable iron is the primary cause of iron deficiency anaemia, inappropriate dietary practices that affect the absorption of iron from the food also contributes towards iron deficiency. Other causes of anaemia include parasitic infestations such as hookworms, physiologic demands of pregnancy and rapid growth, Malaria, Kala-azar, chronic infections and other nutritional deficiencies (vitamin A, C, B-12 and folate) [Appendix 2,3].

In the following section, existing information on etiology of anemia in Nepal is presented:

#### **3.1. Dietary intake**

It is well known that the most common cause of anemia is iron deficiency due to inadequate dietary iron intake. Indeed in Nepal, the diet is low both in iron content and bioavailability. This is mainly due to low consumption of animal products which is the main source of heme-iron, and partly due to the intake of food that inhibits absorption of iron including phytates present in cereals and tannins in tea – both of which are widely consumed in Nepal.

The bulk of the Nepali diet in the hill/mountain areas consist primarily of cereals, which contains little iron, but does have a high phytate content. Phytates are substances in food, which inhibit the absorption of dietary iron. According to a study conducted by WFP/WHO in Dadeldura and Doti districts, the majority of the population receives over 85% of their calories from grain products.

In a recently conducted controlled study, the hemoglobin levels of pregnant women who consumed meat products (meat, fish, egg) were compared with women who only consumed vegetables during pregnancy. There was only 10% incidence of anaemia in the pregnant women who consumed meat products, whereas 90% of those who did not consume meat products were anaemic [58].

Consuming meat products as part of a meal is rare for most Nepali women. A study conducted by NIPPS on cultural factors, caloric intake and micronutrient sufficiency in rural Nepali households found that staple food items are distributed fairly equally among men and women. The study also noted that side dishes containing a higher proportion of micronutrients (meat and vegetable, meat, yogurt, ghee) were often allocated to adult males and small children [20].

Previous analysis of the NMSS data showed that the vitamin A intake from the diet is very low. For instance, the current diet of Nepali women only met half of the required daily allowance of vitamin A.

To quantify the actual intake of iron from diet in women and pre-school children in Nepal, MI analyzed data from the NMSS survey in 2001. The median crude estimate of iron intake was around 33 mg per day for women, 30 mg per day for pregnant women, 34 mg per day for lactating women and 9 mg per day among the preschool children. Only 16.5 percent women and 13.7 percent preschool children consume heme iron in their diet. Based on this level of crude iron intake an assessment was carried out with reference to the Recommended Dietary Allowances for different groups of women and preschool children. 71 percent of the pregnant women and 68 percent of the preschool children were found not meeting their RDA. Not surprisingly 88 percent of the infants (6-12 months) were found not meeting their RDA of 10 mg iron per day [44].

It has been long known that food itself cannot prevent or correct anaemia during pregnancy, especially in a country like Nepal where the general population has low access or intake of animal products as obvious from the above studies. Though green leafy vegetables contain some iron, it is poorly absorbed and cannot meet the increased requirement during pregnancy and also during

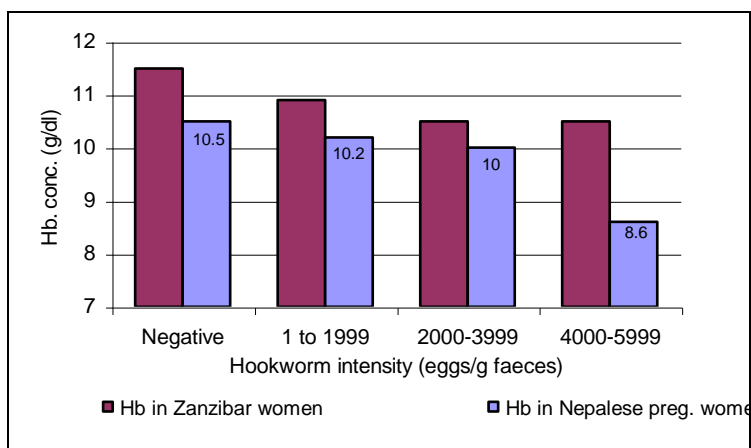
the early years of life. The lack of regular consumption of meat products in Nepal is predominately for economic reasons, but also has a cultural basis.

The findings presented in this section strongly support the notion that, at present, dietary diversification or promotion of iron rich foods alone, cannot solve the problem of anemia in Nepal. Acceptance and acknowledgement of this fact is extremely important at all levels, from the policy makers to health workers to communities themselves.

### 3.2. Parasitic infestations

It is well established that intestinal parasitic worms cause anaemia, particularly hookworm infection (*Ancylostoma duodenale*). Hookworm infection is the major contributor to anaemia in pregnancy and is known to be associated with high maternal morbidity and mortality. Hookworm in particular is a significant contributor to iron loss, as they feed on blood in the intestinal mucosa [Fig.4]. Depending upon the burden of worms, a pregnant woman infested with hookworm could lose 2-10 ml of blood per day [51].

**Fig. 4: Correlation between haemoglobin concentration and intensity of hookworm infection**



A survey conducted in June 1996 by WHO/WFP to assess the prevalence of helminth infection in three districts found 74% school-aged children infected with one or more of three parasites: hookworms, roundworms and whipworms. The prevalence of hookworms was greatest at 65%, followed by roundworm (21%) and whipworm (19%) [58].

A study carried out among pregnant women in 1996 in Sarlahi District in the Terai demonstrated that hookworm infection is endemic among pregnant women. Overall, 90% of the pregnant women were infested with worms. The prevalence of hookworm infection among pregnant women was 78.8%. Roundworms and whipworms were prevalent in the specimens of 56.2% and 7.9% of the women, respectively [14].

**Table 4: Comparison of helminth prevalence rates [21,48,50,51]**

Studies	Districts	Roundworm prevalence	Whipworm prevalence	Hookworm prevalence

	<b>studied</b>			
<b>1996 WHO/WFP study</b> 711 school children	Parsa, Surkhet & Dailekh	22%	19%	65%
<b>1998 JICA study</b> 1905 school children	Kavrepalanchowk	43%	5%	9%
<b>1996 NNIPS study</b> 292 pregnant women	Sarlahi	56%	8%	79 %
<b>1998 NNIPS study</b> 129 infants	Sarlahi	0.8%	0	0.8%

Another study conducted in 1997 in Sarlahi District, found that hookworms, malaria and Vit. A deficiency contributes to Anaemia and Iron Deficiency among pregnant women. Eighty-eight percent of cases of anemia were associated with iron deficiency. More than half of the women with iron deficiency (54.2%) also had a low serum retinol concentration ( $<1.05 \mu\text{mol/L}$ ), 74.2% were infected with hookworms and 19.8% had Malaria [14]. Hookworm infection intensity was the strongest predictor of iron status, especially of depleted iron stores. Low serum retinol was most strongly associated with mild anaemia, whereas Malaria and hookworm infection intensity were stronger predictors of moderate to severe anaemia [16].

There have been major efforts to address the problem of worm infestation in children in Nepal, most recently through the biannual deworming of children, 2-5 years of age during the national vitamin A capsule distribution days. Deworming of primary school children is going on in two districts (Surkhet, Dailech) as part of WFP's school feeding programme. It was started in response to epidemiological data from 1996, which found a high prevalence (74.2%) of worms in these school children. Albendazole is administered once a year to schoolchildren. Incidence of heavy infection has reduced to one fourth (from 9% to 1.4%), along with a significant decrease in the percentage of severe anemia in these districts [58].

Where hookworms are endemic or anaemia is highly prevalent, anthelmintic treatment is recommended for pregnant women. WHO, UNICEF and International Nutritional Anaemia Consultative Group (INACG) recommends a single dose treatment after the completion of the first trimester with one of the following four drugs: Albendazole 400 mg, Mebendazole 500 mg, Levamisole and Pyrantel. *However, no drug should be given in the first trimester.*

A study conducted in Sarlahi shows the attributable risk of iron deficiency anaemia and moderate to severe anaemia due to hookworm infection in pregnant women is 29% and 41% respectively [51].

**Table 5: Proportions of Anaemia Attributable to Hookworm Infection in Different Population Groups [28]**

<b>Population Group</b>	<b>Iron Deficiency Anaemia</b>	<b>Mod. to Severe Anaemia</b>
Zanzibari nonpregnant women	19%	56%
Nepalese pregnant women	29%	41%

The above table shows that reduction of hookworm burden will make a big impact on the prevalence of iron deficiency anaemia, especially moderate to severe anaemia in these groups. About one third of anaemia could be prevented with the treatment of hookworm infection.

Deworming during pregnancy benefits both the mother and fetus. It not only improves overall nutritional status of the mother but it also reduces the risk of maternal death during delivery and peri-natal period by lowering the risk of severe anaemia and haemorrhage [11]. Furthermore, various studies have shown that deworming enhances the response of iron supplementation during pregnancy. For instance, a study carried out in Sri Lanka showed that increases in hemoglobin concentration and iron status is significantly higher in pregnant women who had taken a deworming drug along with iron supplements compared to women who only received the supplements [11]

The Sri Lanka study also documented that deworming during pregnancy does not increase the risk of birth defects in infants. Pregnant women in Sri Lanka have been receiving anti-helminth drugs after the completion of the first trimester of their pregnancy since 1984. The study compared the rates of major congenital defects among babies of mothers who were dewormed during pregnancy with mothers who had not received the treatment. The study found no significant difference in the rate of birth defects between the treatment (1.8%) and control (1.5%) group, not even in mothers who had taken the drug in the first trimester. In fact there was decreased incidence of stillbirths, perinatal deaths and low birth weight infants of mothers who had taken the anti-helminthic drug [11].

The above findings justify a need for deworming after the first trimester of pregnancy. The Nutrition Section is currently in the process of formulating a policy that will allow for the administration of a single dose of albendazole 400mg to pregnant women after the completion of the first trimester. The priority for deworming should be among pregnant women and school-aged children along with the women of reproductive age.

### **3.3. Vitamin A**

The dietary intake of vitamin A increases iron absorption up to twofold for rice, 1.8-fold for wheat and 1.4-fold for corn. Carotene increases iron absorption more than threefold for rice and 1.8-fold for wheat and corn, suggesting that both compounds prevents the inhibitory effect of phytates on iron absorption [15].

A study (1994-1997) in Sarlahi District, found that Vit. A deficiency is strongly associated with anaemia and Iron Deficiency among pregnant women, suggesting that vitamin A deficiency decreases hemoglobin synthesis leading to anaemia [14]. Vitamin A Deficiency also depresses haemoglobin response to iron supplementation by about 30% according to a study done on iron deficient, lactating women in Indonesia [40].

A randomized controlled trial was conducted to study the effects of dietary supplements containing various nutrients on anemia, weight and height in 136 anemic school children in Tanzania. The main outcomes being investigated were anemia and anthropometric indices of anaemic school children. There were four interventions groups including: vitamin A alone, iron alone, iron combined with vitamin A, and a placebo, each administered for 3 months. The group of children who received combined vitamin A and iron supplementation had the greatest improvements in all indicators compared with placebo and those who received only iron supplements [36]. Another randomized placebo controlled trial of vitamin A and iron supplement among pregnant Indonesian women found that daily low dose of vitamin A supplementation significantly increased the haemoglobin concentration and reduced the prevalence of anaemia by 23%. Among women who received both vitamin A and iron, the positive effect on haemoglobin was nearly 100% [52]. Suharno et al (1992) [52], Ahmed et al (1996) [2] and Dreyfuss et al (1997) [14] found 4-10 g/l increases in hemoglobin associated with a 1 µmol/L increase in serum retinal concentration. Finally, according to a large-scale study in Nepal low dose vitamin A supplements reduced pregnancy-related deaths by an average of 44 per cent among women in areas where VA deficiency is widespread [57].

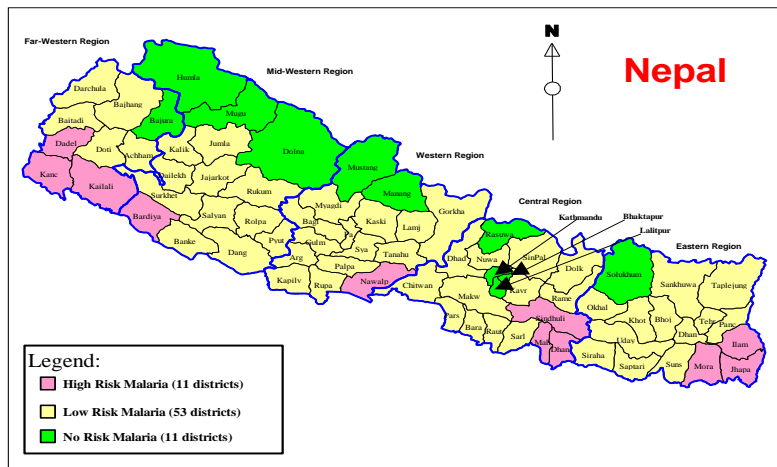
Though there is a lack of large-scale studies, these smaller trials in Nepal and other countries show that Vitamin A deficiency is associated with anaemia. In turn, it may be reasonable to assume that any supplementation regimen during pregnancy that includes both iron and vitamin A will benefit the health and nutritional status of women and infants, and reduce the risk of anaemia.

### 3.4. Malaria

A recent study in Sarlahi District assessed the prevalence and severity of anemia and iron deficiency and their association with helminths, malaria and vitamin A deficiency among pregnant women. Eighty-eight percent of cases of anemia (73%) were associated with iron deficiency. However 45% of non-iron deficient women were anaemic, suggesting that there were other causes of anaemia present in this population. In fact, 20% of the anemic women without iron deficiency, had malaria, which is a strong predictor of moderate to severe anemia in malaria endemic areas [14].

Malaria in its various forms has been the cause of mortality in Nepal through out the ages. Malaria increases the prevalence of anemia and worsens its severity through two major routes. First, and most importantly, it causes a hemolytic anemia that leads to less iron in the hemoglobin mass and second, as with chronic infections, it is associated with impairment in the release of iron from reticulendothelial stores. The increased red cell turnover may bring about folate deficiency, especially during pregnancy when folate requirements are already high [16]. In areas with endemic malaria, the destruction of red blood cells (hemolysis) and the disrupted process of red cell production due to malarial infection may contribute more to maternal anaemia prevalence than dietary determinants.

**Fig.5 Malaria risk areas in Nepal ( MoH)**



Out of 75 districts in Nepal, 90% of the districts are considered high-risk for malaria [3]. According to the 1999 Annual Assessment of Malaria, 9,707 of the population living in high-risk areas (15,879,497) were found to be infected with malaria [HMG, *Epidemiology, Annual report*]. Taking into account only the reported figures (from the governmental health centers) the annual parasite incidence was estimated to be 0.56 cases per thousand. This was thought to be only the tip of an iceberg. Majority of the privately treated cases are not recorded. Annual malaria due to Plasmodium falciparum incidence was less than 0.1 case per thousand. The highest incidence was found in the East and Central regions [Fig.5].

The first documented epidemiological survey of malaria dates back to 1925, and was carried out by Major Phillips in Makwanpur and Chitwan valley [26]. Out of 889 children examined, 712 or 80% had enlarged spleen. The mortality rate (malaria case fatality?) in children was about 43% among hill people and 17% among Terai people. Until the time of the study, it was estimated that 40% of the total population was annually affected by malaria and 10-15% resulted in death.

The National Malaria Eradication Programme (NMEP) was launched as a vertical programme in 1958 with the objective of eradicating the disease. Remarkable progress was achieved by NMEP in the beginning. However, in the early seventies, it suffered a setback due to various problems (technical, financial, logistic etc) and the malaria situation deteriorated. The original goal to eradicate malaria through this ten-year phased programme was not possible and, an alternative, malaria control strategy (as recommended by WHO) was adopted in 1978. There was a massive epidemic in 1985 to 1988. In all the years the cases were well above 15,000 annually escalating to as high as 42,321 in 1985. There have also been periodic malaria outbreaks in the early 1990's. With continued indoor residual spraying with ICON (Insecticide lambda-cyhalothrin), the cases were decreased to 9700 by 1995.

The present policy for prevention and treatment of malaria is to provide anti-malaria services at the community level free of cost, through the existing network of Sub-Health Posts (SHP), Health Posts (HP), Primary Health Clinic (PHC), District Public Health Offices (DPHO) and Hospitals by adopting Primary Health Care approach. Malaria control programme is carried out in the 64 districts (out of 75), which are malaria endemic.

Female community health volunteers (FCHVs) are trained to refer the suspected cases to the nearest S/HP where they are given presumptive treatment of antimalarial drugs (Chloroquine). Their blood sample is then sent to the district health office, where a vector control assistant examines the slides. If the slide comes out positive then the full course of treatment is given, otherwise the treatment is stopped.

Emphasis is given to develop and strengthen the capacity of the health care system for early diagnosis and prompt treatment (EDPT) of malaria cases. Preventive measures like vector control with continuous indoor residual spraying (ICON, deltamethrin) in the epidemic prone areas is also being done. Insecticide (Deltamethrin) impregnated bed nets are being tested in Deupur and Mahadevsthan. The objective of this study was to demonstrate the impact of the insecticide-impregnated bed nets on control of malaria [26].

Until 1993, there had been Passive Case Detection Volunteers (PCDV) who had been trained by the DPHOs. They collected the blood slides from the fever cases, administered treatment and imparted malaria education to the patients and the community. There were altogether about 5000 such malaria volunteers in all the malarious districts. The PCDV mechanism could not be sustained due to many internal problems, but mainly due to lack of recognition.

Recently Ministry of Health, Epidemiology and Diseases Control Division along with Environmental health project (USAID funded) has started the roll back malaria incidence (RBMI) project in three districts- Jhapa, Dhanusa and Kanchanpur. This approach had successfully reduced malaria deaths by 97% and malaria cases by 59% within a few years in Vietnam. The main objective on RBM is to reduce malaria mortality by 90% in high P. falciparum prevalent areas and to reduce morbidity by 50% by the year 2005. Training is being given to all the FCHVs in these districts (~666 FCHVs) along with the other health workers, teachers, students in the PHC. It is felt that the FCHVs will be able to distribute presumptive antimalarial treatment (chloroquine) after the 7-day training. The village health workers (VHWs) will be able to collect the blood specimen slides and take it to the PHC or DPHO for examination [23].

In view of malaria being a contributory cause of anaemia, being particularly pronounced during pregnancy, routine screening for malaria of all pregnant women attending antenatal clinics in

highly endemic areas should be done. Antimalarial chemoprophylaxis with sulfadoxine / pyrimethamine (SP) during pregnancy of *P. falciparum* may also reduce the malaria induced severe anaemia [6]. Distribution of bed nets and if possible insecticide impregnated bed nets will reduce the malaria incidence rate especially in the children. Laboratory facilities in malaria endemic areas should be strengthened to facilitate routine screening procedures and follow up of cases.

### **3.5. Visceral Leishmaniasis (Kala-azar)**

Visceral Leishmaniasis (VL) also termed, “Kala-azar” has long been known to be endemic in the Terai region. This is a chronic disease caused by an intracellular protozoan. It is characterized by fever, hepatosplenomegaly, progressive emaciation and weakness, and is implicated as a major cause of severe anemia in Nepal. Approximately 5.5 million people are estimated to be at risk of VL. It is mainly confined to the southern plains of Eastern and Central regions (12 districts) bordering VL endemic districts of Bihar State of India. There is no distinct transmission season like in malaria for VL.

The incidence of VL in 1995 was 42.13 per 100,000 people living in high-risk areas. The case fatality rate (CFR) in the treated patients ranges from 0.23% to 13.6%. If untreated 75% of the sick will die. A total of 15,758 cases with 402 deaths were reported during 1980-1999. These figures do not represent the actual VL situation of the country as these cases are reported from the hospital records (government) and patients treated elsewhere are not included. Therefore it is believed that VL in Nepal is grossly under reported disease. In 1997, 12 districts reported 1342 cases with 36 deaths and in 1998, 1409 cases with 42 deaths. In 1999 alone, 1,794 cases were recorded in the country from 12 district hospitals with seven districts reporting deaths due to VL. The VL cases are diagnosed on the basis of clinical signs and symptoms supported by tests (aldehyde) in the hospital. The highest VL incidence was in Saptari district (100/100,000) whereas lowest was in Rautahat district (5.75/100,000). The highest case fatality rate (CFR) was in Bara (9.5%) followed by Parsa (8.3%) and Morang (7.4%) in 1999. In other districts the reported deaths (CFR) was below 2.5%. Age group-wise distribution of VL cases showed 66.6% among 15 years and above age groups, 15.7% among 10-14 years, 12.9% among 5-9%, 4.4% among 1-4 years and 0.35% among infants [49].

A target has been set for the reduction of Kala-azar incidence by 50% by 2001. The policies and implementation strategies for achieving this target are early diagnosis and prompt treatment of the cases freely. In addition, the protection of the 'at risk population' with indoor residual spraying with ICON, started in 1992 is another preventive measures taken up by the MoH. In 1999 approximately 0.5 million population in 10 districts of Central and Eastern regions were protected by ICON spraying.

Since Kala-azar is a significant cause of severe anaemia, routine screening of pregnant women along with residual indoor spraying in endemic regions should be carried out.

### **3.6. Other nutritional deficiencies**

Folic acid is a B vitamin that helps in the formation of red blood cells. Folate also regulates the nerve cells at the embryonic and foetal stages of development, helping to prevent serious neural-tube defects of the spinal cord and brain. Folate deficiency contributes to anaemia, especially in pregnant and lactating women, and may be associated with increased risk of maternal death and illness. Folate deficiency causes birth defects in the developing foetus during the earliest weeks of pregnancy- before most women are aware that they are pregnant. It is also associated with a high risk of pre-term delivery and low birth weight [55]. In most dietary supplements, folic acid is provided in addition to iron and other nutrients.



### **3.7. Conclusion:**

The above findings reinforce the complex aetiology of anaemia and the need for comprehensive programs that are designed to address the specific factors that contribute to anemia in different regions of the country. For example, interventions which aim to reduce the prevalence of hookworm and malaria infections may be necessary in addition to providing iron and vitamin A supplements to effectively control anaemia. Treatment of hookworm infection and prevention of reinfection have been shown to decrease iron loss, and thus complement iron replenishment strategies. An intervention focusing on a single nutrient may not be effective if other nutrient deficiencies exist.

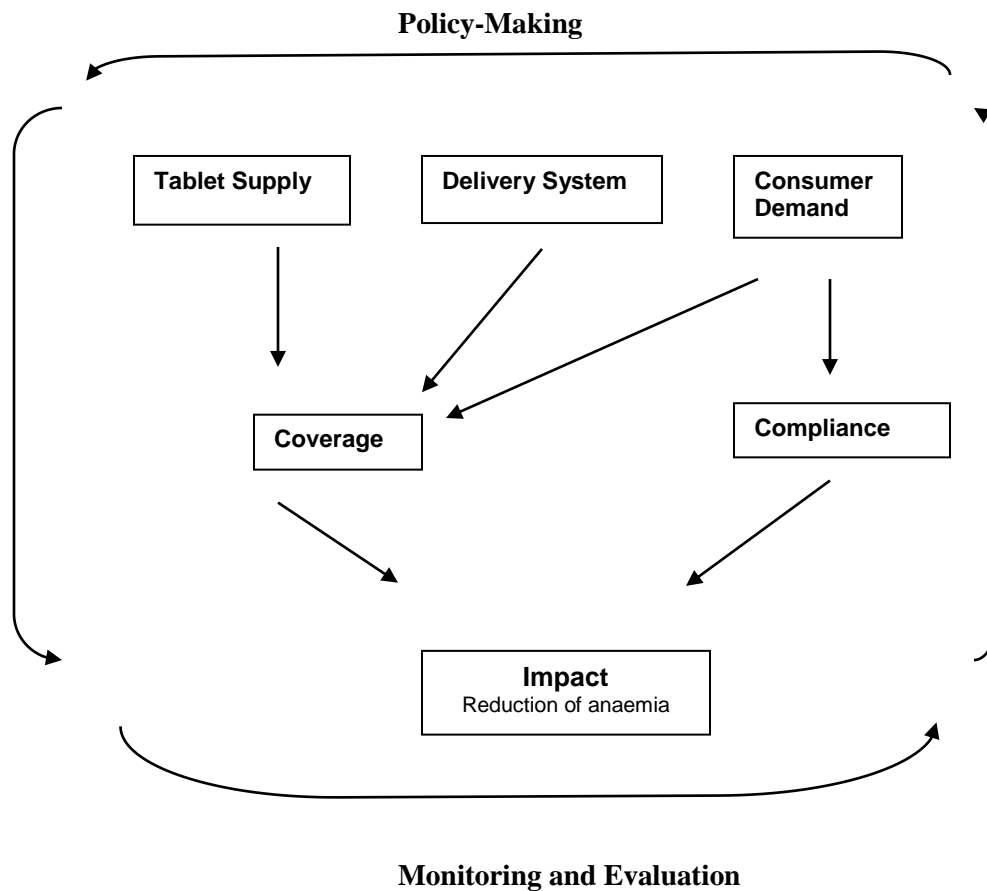
Although vertical programs are in place to address malaria, hookworm and micronutrient malnutrition independently of one another, it may be useful to consider more integrated approaches that will lead to more cost-effective control of multiple health problems. One of the problems with anemia control programs in the past is that they have not been effective in many countries. However, this is in part due to constraints in the implementation of iron supplementation due to poor supply and low demand. But a major constraint has been the fact that anemia control is often considered to be synonymous with iron supplementation and does not address other causes and factors contributing to anemia. In order to be most effective and sustainable, a more comprehensive and integrated approach is required.

#### 4. HMG's iron supplementation programme

Iron supplementation during pregnancy has been the main focus of anemia control in Nepal. For the past two decades, the Ministry of Health has been providing iron tablets to pregnant women through the primary health care system. There have been efforts to raise the awareness about anaemia and iron supplementation through training of health workers of all levels, and various IEC activities such as printing and distribution of IEC materials regarding anaemia and extensive information through media.

Despite the intensive efforts, coverage and compliance of the iron supplementation programme has been extremely poor.

*Figure 6: Elements of Successful Iron Supplemental Programmes*



*(Source: Stoltzfus, R., Dreyfuss, M. 1998)*

There are several factors that are related to iron supplementation success, such as adequate supply of iron tablets, good delivery system, awareness about anaemia and the importance of iron supplementation during pregnancy leading to sustained demand, etc. These factors are integral in leading to improved coverage and compliance of iron supplements, which in turn will lead to a reduction in the prevalence of anaemia.

Polices are needed to provide a formal structure and to establish standard practices for programmes, as well as to identify required resources for the successful implementation of the

programme. In Feb 1999, the Nutrition section of the Child Health Division/MoH organized a multisectoral consultative meeting to identify the key priorities to control anaemia in Nepal and systematize current efforts by various organizations. During the meeting, there was discussion on the existing policies related to the control of anemia.

The meeting affirmed the following as the key priorities:

- Ensure that iron supplements are available at all health facilities at all times
- Increase the access to supplements through community based strategies
- Improve the compliance through establishment of community-based support structures
- Develop & implement comprehensive IEC campaign on anaemia and importance of iron supplementation
- Explore possibilities to address iron deficiency in young children and adolescent girls
- Formulate a policy on deworming during pregnancy

An extensive review was carried out which looked into different policies related to the control of anaemia in Nepal.

#### **4.1. Current policies and guidelines regarding iron supplementation**

According to WHO, UNICEF and the International Nutritional Anaemia Consultative Group (INACG), the global recommendation on iron supplementation for pregnant women is that they should receive and consume daily iron and folate supplements for at least 6 months during pregnancy.

In Nepal, the present policy of Ministry of Health Anaemia Control Programme is that a pregnant woman should start taking iron tablets on a daily basis from the beginning of the second trimester of pregnancy and continue through 45 days postpartum. The programme focuses mainly on the distribution of iron-folate tablets to pregnant women through health facilities. Health workers (health assistants, auxiliary health workers, village health workers, maternal and child health workers etc) from the PHC, HP, SHP and outreach clinics are the only ones who are responsible for the distribution of iron tablets to pregnant women and the community health volunteers such as FCHVs and TBAs are not permitted to carry out the task.

With the realization that the existing programmes for ANS had not been successful, a new strategy was developed in 1995 in which the FCHVs and other front-line workers would undertake the distribution of iron-folate tablet to pregnant women. But to this date there is no policy saying that the FCHVs could distribute iron supplements. So the health workers haven't used them for this purpose.

Outreach clinics had been started 4 years back in a phase wise manner. There are around 3-5 outreach clinics (ORCs) in each VDCs depending on the population. In total there are around 15,000 ORCs in Nepal. They are run every month by maternal and child health workers (MCHWs) or village health workers (VHWs) from the SHP. The date for the ORC is fixed by the management committee, which consists of ward members, teachers, FCHV, TTBA (7-8 member committee). It is run at the same place as the EPI clinic but in different days. At the beginning (4 years back) the government had supplied a kit with basic medications (35 items) for family planning, antenatal care, diarrhoea (ORS), respiratory diseases (ARI) etc. But the kit couldn't be refilled, since the communities rarely paid for the medications and the SHPs couldn't resupply the

necessary medications (iron/folate, ORS, pills, safe delivery kit) to the ORCs since they themselves had insufficient supply. These reasons and more caused the ORCs to be hardly functioning at present. Only around 40% of the ORCs are functional at present. HMG along with UNFPA is on the process of intensifying the support to the ORCs from the year 2002 with reorientation and training to the health workers and the management committees.

A recently conducted study 'Between census household indicator monitoring & evaluation system' (BCHIMES) shows that only 1.9% of pregnant women receive their ANC from the ORCs. The study also point out that 37.3% pregnant women visit an antenatal clinic (ANC) within the first trimester of pregnancy [53]. This shows that the iron supplementation could start earlier than the second trimester or whenever the women come for their first ANC visit, but this would require a modification of the current policy.

There is no policy or guideline at present allowing supplementation of other high risk age groups such as young children, adolescents etc. In 1999, the Nutrition section of the Ministry of Health had initiated an effort to develop a treatment/prevention protocol of iron deficiency anaemia for various age groups, including children and adolescent. However, the protocol is yet to be finalized.

## 4.2. Iron supplementation program and its constraints

### 4.2.1. Tablet supply & utilisation

Adequate supply of iron tablets and effective logistic management of the supply is very critical for the success of any supplementation programme. In many developing countries iron supplementation programmes have failed due to the inability to ensure adequate supply of iron supplements in health facilities, as well as because of improper management of the supply. A regular reporting system of stocks of iron-folate at various levels of the delivery system is very important to ensure that iron tablets are available at all times, in the required quantities.

The Ministry of Health has been providing iron tablets to districts for distribution through the primary health system with the support from various donors such as WHO, KfW (a German project) and UNICEF. The Logistic management (LMIS) system of MoH monitors the stock of iron tablets in district stores [22].

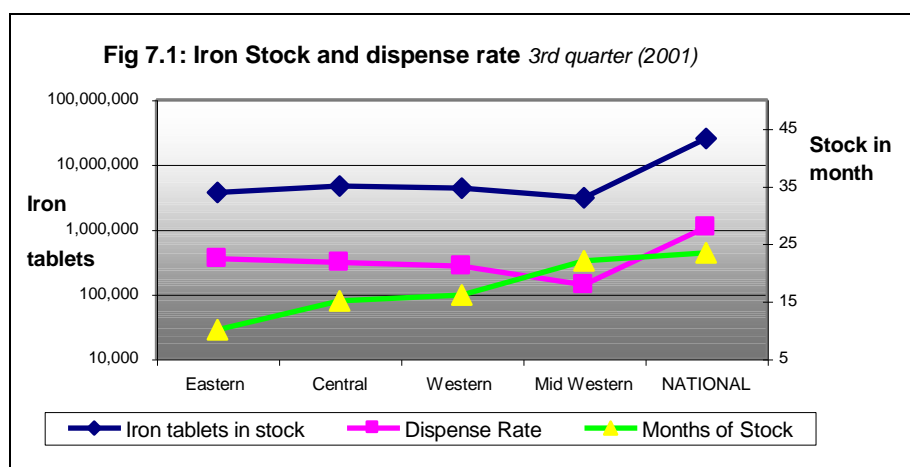
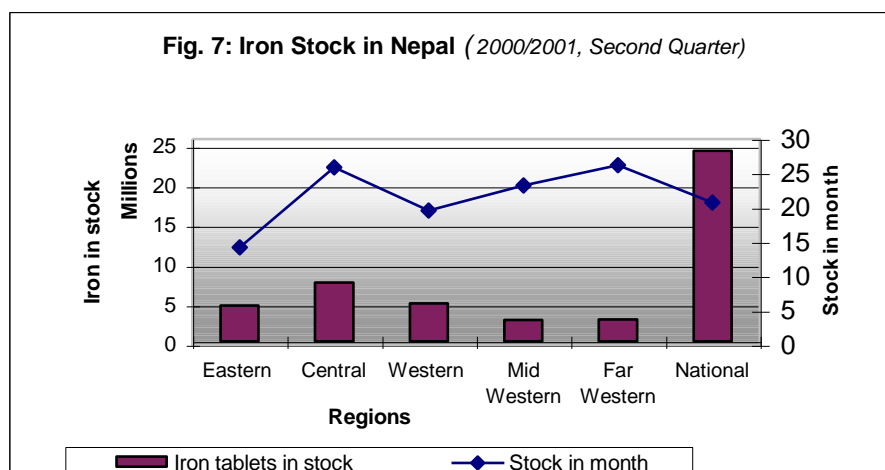
**Table 5: Summary of iron tablets procured/dispensed in the recent years by MoH**

Fiscal Year	Quantity Procured	Total tablets dispensed	Utilisation rate (%)	Donor
1997/1998	6.1 million	4.9 mil	80	WHO
1998/1999	11.5 million	7.3 mil	63	WHO
1999/2000	45 million	9.8 mil.	-	UNICEF
2000/2001		10.2 mil	-	

No data are available about the procurement of iron tablets before 1997. The annual reports of the Department of Health Services (DHS) highlighted that there had been a shortage of iron tablets in the 1980s and in the early 1990s. However, the current LMIS Feedback Report for Nutrition program report indicates that the supply of iron tablets has not been a constraint in most of the districts recently. In some of the districts there is no stock, while in other districts there are

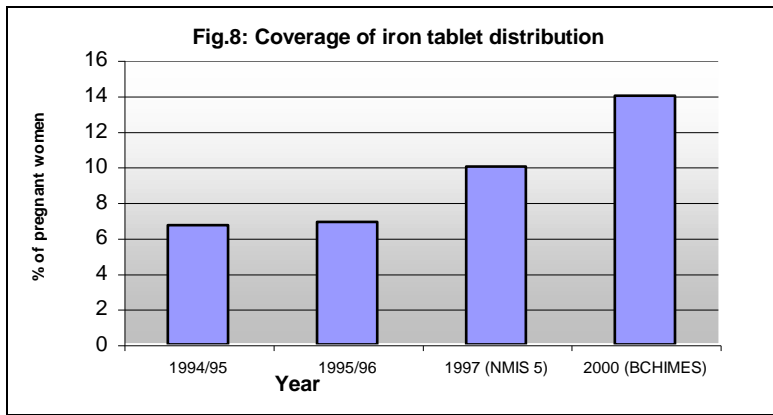
adequate supplies for the next 3 years. Furthermore, the 5<sup>th</sup> Nepal Multiple Indicator Cluster Survey (NMIS), found that more than 80% of the primary health facilities had adequate supply of iron tablets, confirming that supply of iron tablets is not the constraint to the supplementation at present [30].

According to the latest LMIS data, there are enough iron tablets to last another two years in most of the district stores (Figure 7). In 1999, 45 million tablets were procured for the supplementation programme with an aim to provide at least 30% of the expected pregnant women with 225 tablets (as per the recommended daily dose from the 2<sup>nd</sup> trimester through 45 days postpartum).



The above figures show that the dispense rate has not been adequate and there is still enough stock of iron/folate in the regions to last at least 24 months. From the 45 million tablets which have been procured in 1999, only half of it have been utilized until now.

The MoH annual reports and surveys such as NMIS 5 and BCHIMES indeed show that the coverage of iron supplementation hasn't improved much even though there are enough iron tablets in the district stores.



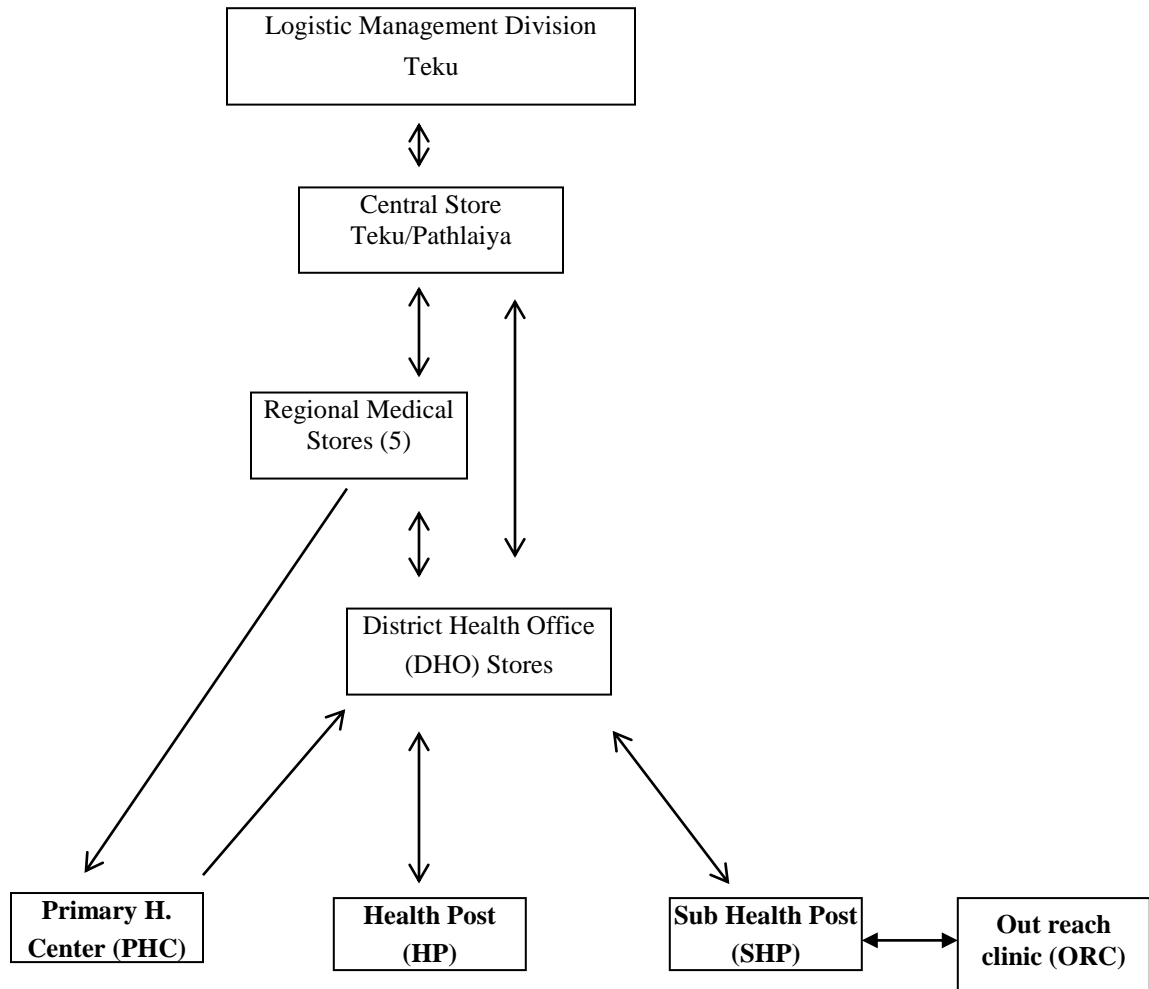
Among those 10% pregnant women who received these tablets, only 2% took them for more than three months and the rest (6.8%) took them for one to three months [30].

Numerous studies have shown that there is little demand or utilisation of iron tablets by the community from the government health facilities. A recently conducted study to assess the Knowledge, Attitudes and Practices (KAP) of mothers on anaemia and iron supplementation during pregnancy in Parsa district found that only 45% of the pregnant women who took iron tablets during pregnancy, got it from the Health Posts /Sub Health Posts. The rest bought it from the local stores [54].

In Nepal, a lack of adequate supply of iron tablets has often been blamed for the failure of the supplementation programme. While lack of adequate supply of iron tablets could have been a problem in the past, the review of LMIS reports and other government documents show that this is not the case in the recent years. Rather, it is likely a lack of awareness of the problem and a corresponding lack of demand and accessibility that seems to be the more significant obstacle. The service providers themselves are not fully aware of anaemia and the need for iron/folate tablets. The person/s in charge of the health institution and those in the regional office should be more active on this matter.

#### 4.2.2. Delivery system and monitoring

Fig. 8: Description of tablet distribution and monitoring mechanism in Nepal



Iron tablets are supplied to the districts from the Central stores based on allocation requests from the districts to the Child Health Division, Ministry of Health. Once the supplements arrive in the DHO, they are dispatched to the Health Post (HP), and Sub Health Post (SHP) etc. Primary Health Center (PHC) gets the supply directly from the Regional Stores. The MCHW from the SHP conduct the ORCs once every month in 3-5 places in one VDC. The VDCs, which have PHC or HP, don't conduct ORC, since there are no MCHWs there.

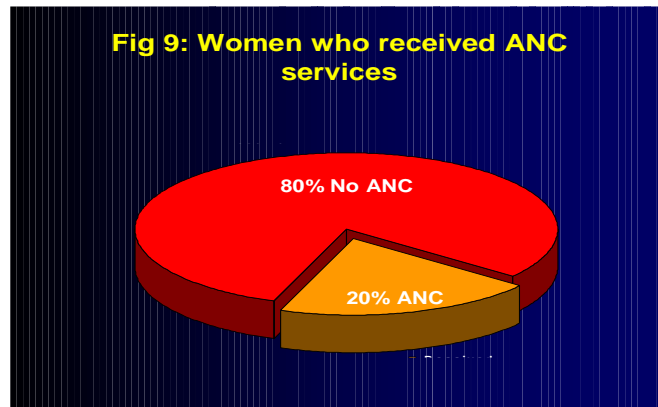
A reporting system is in place, which follows the flow and supply of supplements in the opposite direction. That is, SHPs, HPs and also the PCH send monthly reports to the District Health Offices, from where they are sent to the Logistic Management Section, Teku, Kathmandu, for compilation and further planning. There is as yet no reporting done from the ORCs.

#### The principle problems and constraints faced in the iron supplementation program are:

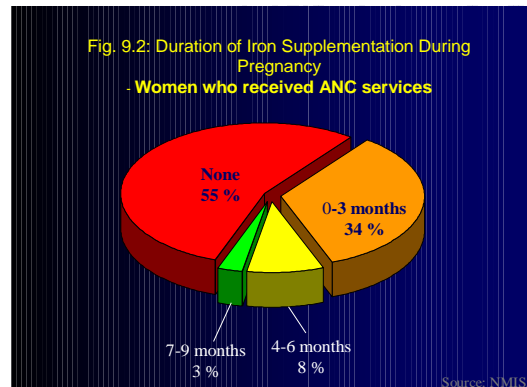
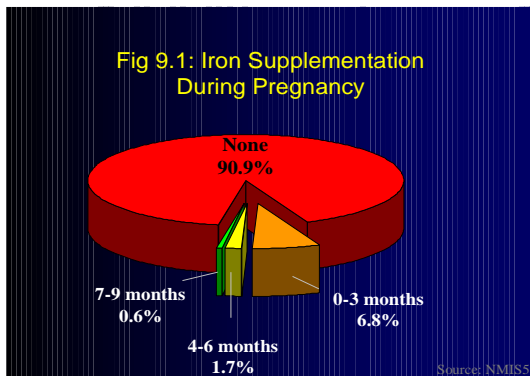
- logistics of supply for iron supplementation programs
- delivery and distribution of iron supplements
- community participation and awareness
- limitations in quality and quantity of nutrition personnel at community level

### 4.2.3. Coverage and acceptability (demand) of iron supplementation programme

There has been little improvement in the coverage and adherence of the iron supplementation programme since it started. NMIS-5 reports that 20% of the pregnant women received antenatal care (ANC) in 1997, and among these, less than half received iron supplements.



That is, of every 100 pregnant women, only 20 received any ANC and only 10 received any iron supplements, while only 1 woman took the supplements as per the recommendation.



According to a more recent survey (2000), the coverage for the supplementation activity has not improved very much.

There are several factors that affect the coverage of the supplementation programme. The poor coverage and adherence of the programme could be due to the poor access to quality health services, lack of knowledge about anaemia and the importance of iron tablets during pregnancy and inability of health workers to provide good counseling etc. At present, in Nepal, community health volunteers are not allowed to distribute iron tablets to the mothers. In the following section, the existing situation of some of the key factors affecting iron supplementation programme is analyzed, and clearly distinguish between issues of supply (availability) and demand.

### 4.2.4 Access to iron supplements

Demand and use of iron tablets is highly dependent on how easily they are accessible. The Sub-Health Post is the closest government health facility currently responsible for providing iron tablets to the community. However, the SHP is not easily accessible in all areas of the country, in particular in the Mountains since there is only one SHP serving nine wards. The BCHIMES study (2000) showed that it takes an average of 2 to 3 hours for pregnant women to reach the nearest



government health post, which is typically the SHP. 67% of women who went for ANC services needed one hour or more to reach a health institution for ANC services and 10% needed more than 3 hours to reach the nearest health institution.

Households in the communities where the nearest health facility is less than two hours journey away are more likely to have used government health services according to the NMIS-5 survey. Apart from the distance, other reasons for not using the government facilities were that most of the patients do not receive all medicines needed for treatment of illnesses, health workers are not always present in their posts, and if present they are not well mannered or well trained. Most of the people (83%) visiting a government health facility reported waiting one hour or more before seeing a health worker if fortunate, while others reported having to visit 2-3 times before being seen [30].

While the government health system remains the primary delivery mechanism for iron tablets, other alternatives to make iron tablets more easily accessible to pregnant women should be considered, such as through outreach programme and immunisation clinics. In addition, distribution through community health volunteers such as FCHVs and TBA should also be explored provided they receive support from local government or organisations.

In small-scale operational research studies, the distribution of antenatal supplements through community health volunteers FCHVs and TBAs improved coverage and acceptance significantly. The coverage of iron supplements increased from 8% to 76% and compliance to 80% when FCHVs were allowed to advocate and distribute iron tablets in Sunsari and Dhankuta districts (HKI Preliminary report reference). Most of the pregnant women consumed the tablets regularly when counseled about anemia and were made aware of the importance of iron for the mother and fetus [28].

Similar results were seen in a study conducted in 1994 by WHO. The study was carried out in 3 urban districts among 200 pregnant women, 20-28 weeks of gestation to find out the proper instruments to increase the iron tablet compliance in them through existing health infrastructures. Blood and stool checked showed that more than 65% and 56% pregnant women were anaemic and had worms respectively. The study utilized the community health volunteers (CHVs e.g. FCHVs) for home delivery of the iron supplements as the main strategy. Informal interviews, focus group discussion and observations were used to obtain information. Most of the pregnant women preferred getting iron supplementation through a community health volunteer (94%) rather than from a health post so that they don't have to waste time going to health posts. Baseline, midline and end line data (after 2 years) showed that the compliance had increased from 20% to 86% after the home delivery through CHV, because of the counseling and improved competence of CHVs and the popularity of the good outcome of pregnancy observed by the community people themselves. Consequently the number of pregnant women visiting HP for iron supplements also increased especially after the TT was given together with the iron supplement [8].

In addition, studies in other counties have indicated similar results. For example, a USAID funded Mother-Care project in Indonesia, Bolivia and India have all shown that the coverage and acceptance for antenatal supplementation activities can be greatly enhanced if community health workers are mobilized [35].

Health services provided through non-government organizations (NGO's) are often used more frequently than government services since they are usually more easily accessible according to a national survey of health service utilisation [30,54]. Furthermore, the private sector, particularly local clinics have tremendous outreach and service demand and could be mobilised for antenatal supplementation promotion or supply because they are often located right within the community.

#### 4.2.5 Quality and dispensing of iron supplements

In recent years, two types of iron tablets have been procured for the supplementation programme in Nepal, Adrion (60 mg of ferrous sulphate + folate, which comes supplied in a plastic bottle of 250 tablets), and UNICEF's 60 mg ferrous sulphate + folate, which is distributed in tin cans of 1000 tablets.

**Iron/folate in bottles of 250 tablets**



Recent cost data from UNICEF Supply Division:  
Pack of 1,000, US\$ 1.81, unit cost = US\$ 0.0018

The Parsa KAP study [31] confirmed that pregnant women often have small quantity of tablets provided in paper at a single time. More than one third of the health workers interviewed in the study reported that they give less than 30 tablets per visit and hardly few dispense tablets enough for two or more months. Mothers reported that they would prefer to have tablets dispensed in a bottle, mainly plastic, because it is easy to carry and store (and would likely lead to better preservation and integrity of the tablet).

**Iron Tablets packed in a paper**



**Change of color due to moisture**



The type, packaging, and presentation are very important factors that influence the acceptability of iron supplements. Various operational research projects, including the ANS study have shown that the acceptability of iron tablets can be greatly increased by packaging it in an attractive fashion. In the ANS, the supplements were provided in blister packs in an attractive cover. The women were very impressed with the packaging and felt enticed to take it.

**Blister packed supplements**



To increase the acceptability of iron tablets, packaging of iron tablets in small containers or blister packs should be explored. Child Health Division is collaborating closely with some INGOs and NGOs to support the delivery of supplements in bottles with a small quantity of iron. Some INGOs e.g. SCF/US, ADRA, Plan International have recently started to buy plastic bottles for the iron distribution in their programme districts. CARE/ Nepal and GTZ are also in the process of procuring bottles for iron distribution. Efforts should be made to replicate and standardize this practice in other districts with the collaboration of district line agencies such as DDC and local NGOs, as well to execute a cost-analysis to consider the long-term sustainability and economic implications of such a practice.

#### **Low cost plastic containers:**



### **4.3. Current IEC efforts**

There have been extensive IEC efforts to raise awareness about anemia and its prevention, in recent years, the MoH has worked closely with NGOs in the provision of training and orientations to health workers. The National Health Training Center has incorporated anaemia as a component of the training protocol provided to all health workers. Different IEC materials such as posters, flipcharts, manuals, etc. have been printed and distributed to health workers throughout the country. In addition, messages on anaemia during pregnancy have been disseminated through media on a regular basis. Currently a nation wide radio/TV campaign on the importance of iron/folate supplements for the pregnant women is being planned and implemented by HMG/ UNICEF for the whole nation. The message stresses on the need of regular iron/folate supplements during pregnancy.

In spite of these intensive efforts, awareness levels about anaemia and its importance is extremely poor. According to NMSS, fewer than 20% of mothers had ever heard of iron or iron supplements. Less than 10% of them had heard about iron or iron supplementation though radio, which reflects that the messages from the past were not being widely, or effectively disseminated.

The review of the IEC materials and messages indicate that there is more focus on green leafy vegetable than meat products and iron tablets, while very little information is provided about Vitamin C and ways to enhance bioavailability of iron [54]. The fact that some 80% of the mothers and almost all MCHWs stated that nutritious foods like fruits and vegetables need to be consumed to prevent anaemia from previous studies may be a reflection of the messages being promoted as part of the current anemia IEC effort.

Indeed, those IEC materials and messages currently being developed and disseminated have done little to generate awareness about iron and its link with blood and anaemia. The messages aired through the radio in the past have tended to be confusing and misleading since they promote both vegetables as well as iron tablets to prevent anaemia during pregnancy. The problem with this approach is that people don't like to take medicines and prefer food over medicines, where they

are presented with a choice. Mothers who said that vegetables could prevent Iron Deficiency Anaemia were less likely to take iron tablets according to a recent study [54].

In spite of the magnitude of anaemia in the country, it has not received the same attention as other micronutrient deficiencies, including vitamin A and iodine. Anaemia should be prioritized as a specific area of concern in the national nutrition programme and a comprehensive plan needs to be developed, which will include enhanced IEC and advocacy activities. The IEC component of the existing curricula of health personnel should be reviewed and revised. Specific attention should be given to training of all categories of health workers, supervision of IEC activities, and monitoring the quality and effectiveness of IEC activities.

A coordinating mechanism or focal point should be established through which uniform messages for health workers, mothers and families can be developed. Messages should be culturally appropriate and adaptable to meet local situations. Based on this a mass media campaign is being planned and implemented by UNICEF/HMG for the whole nation as radio and TV spots. Furthermore, an IEC strategy, which promotes awareness about iron and its importance, as well as its link to blood, should be developed.

#### **4.4 Knowledge and existing perception about anemia and iron tablets**

KAP studies carried out in the past have shown that the knowledge about anaemia and the importance of iron supplementation is very low among health workers, women and community members. According to the Parsa KAP study, while communities are aware about anaemia as a condition that affects blood, their understanding about its etiology and its prevention during pregnancy is extremely poor. This was also true among health workers. Almost all mothers and health workers believe that consuming vegetables and fruits can prevent anaemia during pregnancy. On the other hand, hardly any mothers were aware about the importance of iron tablets during pregnancy. Only two percent of the mothers interviewed knew that iron supplements could prevent anaemia during pregnancy. Furthermore, only one out of four health workers stated that taking iron tablets could prevent anemia. The same limited awareness of the importance of anemia exists among key health professionals and government officials.

The study also found that very few MCHWs counsel pregnant women about the benefits of iron tablets or encourage them to take it consistently, as per the recommendation, and about the potential side effects of taking iron tablets because they themselves have not received relevant training about anemia and iron supplementation. Some of the MCHWs also stated that they hardly have time to counsel visiting pregnant women [54].

The current perception that the mere consumption of fruits and vegetables can prevent anaemia can be a major constraint to the supplementation programme. Unless this perception is changed and the importance of iron tablets during pregnancy is appreciated, compliance and demand will remain low.

#### **4.5 Efforts to address the problem of anaemia in other age group**

Recently a study was undertaken in Saptari District, to evaluate the feasibility of providing iron supplements to infants and young children by USAID and the International Life Sciences Institute (ILSI). Nonprobability purposive sampling was used to select the study sites and to choose key informants and respondents for the qualitative research. The principle informers were women with young children. Key informants were trained health workers and traditional practitioners in the communities. The research explored behavioral and sociocultural factors that may influence

the acceptability use of iron supplements for infants and children under 5 years of age. The study found that mothers were not aware that iron is an important nutrient for preventing and treating anaemia. Mothers said that anaemia could be prevented with food while health care providers said that iron supplements are only for anaemia treatment (and not prevention). Mothers indicated that a liquid supplement with a sweet and fruity taste would be the most appropriate preparation for young children. When asked about their views about sprinkles, mothers thought that it would be another mode of iron supplementation to their children. All study participants identified female community health volunteers as a reliable and helpful source of health care and thought that they should be entrusted with the task of delivering iron supplements other than the government health posts. Because of mothers' acceptance of the local medical practitioners as good providers of health care, involving local practitioners in the iron supplementation program could be important [48].

As for school children, World Food Program–Nepal (WFP), in collaboration with WHO, has been conducting a Primary School Feeding Programme since 1998. This program combines the provision of small amount of fortified food along with annual deworming. The deworming component was started in response to epidemiological data from 1996, which found a high prevalence (74.2%) of worms in school children in two districts (Surkhet, Dailech) representing two geographic areas (Central and mid Western regions). Albendazole is administered once a year to schoolchildren. Evaluation studies have noted that the incidence of heavy infection was reduced to one fourth (from 9% to 1.4%), and the prevalence decreased from 74.2% to 51% within 2 years of annual deworming. The combination of deworming and provision of fortified food was able to significantly decrease the percentage of the anaemic and most importantly, of the severely anaemic children in these regions [42].

## **5. Models of successful supplementation delivery activities**

### **5.1. Intensification of Antenatal Supplementation program:**

An operational trial to test the effectiveness of bringing antenatal supplementation closer to women was conducted in Dhankuta, a hill district and Sunsari, a terai district of Eastern Nepal in 1999. The female community health volunteers were made responsible for counseling pregnant women on the value of supplementation and distributing the iron tablets during pregnancy.

The FCHVs and the TBAs in the project areas received a four-day training. The training focused on raising awareness of safe motherhood practices, and the implications of anemia and vitamin A deficiency during pregnancy. It included the importance and benefits of taking nutritional supplements during pregnancy, the reduced risk of maternal mortality and the benefits of supplementation to the developing fetus. It also included information on the safety issues of both micronutrients. Training in the management of the supplementation process included registration and supply procedures, enrollment of new pregnant women, and counseling. The TBAs were trained to identify and refer pregnant mothers to the FCHV for enrollment, and to provide education and counseling to the pregnant mother and her family members.

Since the FCHVs were the local resident in each ward majority of pregnant women were able to reach them. They provided information and counseling about the micronutrients and reason for taking antenatal supplements during pregnancy, not only to the pregnant women but also to their families, and other community members. The pregnant women were able to understand the benefits of iron tablets for themselves and their babies and the poster/calendars provided to each of them made it easy for them to remember about the iron intake. Once they began taking the supplements and feeling better, they realized the difference it made in their well-being. As more pregnant women began to talk about the supplements, pregnant women from adjoining VDCs heard about them and approached the FCHVs to enroll.

The FCHVs were required to register the pregnant women in their ward and providing supplements to them. Usually, the FCHV's husband and children assisted them with this task and helped with distributing the supplements when they were not at home.

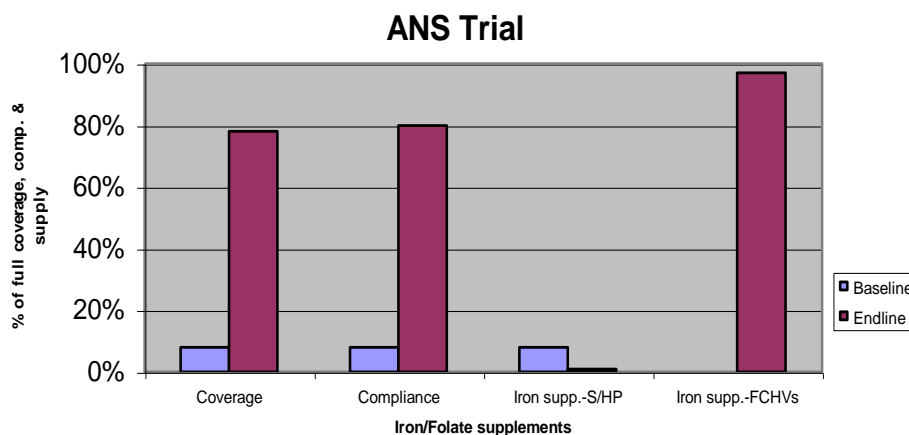
The Nepal Red Cross juniors (NRCJ), a branch of the Nepal Red Cross Society (NRCS) has played an important role in humanitarian service and development activities throughout the country. A NRCS circle is attached to every secondary school. There is usually one secondary school in every VDC. Here the NRCJ were trained to provide support to the FCHVs for completing the enrollment forms and also provide logistical support under the guidance of the teacher leader in each school. Often they were relatives of the FCHV. The volunteers were senior secondary school students. When the NRCJ provided support the intensification programme became more effective.

The IEC was well accepted and good interest was generated in the community with advocacy. Women perceived positive effects, which they described as feeling lighter, energetic, having increased appetite etc. Information about possible side effects encouraged pregnant women to be prepared for any rare discomforts.

The EPI outreach is presently the most institutionalized of the outreach strategies. Women know about it and use it more than any other outreach service. Antenatal care was started in the EPI outreach clinics. This provided a strengthening of support and interaction between the FCHV and the MCHW as the community maternal health service providers, as well as improved access to antenatal care for pregnant women.

Coverage of iron supplementation increased from 8% to 76% and compliance, based on the number of monthly packets collected by enrolled women, was 80%. The first factor, which led to the increased coverage and compliance, was easy access to the supplements. The fact that the supplements were with the female community health volunteers, who lived in their ward, provided manageable access to pregnant women.

The other factors were advocacy, access to information and the increased belief in the benefit of the iron supplements. The female community health volunteers were marketing a product that was special for pregnant women. FCHVs provided information and counseling about the micronutrients and reason for taking antenatal supplements during pregnancy, not only to the pregnant women but also to their families, and other community members. Once the pregnant women began feeling better and the babies were being born healthy the belief of the pregnant women in the iron supplement increased.



**In conclusion,** the intensification of antenatal supplementation took access to community level using grass root level workers within the primary health care system. The dual role of the FCHVs as health care providers and community members made them a valuable resource for identifying, counseling and providing supplements to pregnant mothers in their community. Coverage increased from 8% to 76% and compliance, was 80%. Advocacy played a vital role in mobilizing the community towards the need for increased micronutrient intake during pregnancy. Village Development Committees, Ward members Nepal Red Cross juniors all participated to create an environment of ownership and commitment to the intervention at community level. Mobilization of Nepal Red Cross juniors may provide a model to be used for future program expansion. The data collected in this study found that helminthic infection was a big problem in the region. The study also found that supplementation needs to begin pre-pregnancy, or at least as soon as possible during early pregnancy to make a significant difference in anemia levels.

## 5.2 Postpartum Vitamin A supplementation

In May 1996 the Ministry of Health had approved a national protocol to supplement women immediately following childbirth or as soon as possible up to six weeks postpartum with one oral dose of vitamin A (200,00 IU). The protocol for the women had been disseminated to health care workers and institutions throughout the country in July 1996, but a clear implementation strategy, with well-defined logistical support and supervision, was not defined. Supplements of Vitamin A to post-partum mothers had not been initiated, although, the MoH had already approved it.

A survey had shown that nearly 12-30% of mothers suffered from night-blindness during their pregnancy. So a Vitamin A supplementation program was initiated for the postpartum mothers in 3 districts (Kailali, Kanchanpur and Doti) where there was the highest prevalence of night-blindness, marked vitamin A deficiency, low literacy rate and poor health status.

The project activities were implemented gradually in a phase wise manner ultimately covering all the VDCs of the project districts. Office establishment, recruitment of staff members and their training, identifying of VDC members, local volunteers, schools and non-formal education groups, providing orientation and training to them was accomplished during the first half of the first year. In the second half of the first year Vitamin A activities were initiated in VDCs and were extended in all VDCs of the target districts in the second year. Review meetings were conducted twice every year. Later on the review meetings were integrated to the VDC members' regular meetings conducted on a monthly basis. Schoolteachers, health-post personnel and project supervisors participated regularly and reported the monthly progress to the VDC members.

After identification and selection of local volunteer's groups, formal and non-formal literacy groups and health institutions, one-day training was conducted to health personnel (health-post in charge, midwives, auxiliary health workers, MCH workers and VHWs working in PHC system) and local volunteers (FCHVs, TBAs, Teachers). More than forty thousand students were oriented on the importance of vitamin A and its delivery package to the target group by program supervisors and health personnel. For the disadvantaged group of population special focus group discussion were held bimonthly for men, women and children separately.

Essay competition was organized among students on the importance of vitamin A. IEC materials like posters, leaflets, stickers, calendars, health magazine (Jeevadhara) were periodically distributed to the Non-formal Education (NFE) participants who in turn disseminated these messages at community level. On the occasion of special festivals greeting cards were distributed with vitamin A messages to health workers, school teachers, NFE facilitators, VDC members, FCHVs/TBAs and informal local leaders in the project districts. The local singers and musicians prepared songs on the importance of vitamin A. Rallies, essay competition, radio spots were organized. Cinema slides were distributed to the cinema halls.

After the training period, postpartum mothers of the 3 districts were supplied with Vitamin A capsules (VAC) by the FCHVs under the guidance of primary health care providers. Since VAC supplementation to postpartum mothers was a new concept, health workers of HP and SHPs were given trainings and orientations. The TBAs were taught to educate the new mothers in consumption of vitamin A rich food and to refer them to FCHVs for the VAC.

The coverage rate increased from 16 percent in the first year to 77 percent in the second year showing that the FCHVs were capable of supplementing VAC to the mothers. They are the backbone of delivering preventive as well as promotional aspect of Primary Health Care services to the communities. They being one of the well-respected community members can be utilized as the main channel for capsule distribution.

It was recommended that VAC supplementation to postpartum mothers be initiated throughout the country utilizing the existing networks of FCHVs under PHC system of the MoH. Monthly review meetings held with the VDC members gave a feeling of ownership of the program to the VDC members. Including students in the training, organizing essay competition on importance of vitamin A encouraged the students to share their knowledge and education to communities and households.



In order to document a feasible vitamin A postpartum supplementation strategy, in March 1997 the Nutrition Section/Child health Division of the Department of Health Services/MoH initiated another feasibility study. The aim was to improve maternal vitamin A status immediately following birth and, through increased concentration of vitamin A in breast milk, to provide adequate vitamin A to infants. So another vitamin A supplementation program for PPM was started in 2 districts, Saptari and Udaypur. The intervention was designed to create a model that could easily be expanded and replicated into the existing Primary Health Care (PHC) system through training to all levels of Ministry of Health PHC workers.

Through the PHC, the FCHVs were utilized as health care providers and as the main channel for capsule distribution. They were given education on vitamin A, breastfeeding, nutrition, kitchen gardening, weaning foods and group leadership skills. The FCHVs were trained to keep an updated register of all pregnant and postpartum women in their village. Comic style booklets on postpartum care and supplementation produced by MoH were distributed to schoolchildren, which helped in bringing health information to the family through the children. Every three months process-monitoring surveys were conducted.

The significant finding from the study was the over 90% coverage of vitamin A capsules. The coverage increased from 0% (baseline) to 90% (endline) in both the districts. This was mainly due to the involvement of the FCHVs as the delivery mechanism and the support and follow-up by the NGOs. As the community members become more aware of health benefits, they become more pro-active in their own care. Prior to the project activities, Health Posts were the only delivery source for the supplementation.

The above findings show that community-based delivery system is an effective way to reach postpartum women. Assistance with the community mobilization can be achieved with the help of local NGOs, school children, clubs, groups and political leaders. Using the help of school children as a part of the social mobilization is an innovative and easily acceptable way of raising awareness in the community. The FCHV register of pregnant and postpartum women would be an efficient way to monitor supply and demand, aid in supervision and raise the self-esteem of the FCHV. Use of FCHVs and TTBA (Trained traditional birth attendants) in the community service delivery can be an effective contact point to refer women for education and preventive health care at Outreach Clinics and sub Health Posts.

### **5.3 Decentralized Planning for Child Programme (DPCP)**

Decentralized Planning for Child Programme (DPCP) is a decentralized, community-based development programme. Unicef assists HMG/N to provide financial as well as technical support to the Programme. This programme works closely with communities for the enhancement of the status of children and women in Nepal. The Programme initiates and establishes a process that puts communities at the center of planning. DPCP encourages communities to assess their problems, analyze the factors involved and plan actions themselves.

The objectives of DPCP are to assist families and communities to build their capacity in improving the situation of children / women and assist local bodies (DDCs, VDCs) and NGOs.

DPCP has been implemented in credit and saving community organizations (CO) established by Ministry of Local Development (MLD DDC), and UNDP. The programme will cover 20 districts by the end of the year 2001 in close collaboration with Participatory District Development (PDDP, a UNDP project) and Local Governance Project (LGP). A CO consists of 20-30 households. The COs select activities following a process, called the Community Action Process (CAP) which is the key strategy of DPCP for reaching families or households effectively. It is based on the decentralized and participatory principles and the community based approach. A trained female community mobiliser (from the CO itself) and a village facilitator (trained female

facilitator) facilitates discussions at the community and VDC level respectively, on how to improve the situation of children and women. In the programme-implemented areas, the coverage and acceptance of iron supplements has increased radically.

DPCP places the child at the center of planning and implementation of development activities. Programme activities are implemented at four levels: central, district, VDC and community level. District level activities are mostly related with advocacy on women and children issues and capacity building of DDCs. Community level activities cover both capacity building of VDCs and communities and interventions identified by the communities for the survival, growth and development of children. Communities assess the situation of children and women, identify problems facing them, analyze the causes of the problems and take actions to rectify the problems. If they are unable to take actions themselves, they seek support from DDC, NGOs, UNICEF and other donors. The Ministry of Local Development at the center, DDC at the district level, and VDC at the Village level, are the coordinating and implementing institutions of this Programme.

Intensive advocacy is carried out to improve maternal care by reducing workload and increasing rest and food intake, and encourages pregnant women to receive ANC services by establishing links with outreach activities and ensuring supplements are easily accessible by mobilizing local health structures, governing bodies and NGOs. Furthermore, COs closely monitor pregnant women to ensure iron tablets are being consumed.

DPCP further reinforces the notion that iron supplements' coverage and acceptance can be greatly increased with improved awareness about anaemia during pregnancy and the importance of iron supplementation. It also emphasizes the crucial role of community mobilization and monitoring of iron tablet consumption.

Programs that have proved successful with using iron supplementation to prevent and control iron deficiency have focused on: increasing availability of supplementation, increasing acceptability of supplementation, improving provider performance and increasing compliance.

These models of delivery system can be easily expanded and replicated into the existing PHC system of the whole nation. Awareness creation within the community is the key to making the program a success.

## **6. Conclusions**

According to WHO, anaemia prevalence greater than 20% is considered as significant public health problem. In Nepal, the current prevalence of anaemia is almost four times higher than this cut-off point for both children and women. The severe implications and magnitude of the deficiency strongly warrant the need to review existing efforts to address the high prevalence of anaemia during pregnancy. Mechanisms to reach and treat pregnant women suffering from the severe anaemia should be explored since they are at the highest risk of experiencing life threatening pregnancy related complications [49].

The problem of anaemia in preschool children cannot be left ignored, and there is a need to identify effective mechanisms to address the high prevalence in children. The alarming rate of anaemia in this age group is extremely concerning because this period is most critical for physical and mental growth which may cause irreversible brain damage.

There has been no change in the prevalence of iron deficiency anaemia over the past decades in Nepal, during a period where there has been remarkable progress in efforts to control Vitamin A Deficiency and Iodine Deficiency Disorders. The main reason for this is that the condition often

remains undetected by communities. Furthermore, intervention programmes have often failed to have the desired impact due to inadequate coverage, inadequate supplies of iron/folate tablets, poor compliances, lack of community involvement, and low priority accorded to this programme in national policies.

Much of the low compliance is due to a limited understanding on the part of health workers about the importance of iron deficiency, thereby limiting their ability to promote the program locally. In addition, there has been little attention paid to increasing the awareness of the target groups about iron deficiency and its prevention, which has led to low demand for the supplementation services. Recent trials of antenatal supplementation have shown that women's acceptance and compliance rates can be increased if the pills are made more easily available and if the pregnant women themselves know the importance of taking the pills. Programs like DPCP can be made as models for increasing awareness and mobilizing people in other districts.

In order to improve iron supplementation in the country, it will be imperative to identify community based approaches through which antenatal supplementation can be delivered. Many of the studies done in Nepal have shown that FCHWs and TBAs are also capable of distributing the iron tablets and are well accepted by the community. FCHVs and the TBAs will be the means of bringing the supplements closer to the community. To increase the acceptability of iron tablets, repackaging of iron tablets into small containers or into blister packs should be done. Distributing iron/folate supplements soon after the women get married to build up the iron stores necessary to meet the high iron demands of pregnancy should be considered. Also, reaching other target groups such as infants and adolescents should also be explored. If the anaemic infants are not treated in time they may develop irreversible brain damage.

The long-term goal of intervention should be to shift emphasis away from supplementation toward a combination of food fortification—iron-fortified flour, for example—and dietary diversification, where appropriate and feasible. Thus, supplementation should be considered an essential and complementary bridge to more sustained measures such as food fortification, food-based approaches, and other supportive public health interventions.

To further facilitate the reduction of anaemia, other interventions such as deworming and malaria prevention should also be integrated as part of the overall strategy.

Anthelmintic therapy is inexpensive and is safe during pregnancy after the first trimester (WHO 1996). It should also be given to the under 2 years children since worm is another important cause of iron deficiency anaemia in the toddlers. The severe anaemia attributable to malaria may be reduced by anti-malarial chemoprophylaxis during pregnancy in malaria endemic regions. Laboratory facilities in these endemic areas should be strengthened to facilitate routine screening procedures and follow up of cases. Improving the vitamin A status of pregnant women in addition to iron supplementation will reduce the risk of mild anaemia. Vitamin A supplementation of women before or during pregnancy, or both may be an effective intervention with multiple benefits for the health and nutritional status of women and her child [57].

Food and nutrition education should become a more important part of the mix, while programs to enhance family capacity to grow nutrient-rich foods should continue to be stressed. Public health control measures should continue to be considered an essential complement to interventions for iron. Interventions should incorporate all four strategies— supplementation, fortification, food-based approaches leading to dietary diversification, and complementary public health control measures—again, to the degree appropriate and feasible.

## 7. Recommendations

- Regular iron supplementation to high-risk populations especially pregnant women and children less than two years of age, ensuring consumption.
- Increase the access to supplements - bring the pills closer to the community
- Fortification of bio-available iron of cereals, cereal products, salt and sugar.
- Diversification of diets to include more green leafy vegetables, pulses, fruits/vegetables, liver and red meat, together with avoiding tea with meals.
- Prevention and control of intestinal parasitic infection in pregnant women, preschool and school children, and women of reproductive age.
- Prevention of infections (eg. Malaria), including improvement of environmental health
- Training to the health care personnel to deliver the supplements and counsel appropriately
- Strengthen nutrition education as a preventive measure for the whole population.
- Integration of other health programs contributing to the improvement of iron nutrition including helminth control, malaria prevention, family planning and other specific maternal and child health programs.
- Social mobilization, development & implementation of comprehensive IEC campaign on anaemia and importance of iron supplementation

There is a need to train peripheral health workers to support mothers in preventing and treating anaemia. Recognition of anaemia, its treatment, deworming of children as well as expectant mothers and improvement of environmental sanitation at the community level will contribute to a healthier population.

To prevent anaemia national programmes, which contain a mixture of these approaches should be formulated. Iron supplement distribution for women need to be diversified and intensified, and infant iron supplementation needs to be considered. Low dose of Vitamin A supplementation along with iron should be considered for the pregnant mothers. The relative importance of each component should be suited to local conditions and resources. Integration into health programmes is likely to facilitate and sustain the impact of these activities. For most effective program impact, multiple micronutrient deficiencies need attention.

**Appendix 1. Identification of various programs involved in the field of anaemia**

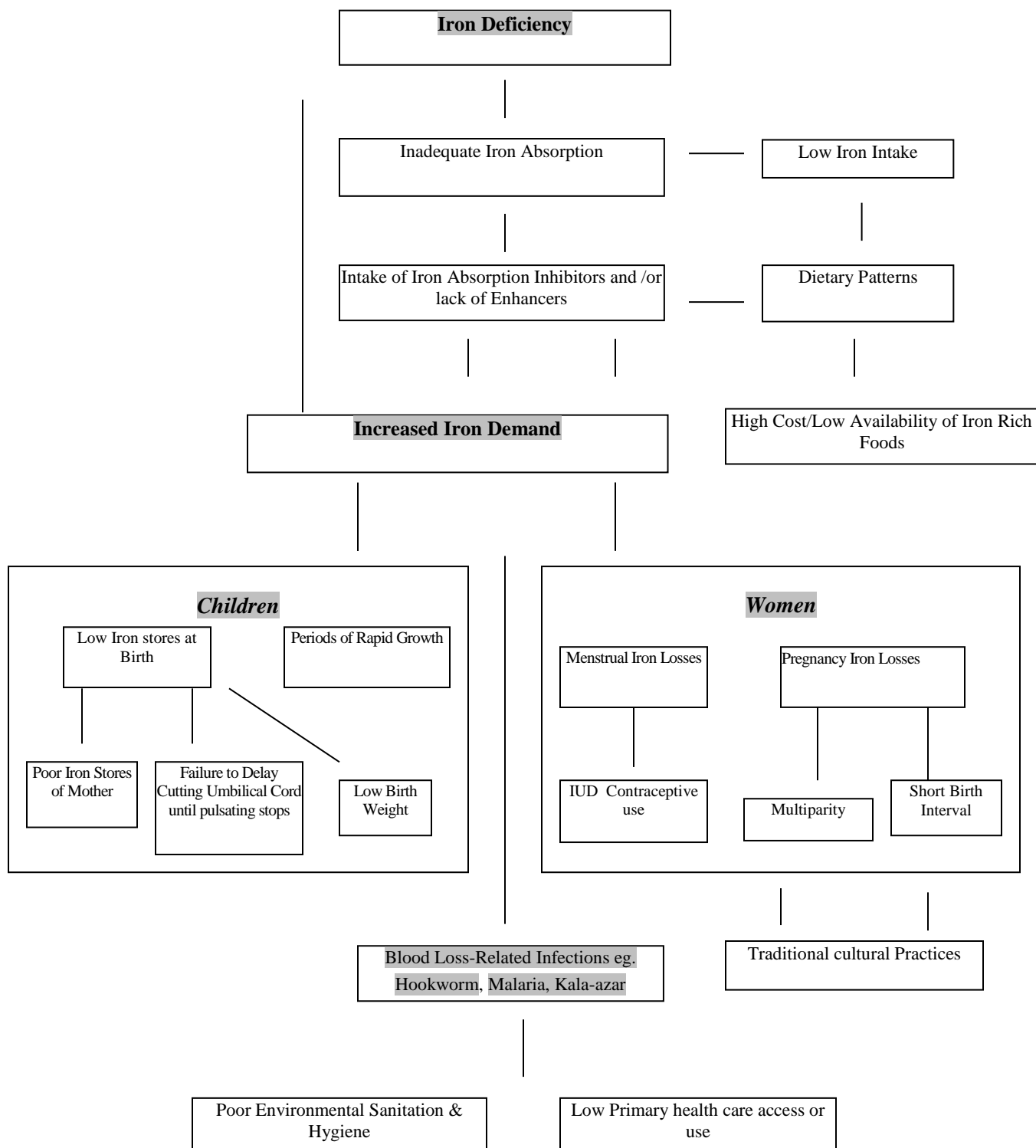
	<b>Organisations</b>	<b>Programs on Anaemia</b>	<b>Activities</b>	<b>Coverage</b>
1	MoH: a. Child Health Division b. Safe motherhood program c. Family health Division	Vit. A capsule distribution  Iron tablet distribution Training to Health workers	Promotion of nutritious iron, vit. A rich food by preg. and lactating women Consumption of vit. A capsule within 45 days of delivery Consumption of iron tablets from the 2nd trimester to 45 days post partum	Nation wide
2	ADRA	TBA, FCHV training	Promotion of nutritious food, vit. A rich food by preg. and lactating women, ANC, procure plastic bottles for the iron tablet distribution	Kavre, Rasuwa
3	CARE Nepal	Maternal and Child Health Program	Promotion of nutritious food, vit. A rich food by preg. and lactating women, procure plastic bottles for the iron tablet distribution in the near future	44 VDCs in 4 Districts (Kanchanpur, Mahotari, Syanja, Bajura) Accham/Bajura - New
4	CEDPA	Nutrition Education	Promotion of nutritious food, vit. A rich food by preg. and lactating women	200 VDCs in 10 districts
5	GTZ.	Support District in various programs No Maternal and child health programs	In the near future- procure plastic bottles for the iron tablet distribution in the program areas	Dhading
6	HKI	Nutrition Education Mothers, Health workers, NGOs, Comm. Health workers.	Promotion of nutritious food, vit. A rich food by preg. and lactating women	Dhankuta, Sunsari, Morang
7	Nepal Red Cross Society (NRCS)	Nutrition Education	Promotion of nutritious food, vit. A rich food by preg. and lactating women and children below 5 years of age	Doti and Udayapur 20 VDCs
8	NTAG	National Vit. A prog. Vit. A supp. to postpartum women Nutrition Educ. prog. Training of the Health workers (MCHW, ANM, FCHW, TBA)	Promotion of nutritious food, vit. A rich food by preg. and lactating women	Nation wide
9	MARD	Nutrition Education Training of farmers, women, FCHVs	Grow and consume off-season vegetables.	

10	PLAN	Vit. A program Care of mothers & new born  Training of the Health workers(MCHW, ANM, FCHW, TBA)	Promotion of nutritious food, vit. A rich food by preg. and lactating women, Iron supplementation to preg. women, Child Nutrition, procure plastic bottles for the iron tablet distribution (recently started)	Rautahat, Bara
11	SCF-USA	Nutrition Program Safe Motherhood Prog.	Promotion of nutritious food, vit. A rich food , Iron rich food by preg. and lactating women, children Consumption of Iron tablets by preg. women -procured plastic bottles for the iron tablet distribution (recently started)	Siraha, Nuwakot, Kailali, Kanchanpur
12	UMN	Nutrition Program Assessment and follow up of malnourished children Assessment of micronutrient status	Promotion of nutritious food, vit. A rich food , Iron rich food by preg. and lactating women  Training manual development	Dailekh- Dullu & Jumla being closed due to Maoist activities
13	WFP	Nutrition Program Child Feeding Program MCHC Training health staffs, FCHVs,	Take-home ration for pregnant, nursing mothers and children 6m-3y Deworming for pregnant women	Dadeldhura, Doti
14	UNICEF	Vit. A supp. Prog. for children and women Iron tablet supply Training Health Staffs, FCHVs, TBAs,	Exclusive breast feeding Promotion of nutritious food, vit. A , iron rich food by preg. and lactating women, children Promotion of Vitamin.A , Iron supplementation	Nation wide
15	MI	Vit. A supp. Prog. Training of Health workers Anaemia control program	Promotion of nutritious food, vit. A, iron rich food, Wheat flour fortification with iron Intensification of supplementations	Nation wide

*Appendix 2: Causes of Anaemia in Women and Children of Nepal*

<b>Women</b>	<b>Children</b>
<ul style="list-style-type: none"> <li>-Insufficient quantity of iron-rich food and iron enhancers in the diet (Vitamin C, citrus fruits)</li> <li>-Low bioavailability of dietary iron (only non-heme iron)</li> <li>-Excessive quantity of Iron inhibitors in diet (tea, coffee, calcium rich foods)</li> <li>-Iron loss during menstruation</li> <li>- Poor iron stores from infancy and childhood deficiencies</li> <li>-Iron loss from post-partum haemorrhage and repeated pregnancies</li> <li>- Increased iron requirement due to tissue, blood and energy requirements during pregnancy, heavy workload</li> <li>-Hookworm Infestation</li> <li>-Malaria, Kala-aza</li> <li>- Other micronutrient deficiencies: Vitamin A, folate etc.</li> </ul>	<ul style="list-style-type: none"> <li>- Poor iron stores at birth due to anaemia in mothers</li> <li>-Early introduction of inappropriate, non-fortified breast milk substitutes</li> <li>-Non-exclusive breastfeeding and too early introduction of inappropriate complementary food</li> <li>- Insufficient quantity of iron-rich food and iron enhancers in the diet (Vitamin C, citrus fruits)</li> <li>-Low bioavailability of dietary iron (only non-heme iron)</li> <li>-Increased iron requirements related to rapid growth and development during infancy and childhood, until adulthood</li> <li>-Hookworm Infestation</li> <li>-Malaria, Kala-aza</li> <li>-Other micronutrient deficiencies: Vitamin A etc.</li> </ul>

*Appendix 3: Factors contributing to Iron Deficiency in Children and Women*





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