

Success in Delivering Interventions to Reduce Maternal Anemia in Nepal:

A Case Study of the Intensification of Maternal
and Neonatal Micronutrient Program



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August 2011

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A2Z: The USAID Micronutrient and Child Blindness Project

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Website: <http://www.a2zproject.org/> This report is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the terms of Cooperative Agreement No. GHS-A-00-05-00012-00. The contents are the responsibility of FHI 360 and do not necessarily reflect the views of USAID or the United States Government.

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Executive Summary

Anemia has been recognized as a serious public health problem in Nepal for many years. Seventy-five percent of pregnant women were found to be anemic in the National Micronutrient Survey of 1998. This finding was used to raise awareness of the problem of maternal anemia and provided the trigger for action to address it. In 2004 the Government of Nepal launched the Intensification of Maternal and Neonatal Micronutrient Program, more commonly called the Iron Intensification Project (IIP), in five districts. The Micronutrient Initiative (MI) and UNICEF were the primary external donor partners supporting the government's implementation of this program. Over the following seven years, the program was scaled up to cover 70 of Nepal's 75 districts. Data in 2009 indicated that the program had achieved substantial success in increasing coverage of interventions in pregnant women that are known to reduce maternal anemia: attending antenatal care (ANC) clinics, taking iron-folic acid supplements, and taking deworming medicine.

This case study describes the development of the IIP, its design, the process used to implement it at the district level, the strategy used to scale it up, and the data available to describe coverage. The reduction in maternal anemia in the country between 1998 and 2006 is also described. Last, conclusions are drawn regarding lessons learned for sustaining and strengthening the program in Nepal as well as the usefulness of the program model for translation to other countries.

For a long time, Nepal had a policy of universal, daily iron-folic acid (IFA) supplementation of pregnant women and postpartum women, but this was not implemented effectively. In 2001, only 23% of pregnant women consumed any IFA, and only 1% took IFA in accordance with the policy.

The IIP is based upon delivery of interventions by female community health volunteers (FCHVs). The cadre of FCHVs was created in the late 1980s. Initially they were largely under-utilized and under-recognized; however, this began to change in 1993 with the introduction and subsequent scale up of the National Vitamin A Supplementation Program. This program involved FCHVs in distributing vitamin A supplements and the FCHVs gained status and respect because their providing the supplements was recognized by the communities as a valued service. The success of the FCHVs' involvement in the vitamin A program increased the level of trust the communities held in the health system.

In 1997, operations research in two districts of Eastern Nepal established that FCHVs could effectively deliver IFA to pregnant women and counsel them on using it. A review of anemia in Nepal gathered evidence on its potential causes and the efficacy of interventions available to reduce it in 2001. This evidence was combined with information on programming experiences both in Nepal and in other countries to design the Iron Intensification Program (IIP).

The implementation of the IIP is district-based. The process of introducing the program was similar to that used for the vitamin A program in that a local NGO (Nepal Technical Assistance Group (NTAG) provided an orientation and awareness-raising event that engaged senior staff of the District Public Health Office (DPHO) with district representatives of other ministries including education, agriculture, local government, women's affairs, and sometimes others.

At district level the NTAG trainers did an initial training-of-trainers and then closely supervised the subsequent cascade of training provided by ministry staff. The two-day training was primarily skills-based. Knowledge of anemia and the role of IFA and deworming were clearly important in this program, but the focus was on ensuring that both health workers and FCHVs enhanced their counseling skills to enable them to support pregnant women in attending ANC clinics and taking the IFA.

After receiving their training, FCHVs informed the community about the importance of iron supplementation and related interventions through various social groups, but primarily a mothers' group. They then immediately started distributing IFA and practicing their new counseling skills. Prior to the program, IFA was available only through health facilities, and so involving the FCHVs increased access to these supplements dramatically. IFA supplies were provided to the FCHVs who then re-packed them into small bottles, and thus replaced the "wrapped in newspaper" tradition that had been identified as a barrier to supplement quality.

The program was designed around involving FCHVs in carefully explaining to the mothers what iron pills were, why they were needed, what happened if they were not taken, the benefits of taking them and the side-effects that might accompany them. The volunteers were to be proactive in going to the pregnant women as often as possible to ensure that the pills are taken, and to discuss the reasons for taking them when needed. Further, FCHVs were meant to discuss the importance of the pills with the family at large so that the family could help remind women and encourage them to take the pills. As it seems natural for women to stop taking pills when they felt better, the visits of the FCHV were to be ongoing.

The FCHVs delivered a package of services, not just IFA. They encouraged ANC attendance early and often so that women could benefit from the available package of services including deworming medicine, which continued to be available only in health facilities. They also provided a postpartum vitamin A dose and encouraged use of iodized salt.

The District Health Office became responsible for managing the program. In particular, this office ensured that there was appropriate supervision of both health workers and FCHVs, an adequate supply of IFA and deworming medicine, and also that monitoring data were collected and reported. At the national level, MI provided a part-time assistant to monitor the program throughout the country. Monitoring calls were made to each district from time to time to verify that IFA stocks were adequate, to help with annual stock planning, to inquire about HMIS reports, and to inquire generally about any constraints that might be hindering program performance.

Results to date indicate successful implementation and likely sustainability. Coverage of key indicators increased sharply with the implementation of the program. Attendance at ANC clinics almost doubled, consumption of any IFA increased by 3-4 times, and deworming treatment increased from near zero in 2001 to 60% in 2009. While other related activities implemented at the same time as the IIP would likely have contributed to the observed increases in ANC attendance, no other national programs focused on promoting IFA and deworming during this period, and so it is reasonable to conclude that the IIP was primarily responsible for the observed increases in these two interventions.

Given strong efficacy data for IFA and deworming to reduce anemia in pregnant women, one can reasonably expect that increasing coverage of these interventions would cause substantial reductions in maternal anemia.

National data on the prevalence of maternal anemia show substantial decreases between 1998 and 2006: from 68% to 36% in women of reproductive age, and from 75% to 42% in pregnant women. These rates of reduction lie between the rates of reduction seen in Nicaragua and Thailand, two other countries in which effective maternal anemia programs were implemented.

The Nepal program had been implemented in only 20 of 75 districts by 2006 and therefore, although the program may have contributed, this substantial reduction cannot be attributed to the impact of the program alone. Further, observed reductions in the prevalence of anemia varied substantial across the three major ecological zones in the country. The percentage reduction in anemia observed in the Terai was about half as large as the reductions in the Hills and Mountains. This observation was unexpected because the indicators of coverage and compliance suggest that the program performed better in the Terai than in the other two zones in the country.

National DHS data were being collected and analyzed while this case study was written and will soon allow analyses to determine the impact of the program on anemia prevalence. Attributing decreases in anemia to specific programs and program components is especially difficult because anemia has many causes which vary across regions (e.g., prevalence of intestinal worms) and many factors influence the quality of program implementation (e.g., capacity of the district health system). Further, temporal changes in other factors that influence anemia prevalence were occurring while the program was implemented and the impact of these will need to be controlled (e.g., availability of micronutrient-rich food, education of girls, birth spacing).

There are compelling, although less well-known, grounds for expecting that the decrease in maternal anemia in Nepal would contribute to decreases in maternal mortality. It is notable that the maternal mortality ratio (MMR) in Nepal decreased from 539 deaths per 100,000 live births in 1996 (95% CIs: 392, 686) to 281 in 2006 (95% CIs: 178, 384). Anemia, independent of postpartum hemorrhage, has been identified as the second most common cause of maternal mortality in the Asia region. The decrease in mortality in Nepal is consistent with what would

be expected with the decrease in anemia. Further analyses are warranted to determine the extent to which the decrease in anemia may have contributed to the decrease in MMR.

In conclusion, the Nepal program increased coverage and compliance substantially with IFA & other anemia interventions. This report has argued that this success resulted from:

- A community-based delivery platform of motivated and respected FCHVs. These “near-peers” are trusted by the community and their activities have built community trust in health system;
- Increased awareness of anemia in the health system and communities that resulted in increased demand for both quality care and products;
- Strengthened logistics system that greatly expanded access and supplies of products with improved packaging;
- Addressing the key preventable causes of anemia, particularly deworming; and
- Effective monitoring at the community, district, and national levels.

The multiple causes of anemia and multiple programs being implemented during this period make attribution of the observed decline in anemia difficult. The 2011 DHS will provide data that should further clarify what impact there may have been of the program on prevalence of maternal anemia.

The Nepal program provides strong evidence that maternal anemia programs can be effective when they are implemented well. The barriers to implementing anemia interventions as components of ANC such as IFA, deworming, and malaria control, are well established and were addressed effectively in Nepal. Yet the global maternal health community seems reluctant to embrace these interventions, particularly universal IFA supplementation, as key to safe delivery and more healthy newborns. Some of this reluctance stems from skepticism that IFA programs are feasible. The Nepal IIP adds to compelling evidence that this skepticism is not warranted.

Acknowledgements:

The assistance of the following people in facilitating the work done in preparing this case study is gratefully acknowledged: Ms. Karuna L Shakya, Mr. Ram Shrestha, Dr. Stephen Hodgins, Mr. Naveen Paudyal, Mr. PO Blomquist, Ms. Kyoko Okamura, Mr. Hari Koirala, Ms. Laura Seckel, Dr. Lidan Du, Dr. Nadra Franklin, Mr. Peter Oyloe, Ms. Katura Harvey, Dr. David Pelletier, and Dr. Robin Houston.

Abbreviations:

AHW	Assistant Health Worker
ANC	Antenatal Care
ANM	Auxiliary Nurse Midwife
BPP	Birth Preparedness Package
CHD	Child Health Division
CHERG	Child Health Epidemiology Research Group
CMA	Community Medical Assistant
DDC	District Development Committee
DHO	District Health Officer
DHS	Demographic and Health Survey
DPHO	District Public Health Officer
DTLA	District Tuberculosis Officer
EPI	Expanded Program of Immunization
FCHV	Female Community Health Volunteer
FHD	Family Health Division
FP	Family Planning
HA	Health Assistant
HEO	Health Education Officer
HF	Health Facility
HMIS	Health Management Information System
HP	Health Post
IFA	Iron folic acid supplementation
IIP	Iron Intensification Project
IMNMP	Integrated Maternal and Neonatal Micronutrient Program
INGO	International non-government organization
JHU	Johns Hopkins University
LMD	Logistic Management Division
MCHW	Maternal Child Health Worker
MDG	Millennium Development Goal
MI	Micronutrient Initiative
MMR	Maternal mortality rate

MO	Medical Officer
MOH	Ministry of Health
NFHP	Nepal Family Health Program
NGO	Non-government organization
NHEICC	National Health Education and Information Communication Center
NHTC	National Health Training Center
NTAG	Nepali Technical Assistance Group
NVAS	National Vitamin A Supplementation Program
ORC	Outreach Clinic
PAG	Program Assessment Guide
PHC	Primary Health Care
PHN	Public Health Nurse
PNC	Post Natal Care
SA	Statistical Assistant
SHP	Sub Health Post
TOT	Training-of-trainers
VDC	Village Development Committee
VHW	Village Health Worker
WFP	World Food Program
XN	Night blindness

Introduction

THE CONSEQUENCES OF MATERNAL ANEMIA ARE IMPORTANT

Strong evidence links anemia to health and development problems. The consequences of iron deficiency, anemia or both were first associated with fatigue, decreased physical work productivity in adults, and then subsequently with delayed child development, lower IQ, poor school achievement, decreased active play in children, preterm birth, low birth weight, perinatal mortality, infant and child mortality, and maternal mortality. These are all important outcomes in terms of countries achieving the Millennium Development Goals (MDGs).

Overall, about 20 percent of maternal and perinatal mortality in developing countries can be attributed to iron deficiency anemia.^{1,2} Recent work has shown that most of this impact is in the mild and moderate grades of anemia, rather than being limited to severe anemia.^{1,2} Maternal anemia is highly prevalent throughout South Asia and is the second most common cause of maternal mortality in the region.³ Anemia in pregnant women results in lower birthweight babies who have a higher risk of death.

Important contributions to this body of scientific evidence come from research undertaken in Nepal and these will be described briefly below.

CAUSES OF MATERNAL ANEMIA IN NEPAL

The multiple causes of maternal anemia are well documented. The most common in Nepal are described below.

Inadequate intake of iron and other nutrients: This results from the usual Nepali diet that offers too little iron in a form that is poorly absorbed. This diet also lacks other nutrients that contribute substantially to anemia, including vitamins A and C, folate, riboflavin, and B12. Cultural practices result in women often not sharing fully in the side dishes which are more nutrient-rich than the staple dishes.⁴ One study in the Terai estimated that women met only half of their requirement for vitamin A,⁵ which would have major adverse effects on anemia because vitamin A is required in the synthesis of hemoglobin.

Poor absorption of iron: Because dietary components such as phytates in cereal foods bind with the little iron present in plant foods, much of it is unavailable for absorption. As a result, iron consumed cannot be readily absorbed and used. A World Food Program (WFP)/WHO study in the Dadedhura and Doti Districts was reported as finding that phytate-rich grains contributed over 85% of the energy requirements in a majority of the women investigated.⁶

Parasitic worms: Hookworm infection is prevalent, particularly in the Terai, and damages the lining of intestine, resulting in blood loss and hence loss of iron.

Dreyfuss et al.⁵ undertook a study in the Terai with pregnant women and found that 73% of them were anemic, with 88% of the anemia caused by iron deficiency. The results of this study showed that three-quarters of the women had hookworm infection and that the intensity of hookworm infestation was the strongest predictor of iron status. However, 54% of women also had low serum retinol levels (vitamin A deficiency), and another 20% had *Plasmodium vivax* malaria parasites observed in their blood smears. A further study in eastern Nepal by Shah and Baig⁷ showed that anemia in pregnancy was strongly associated with hookworm infection. Visceral leishmaniasis (Kala-Azar) has also been identified as a cause of maternal anemia in 12 districts of the Eastern and Central Terai.

Malaria: Particularly in pregnant women, malaria is an important cause of anemia where it is prevalent. *Plasmodium vivax* is the most common type of malaria in Nepal, as described by Dreyfuss et al. in the study mentioned above.

Other infections, both chronic and systemic: The inflammation resulting from common infections has been increasingly recognized as a critical cause of anemia acting through the hepcidin mechanism regulating the absorption and metabolism of iron in the body.

Early and repeated pregnancies and inadequate birth spacing: The reproductive cycle increases requirements for iron enormously. The greatly increased requirements for iron during pregnancy make it impossible for even iron-rich diets consumed in western countries to meet them. The period between pregnancies provides some opportunity to women to recover their iron supplies. But without adequate birth spacing and without adequate quantities of absorbable iron in the regular diets of Nepali women, iron deficiency and anemia become the norm.

Genetic disorders: Although not a preventable cause, hemoglobinopathies such as the thalassemias and sickle cell trait are associated with iron status and anemia, and also with the response of these indicators to iron supplementation.

The common indirect causes of undernutrition also contribute substantially to maternal anemia. Many of these causes are social, economic and cultural, including poverty, lack of education, lack of access to land for agriculture, and gender inequality.

EFFICACIOUS INTERVENTIONS ARE AVAILABLE TO ADDRESS MATERNAL ANEMIA

Globally, the efficacy of daily iron supplementation for reducing anemia among pregnant women has been established for some time. A recent article reporting on a meta-analysis undertaken for the CHERG group reported that daily iron supplementation reduced the incidence of anemia at term by 73% (RR = 0.27; 95% CI: 0.17 – 0.42) compared to no intervention/placebo.⁸

The evidence of efficacy for other interventions addressing maternal anemia is also well established. In Nepal, the substantial benefits of addressing the direct/immediate

causes of maternal anemia have been demonstrated with research undertaken by the Johns Hopkins University (JHU) group in the Terai. Maternal iron-folic acid supplementation was shown to reduce mortality among children between birth and 7 years by 31% (RR = 0.69; 95% CI: 0.49-0.99).⁹ The strong association between hookworm and anemia was mentioned earlier. An intervention study showed that women given albendazole in the second trimester experienced less severe anemia. Women who received a second albendazole had babies with higher birthweight (59 g) and 41% lower mortality to six months of age compared with controls.¹⁰

LARGE-SCALE PROGRAMS ADDRESSING MATERNAL ANEMIA CAN BE EFFECTIVE

Experiences with national programs in Thailand¹¹ and Nicaragua¹² have shown that when large-scale programs are well implemented, they are successful in reducing anemia.^{13,14} The key features of these successful programs include the target populations needing to appreciate the consequences of anemia for both mother and child, understand the link between iron supplementation and blood, and know how to cope with side effects as well as remembering to take the iron folic acid supplements (IFA). The programs need to be comprehensive in terms of including interventions that address the preventable causes of anemia other than iron deficiency; these causes certainly include hookworm in Nepal, and malaria and Kala-Azar in the areas where these are problems. The programs need to ensure that supplies of supplements and medicines are reliable, and that all interventions -- together with the communications and the counseling support required -- are easily accessible to the target groups. The quality of training, supervision and monitoring of all activities are the final required components of successful programs.

Methods

This case study of the Nepal Intensification of Maternal and Neonatal Micronutrient Program (IMNMP), more commonly called the Iron Intensification Project (IIP), was based largely upon reviewing both published and unpublished reports in the literature. Limited field work was undertaken in the context of facilitating a Program Assessment Guide (PAG) Workshop in late April 2011. This 10-day country visit allowed for extensive discussions of the program and its history with key informants in the Child Health Division, the Micronutrient Initiative (MI), and the Nepal Technical Assistance Group (NTAG).

The case study describes the policy and programming context that shaped the program design, the district-based implementation and management processes, the strategy used to scale up the program from eight districts in 2004 to 70 districts in 2011, the monitoring process, and the data available to describe the substantial impacts of the program in terms of coverage and compliance. A reduction in maternal anemia in the country between 1998 and 2006 is also described. Last, conclusions are drawn regarding lessons learned for sustaining and strengthening the program in Nepal, as well as the likely usefulness of this program model for translation to other countries.

The Iron Intensification Program

DEVELOPMENT OF THE PROGRAM

An overview of the development and implementation of the IIP is shown in **Table I**. The policy and programming context existing in Nepal in the 1990s played a critical formative role in its development. The sequence of program activities from operations research to establish the feasibility of the delivery model, to the launch of the program and its subsequent scale up to a national level are identified, along with other related developments in nutrition occurring over the last decade.

POLICY AND PROGRAMMING CONTEXT IN NEPAL

Policy of universal iron-folic acid supplementation: Similar to most poor countries and based on WHO's global guidance, Nepal for a long while had a policy of universal, daily iron-folic acid (IFA) supplementation of pregnant women starting at the beginning of the second trimester of pregnancy and continuing through 45 days postpartum. The policy stipulated that the IFA be distributed through health facilities and outreach clinics (ORCs) that were run by health workers. Notably, community health volunteers such as female community health volunteers (FCHVs) were not permitted to carry out this task.

Beginning in the 1990s, it became apparent that this policy was not being implemented effectively, and alternative delivery mechanisms were explored. The report of 1997 Nepal Multiple Indicator Surveillance Cycle 5 noted that only 10% of women received IFA supplements during pregnancy and only 2% took more than 90 of these.

A National Micronutrient Survey was undertaken in 1998 with support from MI and UNICEF.¹⁵ Very high prevalence of anemia was noted among Nepali women of reproductive age (68%) and among pregnant women 75%. These data were critical to raising awareness of the problem of maternal anemia among policy makers and provided the trigger for action to address it.

Small-scale efforts were then launched in the mid-1990s to explore how access might be increased through expanding the role of FCHVs in distributing IFA to pregnant women. The introduction of outreach clinics in 1997 contributed to this effort to expand access to IFA. Three to five ORCs were established in each Village Development Committee (VDC) depending on the population, leading to a total of 15,000 ORCs throughout the country. These were run once a month by maternal and child health workers (MCHWs) and village health workers (VHWs) from the sub-health post (SHP) and were initially supplied a kit with basic medications.

Results of the 2001 DHS again confirmed that the policy of universal daily IFA during pregnancy was not being implemented effectively. At this time 23% of pregnant women consumed any IFA, and only 1% took IFA in accordance with the policy.¹⁶

An existing community-based delivery platform: The IIP is based upon FCHVs at the community level extending the reach of IFA delivery beyond that being achieved by existing health facility and ORC distribution. A national cadre of FCHVs was created in 1988 and managed by a designated unit of the Family Health Division of the Ministry of Health. Initially the responsibilities of FCHVs were restricted to encouraging community attendance at EPI clinics and supporting some family planning work. Indeed, FCHVs were largely under-utilized and under-recognized.

This situation changed in 1993 with the introduction and subsequent national scale up of the National Vitamin A Supplementation Program (NVAS). Those designing this program recognized the potential of FCHVs to expand the reach of the health system and thus made this cadre central to the distribution of vitamin A supplements.

The health system and communities adopted the NVAS as their own and this program became recognized globally for its effectiveness. The program was introduced at the district level with an orientation process that engaged multiple sectors and raised awareness of the problem of vitamin A deficiency. It was followed by cascade training for both health workers and volunteers. A largely illiterate cadre of FCHVs was transformed into a highly effective health force through the participatory and skills-based training and the development of a reliable supply and distribution of vitamin A capsules twice each year. The key to the success of the FCHVs has been attributed to the trust they established with the communities they served.¹⁷

Due to prior experiences of inconvenient and inconsistent service, many villagers had become jaded with the public health system. As mothers within the Ward, the FCHVs were able to bridge this gap of mistrust between the public health system and their communities by reliably providing them with vitamin A capsules on set dates, two times each year. Despite the 60% illiteracy rate among the cadre, with training the FCHVs were able to develop both the competence and the confidence they needed to teach and counsel other mothers about the importance of vitamin A supplementation, as well as to actually administer the supplements.

Perceptions of FCHVs after involvement in the National Vitamin A Program

“After the implementation of the National Vitamin A Program I become involved in every program of the village. I have earned a lot of respects.”

“This (vitamin A) program has made us more active. We undergo training every six months and people come to visit so often for advice.”

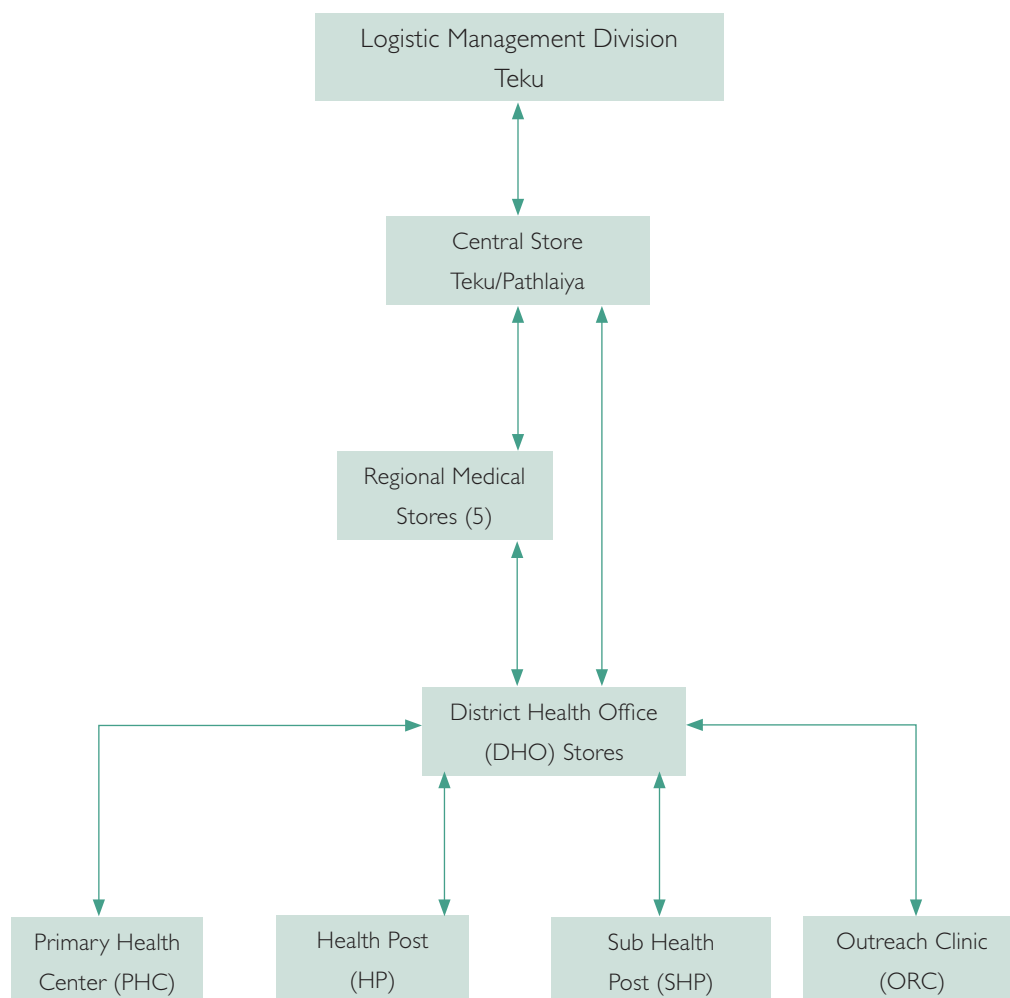
“People, including local medical attendants, also come to me for advice. This encourages me to work harder even if I do not get paid. It also gives me an opportunity to learn many new things

THE 2001 ANEMIA REVIEW

The MI commissioned a situation analysis of anemia in Nepal in 2001 and this work was strongly supported by UNICEF and other donors. This analysis reviewed and collated the existing evidence on the causes of anemia in Nepal and the efficacy of interventions available to address it, and combined this evidence with information on anemia programming experiences both in Nepal and in other countries.¹⁸ This analysis provided the evidence base upon which the IIP was designed.

Supplies and logistics: The critical importance of assuring an adequate supply of IFA to the success of anemia programs around the world had been well documented.¹⁹ Based upon these experiences, a comprehensive description of the Nepali logistics system for IFA in 2001 was presented (**Figure I**). Iron tablets were supplied to the districts from the Central Stores of the Ministry of Health (MOH) based on allocation requests from the districts to the Child Health Division (CHD). The CHD passed these requests on to the Logistics Management Division (LMD) that was responsible for procuring the product. At this time, the MOH procured its supply of IFA with support from donors such as WHO, KfW (a German Bank) and UNICEF.

Figure I: Iron-folic acid tablet distribution and monitoring mechanism in Nepal



The LMD sent supplies both to Regional Stores and District Stores. When the IFA arrived in the District Stores, they were transferred to the Health Post (HP), and Sub Health Post (SHP). Primary Health Centers (PHC) received their supplies directly from the Regional Stores. The MCHW from the SHP conducted the ORCs once every month in 3-5 places in each VDC.

The Logistic Management Information System (LMIS) of LMD monitored the stock of IFA and other medicines in the District Stores.²⁰ In theory, SHPs, HPs and the PHC sent monthly reports to the DHO, which were sent to the Logistic Management Section in Kathmandu for compilation and further planning. No reporting had yet been established for the ORCs.

In 2001, LMIS data indicated that at existing levels of demand, there was sufficient IFA to provide a two-year supply in most of the district stores. It was concluded that supplies were not the bottle neck in achieving adequate coverage with IFA, but rather it was more likely that it was "... a lack of awareness of the (anemia) problem and a corresponding lack of demand and accessibility that seems to be the more significant obstacle. The service providers themselves (were) not fully aware of anemia and the need for iron/folate tablets..." (2001 Anemia Review, page 22)

Figure 2: Packaging of Tablets



- a. Standard method in use before IIP, and
- b. the discoloration of IFA resulting from moisture.
- c. the small clear plastic bottles introduced with the program to help maintain the appearance and taste of the tablets

As had been identified in other countries, one factor contributing to the lack of demand for IFA was likely to be the appearance and taste of the tablets. Traditionally, tablets were dispensed from large cans, often wrapped in newspaper and handed to women; because of humidity and heat, this resulted in spoilage of the tablets (**Figure 2**). To overcome this obstacle, small clear plastic bottles were introduced to stop spoilage and discoloration of the IFA tablets that occurred with the newspaper.

Operations research on delivery of IFA: The 2001 Review described operations research on community-based delivery of IFA carried out in two districts of Eastern Nepal (Dhankuta in the Hills, Sunsari in the Terai) in 1999.²¹ This work established that FCHVs could effectively deliver iron supplements to pregnant women and counsel them on using it with high compliance. In this study, a four-day training

session enabled FCHVs to distribute the iron tablets and then effectively counsel mothers on using it.

Overall in the two districts, coverage of iron supplementation increased from 8% to 76% and compliance was 80%. The FCHVs facilitated this improvement by increasing access to the supplements, advocating the importance of the supplements, reminding women to take them, and counseling them on coping with side-effects when needed. It was reported that pregnant women began to notice positive impacts on themselves and their babies and belief in the benefits of iron supplements increased. The report concluded that, *“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.”* (2001 Anemia Review, page 31)

Conclusions

The major conclusions from the 2001 Anemia Review that informed the design of the IIP included:

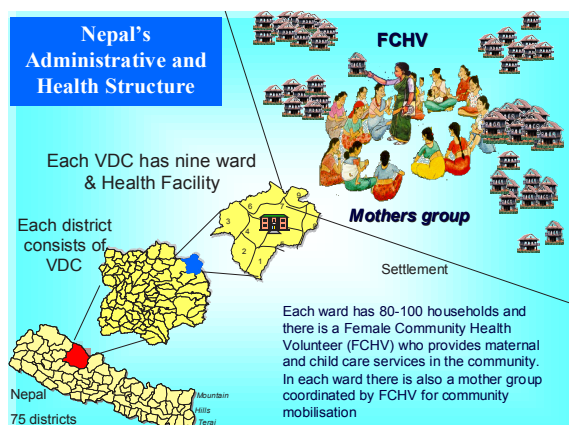
- Much of the problem of low compliance was due not to lack of supplies, but rather to the limited understanding on the part of health workers about the importance of iron deficiency.
- There had been little attention paid to increasing the awareness of the target groups about iron deficiency and its prevention, and this resulted in little or no demand for IFA and other anemia reduction interventions.
- To improve iron supplementation in the country, access to IFA needed to increase. It was critically important to identify community-based approaches through which the IFA could be delivered. Given the encouraging results of operational research on this issue, it appeared that FCHVs were capable of distributing the iron tablets and were well accepted by the community. Thus, FCHVs should be the means of bringing the IFA closer to the community.
- A major constraint to success of anemia programs to date had been that anemia control was considered synonymous with iron supplementation and did not address other preventable causes of anemia. To be effective and sustainable, a more comprehensive and integrated approach was required, with interventions such as deworming treatment and malaria prevention included in the overall strategy.

These conclusions were also important in the development and adoption of a Five-Year Plan of Action for the Control of Anemia among women and children in Nepal.²² This Plan of Action provided an important, broader context for the implementation of the IIP. The IIP addresses directly the increased requirement for iron in pregnancy, but it is fully recognized that this, by itself, is not sufficient to address the problems of anemia in iron deficiency. The Plan of Action proposes eight other population-based interventions, including food-based interventions that are needed to increase the consumption of iron in the population. This Plan also provided key policy endorsement for distributing iron supplements through FCHVs.

IMPLEMENTATION OF THE PROGRAM AT DISTRICT LEVEL

District Administrative Structure: The operational strategy of the IIP was built upon the community-based delivery platform provided by the FCHV within the structure of the district public health system. **Figure 3** shows the administrative structure of the Nepal public health system and how the FCHVs extend the reach of the health system into their communities.

Figure 3: Structure of Health System Used in Implementing the Program

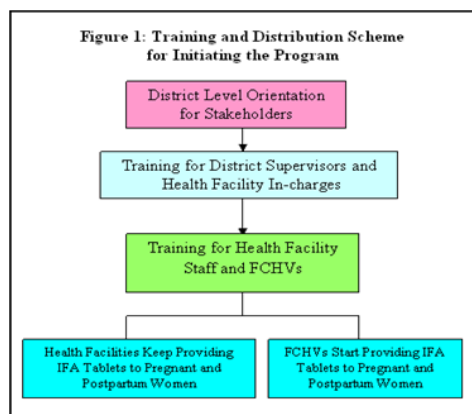


The IIP program is implemented at the District level. Nepal has 75 districts, with each district having 30-60 Village Development Committees (VDCs). Each VDC consists of nine wards, the smallest administrative unit. Each ward has 80-100 households and an FCHV providing services to mothers and children. Each ward also has mothers' groups and other social groups that the FCHV can work with for community mobilization. Each FCHV is generally responsible for 4-5 pregnant women.

Each District has a District Hospital, up to three primary health care (PHC) facilities and 9-15 health posts (HPs). Auxiliary nurse midwives (ANMs, female) and health assistants (HA, male with same level/duration of training as ANMs) staff the district hospitals and most HPs. All VDCs have either a Health Post or a sub-Health Post (SHP). Assistant health workers (AHWs) staff SHPs and HPs without an ANM or HA. Other staff supporting the functions of the HPs and SHPs included the maternal and child health workers (MCHWs) and village health workers (VHWs).

Orientation: The program implementation was initiated with an orientation provided at the district level. This brought together representatives of multiple government agencies and broadly raised awareness of maternal anemia and the program to address it (**Figure 4**). The orientation was usually planned by an NTAG coordinator who traveled to the district headquarters to formulate an implementation plan with the District Development Committee (DDC) and District Health Office (DHO) authorities. This was followed by an invitation letter from the DHO to district representatives of line ministries and the most influential organizations, including officials from the departments of health, education, local government, women's development and agriculture, as well as representatives of NGOs and INGOs.

Figure 4: District Implementation, Orientation followed by a Cascade Training to all Health Staff and FCHVs



District supplies of IFA and deworming medicines were increased in anticipation of increased the demand of these that resulted from program implementation. The LMS system was not changed for the IIP and has been described above.

Training-of-trainers: A three-day master training of trainers (ToT) was organized for key trainers of NTAG and DPHO/Nutrition Focal Persons in Kathmandu before launching of the program. The Nutrition Section/CHD and MI facilitated this ToT.

A one-day district-level ToT was conducted for all health facility in-charges (PHC, HP, and SHP) by DHOs and NTAG trainers. Participants in this training, as available, included technical supervisors of DPHO, family planning assistants, training assistants, EPI supervisors, malaria supervisors, leprosy supervisors, TB supervisors, and representatives from the aayurved units.

The health facility in-charges along with trainers from NTAG then undertook a two-day training of all health workers and FCHVs at their respective VDCs. District supervisors and initially an MI technical staff member closely monitored the cascade of training to maintain the quality of training. This has been called a “modified cascade” training approach and worked well with the scale-up of the National Vitamin A Supplementation program.

The curriculum for the training and supporting materials were developed by a technical core group (comprising representatives from CHD, MI, UNICEF and WHO) constituted for this program. These were based upon two premises: First, volunteers with limited education could and should understand the basic principles of iron deficiency anemia and the well-established barriers to regular consumption of IFA; and, second, enhancing the skills of health workers and volunteers in counseling and advocacy was critically important to the success of the program. The training materials were revised in later years on the basis of experiences gained during program implementation.

Delivery: The community-based delivery mechanism for IFA was launched immediately after the FCHVs were trained. The FCHVs shared their new knowledge with mothers at their regular monthly mothers' group meeting in the ward and began identifying and supporting pregnant women. This enabled them to practice their newly acquired counseling skills.

Ideally, FCHVs carefully explain to the mothers what iron pills are, why they are needed, what happens if they are not taken, the benefits of taking them and describe possible side-effects. They should also not only remind women to take the pills but actively go to the pregnant women as often as possible to ensure that the pills are taken, and



VDC Facility In-charge Training in Bhojpur

to discuss the reasons for taking them when needed. Further, FCHVs are meant to discuss the importance of the pills with the family at large so that the family can help remind women and encourage them to take the pills. As it seems natural for women to stop taking the pills when they feel better, the visits of the FCHV have to be ongoing. Since the uncomfortable side-effects of iron, particularly in the first few days cause women to stop taking the pills, the FCHVs need to explain why it is important to continue, and to discuss the importance of the side-effects relative to the benefits of the extra iron both for the baby and themselves.

FCHVs monitored the IFA they distributed in registers that were designed specifically for the task. In these registers they tracked their supply of IFA and the numbers of pregnant women who had received IFA. *The use of the information in these registers is described further below.*

In addition to distributing and counselling on IFA, the FCHVs also encouraged pregnant women to attend ANC clinics, distributed high-dose vitamin A to postpartum women within 45 days of their delivery, and encouraged use of iodized salt. Attendance at ANC clinics was a vital component of the design of the IIP in addressing preventable causes of anemia other than iron deficiency. Deworming and malaria medicines were available only at the health facilities, in accordance with Nepal Government policy.

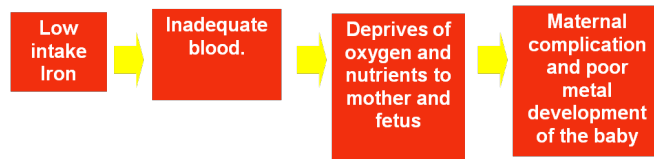
Communication materials: Simplified key messages were developed by the technical core group to inform the women about the importance of anemia and the benefits and availability of IFA. The messages included: almost all pregnant women suffer from anemia or “lack of blood”; low intake of iron leads to lack of blood in the body; adequate blood is required to deliver oxygen and essential nutrients to the mother and the fetus; inadequate blood can result in birth complications and could impair mental development of the baby; and iron supplementation improves the health of both the baby and the mother **(Figure 5)**.

All materials were field tested before finalization and were revised several times in later years based on the experiences gained during program implementation.

Communication materials such as posters, flipcharts and manuals were distributed to health workers and FCHVs in all program districts. In addition, media messages on

anemia during pregnancy were promoted on a regular basis, and nationwide radio/TV campaigns on the importance of IFA supplements for pregnant women were disseminated by the Government with UNICEF support. The central messages stressed the need for regular IFA supplements during pregnancy.

Figure 5: Central Message Communication links iron supplementation to health of the baby



Not all messages aiming to reduce anemia had a positive effect on IFA supplementation in pregnancy. Some radio messages focused solely on promoting the consumption of green leafy vegetables as the best way to prevent and treat anemia. These messages were found to confuse both mothers and health workers because they were interpreted as saying that vegetables alone could prevent iron deficiency and anemia in pregnancy. This information was misleading for pregnant women because very little of the iron in vegetables is absorbed, and even if the iron were all absorbed, it still could never be enough to meet the increased requirements for iron associated with pregnancy. Thus, these messages inadvertently discouraged IFA consumption.²³ This experience highlighted the need for central coordination of messaging to address anemia.

Monitoring: The activities of the program were monitored primarily with the established Health Management Information System (HMIS) and the LMS system that were managed by the DHO. Community-based delivery of IFA was reported by FCHVs to SHPs or HPs at regular monthly meetings. The information reported by FCHVs and the register they used were developed by the technical core group, and included the FCHV's stock of IFA, such as the number of IFA received and distributed. Although several informants expressed concern that this first step in the monitoring system did not work well, reliable data on this issue were not available. It is clear, however, that being able to effectively complete these reports depends upon the FCHVs having a sufficient supply of registers.

Data from the FCHV's registers were tallied and added to the HMIS forms completed at the SHP or HP and then sent to the DHO, where they were compiled into district tallies. The number of pregnant women attending ANC and receiving deworming medicine was also monitored through this system. These data were then filed with CHD and HMIS HQ in Kathmandu.

Supplies of supplements and medications were monitored through the LMS system as described above. Detailed data on the robustness of this system were not collected for this case study. At present, there are no systems in place to monitor stock outs at the community (FCHV) level.

SCALE UP OF THE PROGRAM

In 2003, MI provided technical and financial support to the CHD to develop and implement Phase I of the IIP in five priority and easily accessed districts of the Terai (**Table 4, Figure 6**).

In 2004, CHD launched a pilot project on low-dose vitamin A supplementation for treatment of night blind pregnant women in three districts of Terai. The pilot project also incorporated the components of IIP. The pilot project/IIP was supported by UNICEF with funding support from MI in two out of three districts.

Table 4: Scale Up of the Nepal Iron Intensification Program, Districts by Phase and Year

	Phase I (2003-2004)		Phase II (2005-06)		Phase III (2006-2007)		Phase IV (2008)	Phase V (2009-10)	Phase VI (2011)
	MI	UNICEF/MI	MI	UNICEF	MI	UNICEF	MI	MI	MI
1	Jhapa	Sunsari	Sarlahi	Salyan	Kapilvastu		Nuwakot	Jajarkot	Lalitpur
2	Morang	Parsa	Rautahat	Pyuthan	Nawalparsi		Bajura	Kalikot	Bhojpur (ongoing)
3	Saptari	Chitawan	Rupandehi	Ramechhap	Udayapur		Sindhuli	Rolpa	
4	Dhanusha		Doti	Myagdi	Dang		Lamjung	Rukkum	
5	Mahottari		Baitadi	Syanja	Tanahun		Gorkha	Humla	
6			Kailali	Baglung	Dadeldhura		Gulmi	Achham	
7			Kanchanpur	Parbat	Kavre		Manang	Sankhuwasabha	
8			Siraha	Argakhachi			Mustang	Makwanpur	
9			Jumla	Darchula			Rasuwa	Kaski	
10			Bardiya	Dolpa				Dolakha	
11			Dailekh	Mugu				Solukhumbu	
12			Surkhet	Palpa				Dhading	
13				Sindhupalchok				Khotang	
14				Bajhang				Bhaktapur	
15								Panchthar	
16								Okhaldhunga	

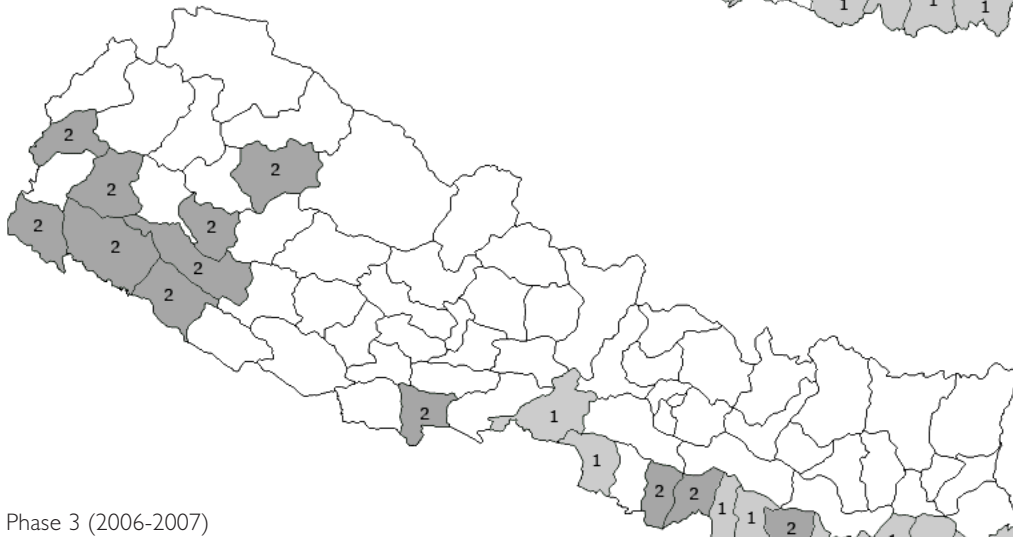
Bara - PLAN
Banke - WHO

Figure 6. Phase-wise district scale up of Iron Intensification Program, 2004-2011

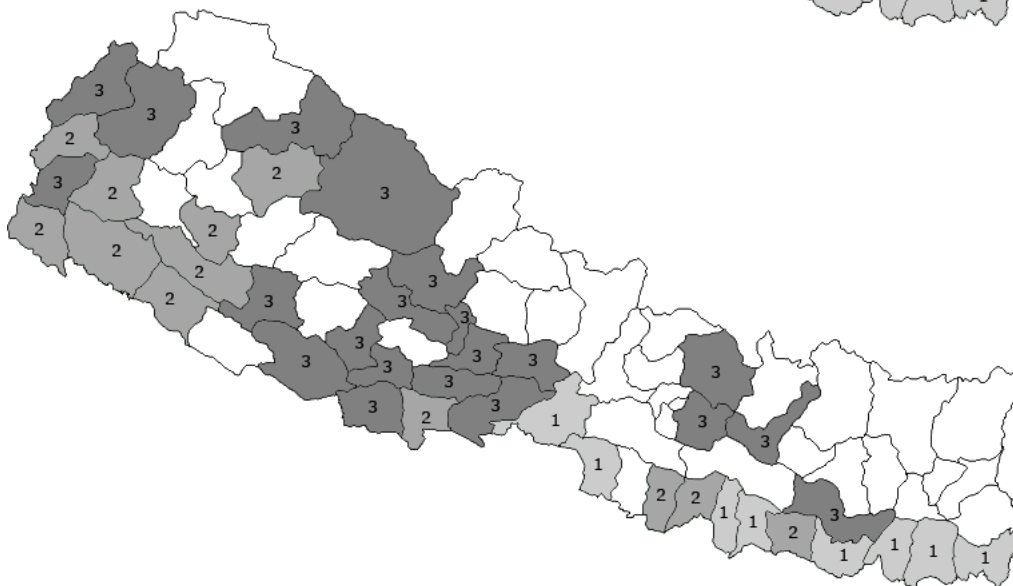
Phase I (2003-2004)



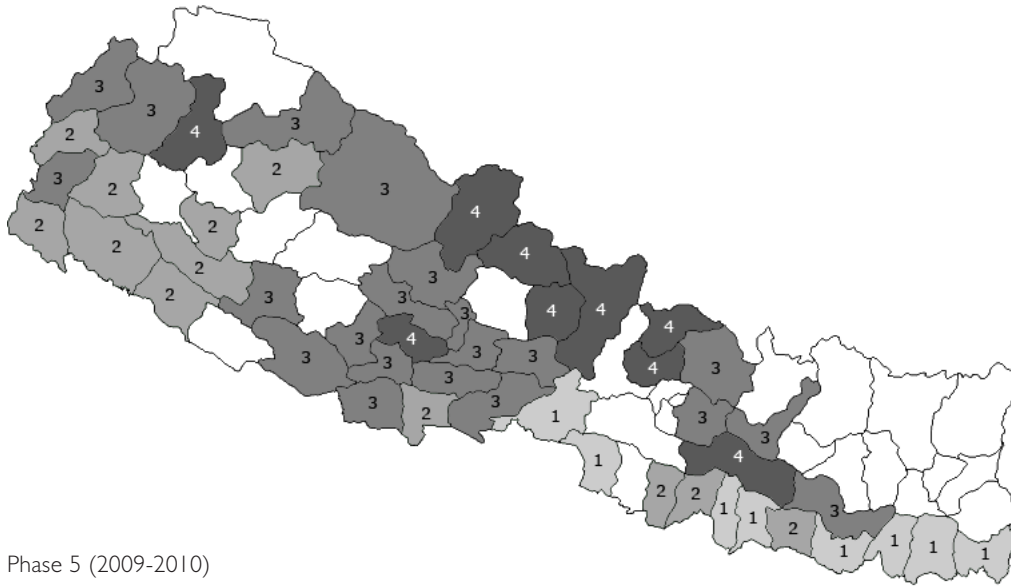
Phase 2 (2005-2006)



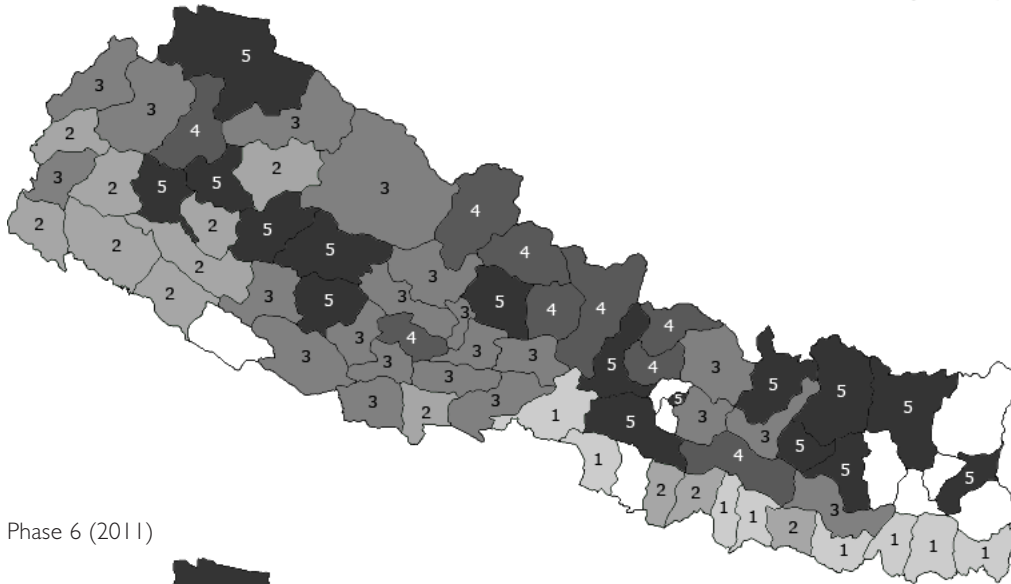
Phase 3 (2006-2007)



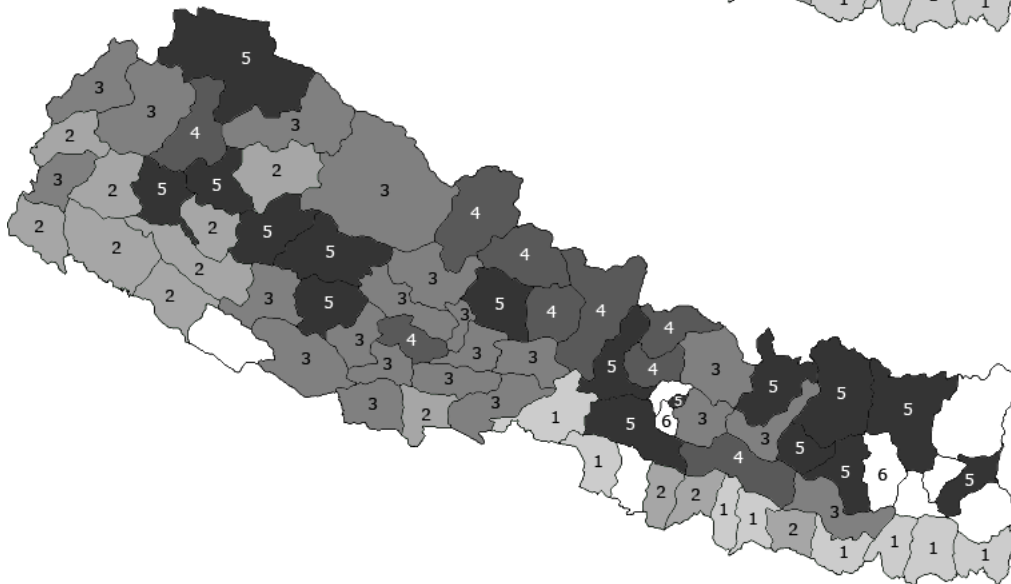
Phase 4 (2008)



Phase 5 (2009-2010)



Phase 6 (2011)



An evaluation of the MI-supported five initial program districts after 12 months of implementation revealed positive results: there was significantly increased coverage and compliance of IFA tablets among pregnant and postpartum women compared to a comparison district. Encouraged by these results, MI provided further support to CHD to expand the program to 26 more districts over three subsequent one-year phases (Phase II through IV) from 2005 through 2007 (**Figure 6**). UNICEF supported the program scale up in an additional seven districts in 2006-2007. MI supported the programs further expansion in 27 districts from 2008 to 2011. WHO and Plan Nepal each supported the scale up of the program in one district each in 2005-06. Thus, at the time this report was prepared, the program was being implemented in 70 of the country's 75 districts. Results from a 2009 program evaluation (*described below*) are unclear about whether the program is needed in the last five districts. This is a policy decision currently under review at CHD.

A national NGO, NTAG, was selected following a bidding process and contracted to do the orientation and training in all districts directly supported by MI, as well as in UNICEF-support districts. NTAG was not involved in the trainings in the WHO-supported district, and a local NGO was contracted to conduct the trainings in the Plan-support district. The program was introduced in a similar way in both the MI- and UNICEF-supported districts, except that UNICEF provided funds that allowed NTAG to undertake additional monitoring activities for up to 12 months after the initial orientation and ToT activities.

CURRENT DELIVERY SYSTEM AND MANAGEMENT OF THE PROGRAM

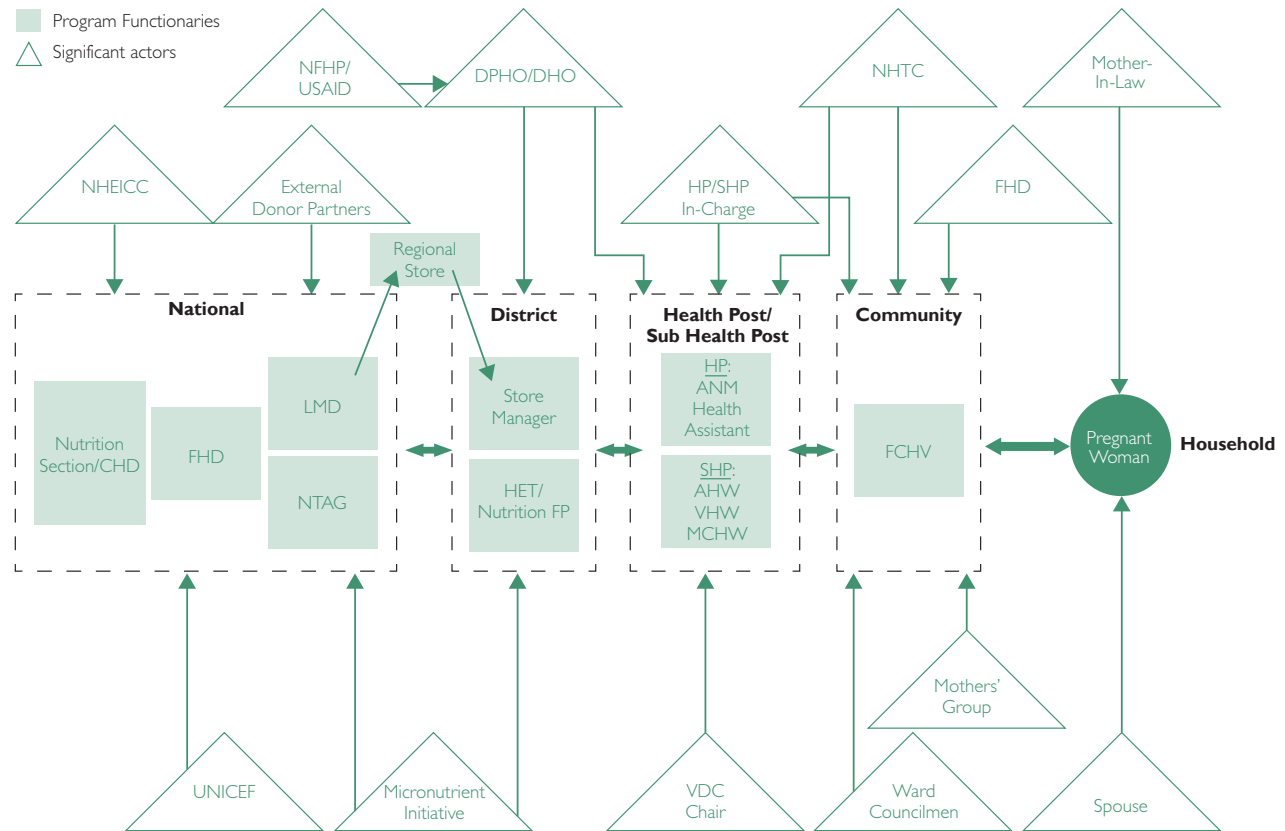
The IIP delivery system: A map of the current delivery system (**Figure 7**) was developed from information gathered in preparation for and at a Program Assessment Guide (PAG) mini-workshop held in Nuwakot District on 28 April 2011.²⁴ The PAG describes a participatory process designed to identify both program functionaries -- the people engaged directly in making the program work -- and significant others, those who influence the work of the functionaries. Once all people involved in the program were identified, the PAG process determined what each person needed in order to make the program work well, and then helped to plan how best to meet those needs.

Household: The people with primary influence over the behaviors of the pregnant and postpartum women were found to be their mothers-in-law, their husbands and the FCHVs. Mothers-in-law in Nepal traditionally are the most important decision makers in issues related to pregnancy and child care, and this is well incorporated into the design of communication materials and the counselling provided by FCHVs.

Community: The overall FCHV program nationally is managed by the Family Health Division. As described above, FCHV activity in the IIP is managed and supervised by staff at the nearest health facility, most often the SHP. The VHW and/or MCHW provide the FCHV with supplies of IFA, communication materials, and registers for monitoring activities. The FCHV participates in a monthly meeting at the SHP where

she provides a report of activities for the HMIS, picks up any supplies needed, and ideally discusses any concerns or issues with the program.

Figure 7: Delivery System of IIP as described for Nuwakot District in the Program Assessment Guide Workshop, April 2011



The National Health Training Centre (NHTC), in coordination with FHD and CHD, provides all FCHVs with their initial 10-14 day basic training, as well as two, two-day refresher trainings each year. Once the IIP program has been introduced in a district, specific refresher training modules for the IIP are incorporated into this regular refresher training. FCHVs receive a small daily allowance of NPR 200 (USD 2.80) for participating in training sessions.

The FCHV is commonly supported (at least in theory) by the mothers' groups from which they are originally selected.^A Because each of the 11 mothers of the group represent a 'neighborhood' of about 10 households, the group is well positioned to be informed about happenings in the Ward. The mothers' group is thus an excellent channel through which the FCHV can collect and disseminate information. The Ward Councillors and the chair of the VDC administration also have some authority over, and are commonly in communication with, the FCHVs.

A. Mothers' groups, in general, are becoming less easily identified, even "splintered" to some extent. This seems to be having somewhat negative effects as different development partners create "mothers' groups" in support of issues they are promoting (e.g., literacy groups, savings and credit groups). Participation in some of these groups is encouraged with financial incentives and this appears to contribute to the "splintering" of groups.

District: As described above, the IIP is managed by the District Health Office. Given the numbers of vacancies in staff positions, and the frequency of transfers, flexibility is needed within the system. **Figure 7** shows boxes for HPs and SHPs as overlapping because, increasingly, SHPs are being upgraded so that their functions overlap with those of HPs.

MI assisted in monitoring program performance throughout the country by employing a part-time consultant to contact district health offices from Kathmandu. These phone calls allow the consultant to verify that IFA supplies are adequate and that HMIS reports are in order. The consultant also provides advice as needed during the annual planning phase for the program, monitors supply chain management, and offers 'trouble-shooting' guidance as needed to resolve any difficulties that may arise. MI has recently put in place two field extenders who will be monitoring the program in 40 priority districts through field visits in a year.

The USAID-funded Nepal Family Health Program (NFHP) operates in 20 districts aiming to build capacity of the public health system. One could expect that the performance of national programs, including the IIP, would benefit from the NFHP activities in the selected districts. For example, NFHP positions additional staff to work with the DHO in strengthening training and logistics operations both in facilities and community-based programs.

National: The Nutrition Section of the CHD has overall responsibility for the IIP. It has played the central role in managing the introduction and scale up of the program and ensures that the program fits into the Government's overall priorities in policy, programming and information management strategies. The procurement and distribution of supplements and medicines required for the program have also been fully mainstreamed into the health system. Family Health Division is a key national partner in this program because it is responsible for the cadre of FCHVs. NTAG has provided all the orientation and training for the program, which was made possible through funding provided by MI and UNICEF.

The CHD manages the program at the national level, receiving LMD reports from the Districts to monitor supplies, and HMIS reports annually once these are compiled. This high level management function with respect to IIP is also supported with technical input from MI. Routinely collected national data disaggregated by District data are available electronically in the following calendar year. While the HMIS data are readily available in a timely manner, concerns are expressed about their quality. Particular issues include underreporting by FCHVs and the use of denominators estimated from census data that are often considered to be out of date. Thus, district-level data on coverage and utilization (compliance) are often considered unreliable, and likely to substantially underestimate (or in some cases, overestimate) actual coverage. Population-based survey data confirm the concerns expressed anecdotally about underreporting.

Coordination among the NGOs and INGOs has been recognized as important for many national programs. MI facilitated this coordination through several meetings in initial years to encourage the consistency of messages being promoted and the use of small bottles for repackaging the iron tablets. MI also drew attention to the uneven quality of IFA that was being procured. The Government responded in 2010

by mandating the procurement of IFA in blister packs. Efforts have also been made to enhance access to free IFA in large urban hospitals where only prescriptions (not free distribution) had been provided in the past.

Population-based monitoring data: Specifically in support of the IIP, MI commissioned population-based monitoring surveys in 2004, 2005, 2006, 2008.²⁵ Information for evaluation of the IIP has been provided by a baseline survey undertaken in 2003 in the five initial districts where the program was launched in 2003, and a follow up survey in five IIP districts (randomly selected from 43 districts where the program had been in place for at least for one year) in 2009. The sample for the 2009 survey comprised also another two different sets of districts in which the program had not been implemented.

The Nepal DHS were carried out in 1996, 2001, 2006 and 2011 and were funded largely by USAID. The results from the 2011 survey were not yet available when this case study was prepared. Hemoglobin data allowing estimates of anemia prevalence were collected in the DHS of 2006 and 2011. The national micronutrient survey of 1998 used a sampling frame based upon the DHS series and this provided estimates of anemia prevalence that presumably allow valid comparisons with the 2006 results.

The most recent estimates of coverage and compliance data are available through the results of the mid-term evaluation of the NFHP in 2009.

Results

Data from several different sources confirm that the IIP was effectively implemented and successfully scaled up to achieve national coverage. A monitoring survey was undertaken by MI in 2008 in the five Eastern and Central Terai districts where the program was initiated in 2003. This allowed before–after comparisons to be made for knowledge, attitudes and behaviors related to maternal anemia of both mothers and health workers over the course of four years of implementation. Results showed substantially improved awareness of anemia and the need for IFA supplementation among both health workers and mothers. Coverage with IFA also increased markedly from 47% to 86%.

In 2009 MI commissioned a more detailed evaluation of the program.²⁶ The sample for this survey was based upon random samples undertaken in three groups of five districts:

- Component A – the program had been in place for 12 months or more;
- Component B – from the 12 districts in which the program was to be implemented in 2009/2010;
- Component C – from districts where there were no plans to implement the program.

The sample of Component A included 520 pregnant and lactating women and 120 health workers/volunteers (VHW/MCHW/FCHVs). The samples for Components B and C were each 200 pregnant women, 120 postpartum women and 120 health workers/volunteers.

Attendance at ANC clinics was best in program districts: 92% of respondents in Component A districts attended ANC clinics, significantly higher than in Component B districts (66%) or Component C districts (86%). The frequency of ANC attendance was also higher among program districts compared to districts in Components B and C (3.7, 2.6 and 3.2, respectively).

Coverage among pregnant women with any IFA was 90% in program districts, significantly higher than in districts in Component B (65%), but not significantly higher than in districts in Component C (86%). FCHVs were the most common source of recommendations to take the IFA as well as the source of iron in program districts. Staff of health facilities remained the most common source of IFA and the recommendations to take it in districts in Components B and C. The coverage of IFA supplementation among postpartum women in Components A, B, and C were 59%, 28% and 60%.

Compliance with IFA supplementation (the proportion who had taken at least 80% of the recommended dose at the time of the survey) was higher among pregnant women of Components A and C (68% and 66%) than among those

from Component B (44%). Likewise, the coverage of de-worming tablets during pregnancy was higher in Components A and C than in Component B (69% and 73%, respectively, vs. 52%).

The above results from the 2009 evaluation, however, need to be interpreted in the context of very different rates of literacy across the three groups of districts. Literacy among survey respondents in the districts of Component C was 85%, almost double the rates in Components A and B (46%). Coverage with IFA during pregnancy among literate respondents in all three sets of districts was at least 85%, but coverage among the illiterate women surveyed was very different across the three components of the survey: 85% in program districts compared with 55% and 58% in Components B and C, respectively. This is strong evidence that the IIP was effective in reaching disadvantaged groups.

The 2009 results provide some insight in the factors affecting IFA compliance. Fewer than one in seven (n=121) women surveyed reported stopping taking IFA after they had started (12%, 16% and 15% in Components A, B and C, respectively). Among those who stopped, the most common reason offered (26%) was forgetting to take the tablets, followed by the IFA not being available from the FCHV or health facility (16% and 14%, respectively). Less than 10% reported stopping the tablets because of “side-effects” or “nausea.” Fear of having a big baby was the primary reason reported for stopping by only 4% of respondents.

Knowledge and behaviors of the program’s front line health workers (MCHWs and VHW) and FCHVs were assessed. Interestingly, FCHVs in the districts where the program had not yet been introduced were already implementing several program components (e.g., distributing IFA, advising women on how to cope with side effects), but there remained clear differences in programming behaviors showing positive impacts of the training provided by the program. For example, 97% of FCHVs in districts of Component A “always” provided IFA to pregnant women, compared with 56% and 63% in districts of Components B and C reporting doing this.

Data on coverage of antenatal care and its components related to anemia for national and ecological zones are available for 2001, 2006 and 2009 (**Table 2**). The data for 2001 and 2006 are from DHS surveys and thus of standardized sampling and quality. The 2009 data are from the mid-term evaluation of Nepal Family Health Project (NFHP) and this survey was based upon the DHS sampling frame and questionnaires. The NFHP project aims to build the capacity of the health system in 20 districts. The 2009 data include data for the 20 NFHP districts and 20 other districts selected as controls. To allow a valid comparison between 2006 and 2009 cross-sectional surveys, data for these 40 districts were presented from the 2006 survey in addition to the national data. These data confirm the positive impacts of the program on anemia related behaviors that are provided by the MI commissioned surveys.

Table 2: Coverage of Antenatal Care (ANC), ANC Components, Related Maternal Anemia Prevalence, and Birth Intervals, Nepal 2001, 2006 and 2009

Indicator	Year of Survey			
	2001 ⁽¹⁾	2006 ⁽¹⁾	2006 ⁽²⁾	2009 ⁽³⁾
National				
% attending ANC	49.1	73.8	77.0	87.0
% attending <4 m ANC	16.4	27.7	23.8	33.4
Median months pregnant at 1st ANC visit	5.0	4.6	4.8	4.4
4+ ANC visits	14.3	29.4	30.0	46.6
% receiving any IFA ⁽⁴⁾	22.7	59.3	63.0	81.3
% receiving 90+ IFA supp ⁽⁴⁾	5.7	6.8 (180+)	NR	NR
% received IFA postpartum	?	23.2	NR	NR
% receiving dewormer ⁽⁴⁾	0	20.3	25.9	59.9
Median birth interval (months)	31.8	33.6	33.2	36.2
ANC by zone				
Mtn % attending	30.7	56.3	64 ⁽⁶⁾	69.9
Hill % attending	44.0	69.1	64 ⁽⁶⁾	69.9
Terai % attending	56.1	80.5	81 ⁽⁶⁾	91.9
Mtn % receiving any iron supp ⁽⁵⁾	14.1	41.3	51 ⁽⁶⁾	67.4
Hill % receiving any iron supp	22.2	56.4	51 ⁽⁶⁾	67.4
Terai % receiving any iron supp	24.5	65.7	66 ⁽⁶⁾	85.3
Mtn % receiving 90+ iron supp ⁽⁵⁾	2.3	5.7 (180+)	NR	NR
Hill % receiving 90+ iron supp	6.2	9.3 (180+)	NR	NR
Terai % receiving 90+ iron supp	5.7	5 (180+)	NR	NR
Mtn % receiving dewormer	0	13.3	15 ⁽⁶⁾	43.8
Hill % receiving dewormer	0	15.5	15 ⁽⁶⁾	43.8
Terai % receiving dewormer	0	25.3	25 ⁽⁶⁾	64.5
Mtn median birth interval (months)	31.9	33.3	NR	34.3
Hill median birth interval (m)	32.0	34.4	NR	34.3
Terai median birth interval (m)	31.6	33.0	NR	36.6

⁽¹⁾ Percent of women who had a live birth in last 5 years

⁽²⁾ 2006 data from 40 selected (NFHP & control) districts included in 2009 NFHP survey

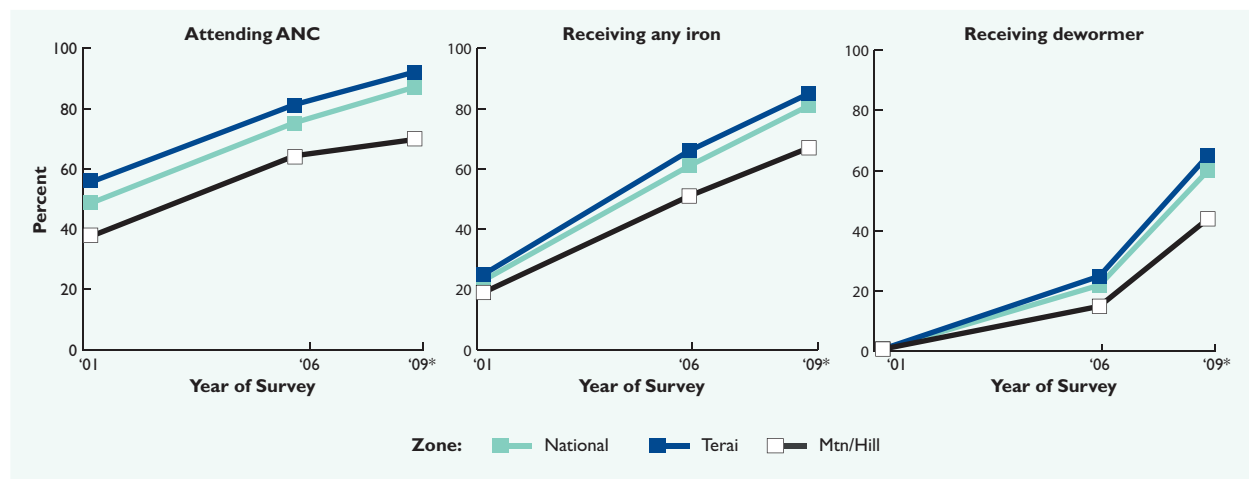
⁽³⁾ 40 selected (NFHP supported & control) districts; of women who had a live birth in last 3 years

⁽⁴⁾ Percent of women who received supplement/medicine for most recent birth

⁽⁵⁾ DHS reports switch between 'took' IFA in Tab 10.9 and 'received' IFA in Tab 9.3

⁽⁶⁾ Numbers approximately from report, not calculated

Figure 8: Antenatal care coverage and interventions delivered that are likely to be associated with maternal anemia prevalence in Nepal 2001, 2006, 2009.



* NFHP mid-project survey in 40 selected districts

In general, the results of these large, population based surveys indicate sharp increases in the behaviors targeted by the program (**Table 2, Figure 8**). From 2001 to 2009 in 40 of the 70 districts in Nepal, ANC attendance almost doubled (49% to 87%), coverage of any IFA increased four-fold (23% to 81%) and deworming increased from near zero in 2001 to 60% in 2009.

The DHS data from 2001 and 2006 provided estimates for the three broad ecological zones in Nepal (Mountains, Hills and the Terai). Because the sample size in the 2009 NFHP survey was smaller than those of the DHSs, the report presented results combining Mountains and Hills. While increases in coverage and compliance were observed for all indicators, the increases in the Terai were greater than those in the other two areas (**Table 2, Figure 8**).

The prevalence of maternal anemia in Nepal was assessed in national surveys undertaken in 1998,²⁷ 2006²⁸ and in 2011. Data from the 2011 DHS survey were not available at the time this report was written. The prevalence of maternal anemia decreased substantially between 1998 and 2006, but remained high (**Table 3**). At the national level, the prevalence of anemia in women of reproductive age decreased by almost a half (47%), from a baseline of 68% in 1998 to 36% in 2006. During this same period, the decreases observed in the Hills and Mountains (66-68%) were substantially larger than the 30% decrease observed in the Terai. The prevalence of anemia in pregnant women over the same period was presented only for the national level in the 2006 DHS and suggests a reduction of 43% from baseline, from 75% in 1998 to 42% in 2006.

Table 3: Decreases in the prevalence of anemia among women of reproductive age, pregnant women and preschool children, across ecological zones in Nepal between 1998 and 2006

Group	Zone	Year of Survey		Percent Decrease*
		1998	2006	
All women 15-49 y	Mtns	66.9	21.5	68%
	Hills	61.2	20.7	66%
	Terai	73.5	51.4	30%
	Total	67.7	36.2	47%
Pregnant women	Mtns	77.1	NR	NR
	Hills	68.4	NR	NR
	Terai	80.3	NR	NR
	Total	74.6	42.4	43%
Children 6-59 m	Mtns	78.9	45.2	43%
	Hills	76.2	36.9	52%
	Terai	79.7	58.5	27%
	Total	78.0	48.4	38%

*Expressed as a proportion of baseline prevalence

Discussion

The program design, implementation and national scale up proved successful

This case study has attempted to describe how the design of the IIP: a) was tailored to fit the policy and programming context in Nepal; b) addressed the multiple, preventable causes of anemia, particularly hookworm; c) incorporated lessons learned from nutrition programming in Nepal and maternal anemia programming in other countries; and d) used an existing community-based platform to greatly expand access to IFA supplementation and support pregnant women in achieving high compliance.

The program was implemented by the existing government public health structures. The District Health Office remains responsible for the management of the program within its area and ensures that supplies, training and supervision are provided to the cadre of FCHVs who deliver the IFA to pregnant women in their ward. The program was established in each district with a process of orientation and training similar to that proven effective in with the National Vitamin A Supplementation Program. The FCHVs were excited to expand the services they provided from largely children to pregnant women, and this is likely to have strengthened the FCHV program. The launch of the program in the districts was made possible through external donor funding, led by MI and UNICEF, to NTAG, a local NGO specializing in training and community mobilization. However, once the program was launched, the DHO ran the IIP from its own budget as part of routine activities.

The collection of routine monitoring data and its use in management is a critical component of the program. Existing HMIS and LMIS systems have been modified to allow anemia interventions and supplies to be tracked. These data are collated by the DHO and forwarded to the appropriate divisions at the central level. The Nutrition Section of the CHD, which manages the program and coordinates the support it requires from other national institutions, receives the HMIS and LMIS reports from the Management Division and LMD, respectively, on regular basis. Other important national-level groups that support the IIP include: the FHD, responsible for the FCHV program; and the NHTC, responsible for one-time basic training and twice-annual refresher trainings of the FCHV cadre as well as other health workers.

The program was successfully implemented in the five initial districts in 2003, and was then systematically scaled up to 70 of the country's 75 districts over the subsequent seven years. Monitoring surveys and other population-based surveys provide strong evidence that the program continues to be implemented effectively once it is established. This program is expected to be fully sustainable because it is fully mainstreamed within the Government's public health system and uses a well established, motivated cadre of FCHVs providing the critically important community-based delivery platform.

The program increased ANC attendance, coverage and compliance with IFA supplementation and deworming treatment

Strong and consistent evidence from a number of different surveys confirms that behaviors associated with anemia reduction and improved birth outcomes for mothers and newborns increased sharply with the roll out of the IIP. National results from DHS surveys in 2001 and 2006, and from a NFHP 'DHS-like' survey of 40 districts in 2009, are consistent with the results from multiple monitoring surveys undertaken by MI. Results of all surveys point to an almost doubling of ANC attendance, three- to four-fold increases in IFA coverage and compliance, and increases in deworming rates in pregnancy from near zero in 2001 to 60% in 2009. Because no other national programs promoted IFA and deworming interventions during this time period, it is reasonable to conclude that the IIP brought about these increases.

The finding that the program contributed to increased ANC attendance was important for several reasons. First, attending ANC clinics provides women with a package of services and screenings that are important for the safety of their deliveries and for the health of their newborns. This includes treating intestinal worms with albendazole, government mandates can only be distributed by trained health workers, not volunteers. Hookworm has been shown to be a major cause of anemia in Nepal and treating this infection with albendazole has been shown to bring substantial health benefits in terms of reducing anemia of women at birth and also substantially reducing mortality of infants to six months of age (Christian et al. 2004 ^{ibid}).

A further reason that increasing ANC attendance was important for this program is that some policy makers feared that allowing FCHVs to distribute IFA would cause a decrease in ANC attendance and thus were reluctant to allow this delivery channel to be opened. The thinking here was that pregnant women would be less likely to visit health facilities for ANC if they were able to receive IFA in their villages. The results on ANC attendance demonstrate that, with respectful and effective training, community volunteers understood clearly the advantages of attending ANC clinics and became strong and trusted advocates, encouraging their pregnant neighbors to attend clinics early and often.

Results from the 2009 evaluation of the IIP program highlighted an increased equity in coverage of IFA. The program was not shown to increase IFA coverage among literate women, but it increased coverage among illiterate women substantially, from under 60% to more than 85%. Given that illiterate women are at higher risk than illiterate women of adverse health outcomes including maternal death, this was a significant finding. It is interesting that a similarly beneficial equity outcome for child mortality was observed with universal vitamin A supplementation being delivered through the FCHVs.²⁹

This case study provides strong evidence that maternal anemia programs *can* be effective when they are implemented. The barriers to implementing anemia interventions such as IFA, deworming and malaria control as components of ANC are well established and were addressed effectively in Nepal. Yet the global maternal health

community seems reluctant to embrace these interventions, particularly universal IFA supplementation, as key to safe delivery and more healthy newborns. Some of this reluctance stems from skepticism that IFA programs are feasible. The Nepal IPP provides compelling evidence that this skepticism is not warranted.

Identifying the elements of success in the program

Why was this program successful? The consensus judgement of stakeholders in the program canvassed on this question is that in addition to existing health facility delivery, introduction of a community-based delivery platform provided -- motivated and respected FCHVs -- was the most critical element of success. These “near-peers” are trusted by the community and have also built community trust in the Government’s public health system by delivering a dependable supply of vitamin A and IFA supplements which are valued by the community.

The IIP training was carefully designed and delivered in ways that treated FCHVs respectfully. This respect was apparent in the underlying premise of the training: that volunteers with limited education could understand the basic principles of iron deficiency anemia and the barriers to consuming IFA. Further, the training aimed to strengthen the volunteers’ skills in counseling and advocacy, skills that would likely be valued by the community. The process used in engaging health workers and volunteers in implementing the IIP may well be as important to the success of the program as were the products and the content of the messages.

The implementation of the IIP may have strengthened the FCHVs program, but additional data are needed to confirm this assertion. Anecdotal reports indicate that the FCHVs were excited and motivated by having their services extended from children to mothers. Being informed about a condition as common as anemia, distributing IFA to address it, and being able to counsel mothers, as needed, on coping with side effects was likely recognized as useful by FCHVs, their clients and the community. Delivering these additional services likely increased the status and recognition FCHVs receive from the community.

The concepts of “trust,” “respect,” “community recognition” and “status,” although proposed as important elements of success, are difficult to quantify with rigor, and hence do not lend themselves to statistical analysis. Despite this, they were central to the success of the program.

In most countries, an unreliable supply of IFA has been the major constraint to performance of maternal anemia programs. The 2001 Anemia Review suggested that in Nepal, supplies of IFA were adequate at that time and hence not the major factor limiting program performance. Rather, the review concluded that it was a lack of awareness of the importance of anemia on the part of health workers that was the bottleneck. Effective program advocacy increased awareness of the adverse consequences of anemia and the effectiveness of IFA supplementation to address it among health workers, volunteers and communities. This resulted in greater overall demand for interventions to reduce anemia.

Additional factors that were important to the success of the program include:

- **Extending the logistics system to ensure that FCHVs had sufficient supplies of IFA to meet the increased demand created by the program.** Improving the packaging of IFA by providing small plastic bottles was reported to be an important innovation that improved compliance.
- **Addressing the key preventable causes of anemia, particularly deworming.** While proportion of anemia that is caused by iron deficiency varies, it is generally about 50%. In Nepal, deficiencies of vitamin A and worms have been very clearly identified as major causes of maternal anemia and therefore for programs to effectively reduce anemia, these other causes must be addressed.
- **Effectively monitoring at the community, district, and national levels.** Built upon the existing HMIS, the data are very accessible at the national level. There are acknowledged issues with underreporting (and in some cases overreporting) and the quality of the resulting coverage estimates is further reduced because denominators are estimated from outdated census data. Despite these difficulties, these data provide an excellent basis for discussions with district-level staff about improving program performance.
- **Communicating messages that clarified the adverse health consequences of anemia and the availability of interventions to address it to the key audiences, including health workers and volunteers.** Once these program functionaries were convinced, they became enthusiastic, committed advocates for the program.

The prevalence of maternal anemia in Nepal decreased between 1998 and 2006

The national prevalence of anemia among pregnant women in Nepal decreased between 1998 and 2006 by 44%, from 75% to 42%. For all women, the prevalence of anemia decreased over the same period from 68% to 36%, a 47% reduction. As impressive as these reductions are, maternal anemia remained a severe public health problem based on WHO criteria (prevalence of anemia in pregnant women above 40%). Results from the 2011 DHS were not available at the time this case study was prepared.

The sampling and methods of statistical estimation used in the 1998 and 2006 surveys were similar and both surveys used the Hemocue test for hemoglobin, adjusted for altitude. This should allow valid comparisons of results between the two surveys. There is no reason to believe that any systematic differences occurred between the two surveys in the use of the Hemocue that could explain such large reductions in prevalence.

The reductions in maternal anemia observed in Nepal are intermediate between those observed in Thailand and Nicaragua, where large maternal anemia programs have been implemented effectively.³⁰ In Thailand, the prevalence of anemia in pregnant women

decreased 35% over 17 years, from 40% in 1986 to 26% in 2003. In Nicaragua, the reduction in anemia prevalence among women of reproductive age^A was 85% over 16 years, from 34% in 1993 to 5% in 2009. These findings suggest that maternal anemia is relatively responsive to effective programming and/or temporal changes.

Was it the IIP program that brought about these reductions? Given strong efficacy data supporting IFA and deworming in reducing anemia in pregnant women, one can reasonably expect that the well-documented increases in coverage with these two interventions in Nepal would cause substantial reductions in maternal anemia. However, it seems very unlikely that the entire reduction described in 2006 can be attributed to the program. In 2006, the IIP had been rolled out in only 20 of the country's 75 districts, and so it is difficult to argue that this substantial reduction could have been attributed to the program. The multiple causes of anemia make it difficult to explain these reductions.

There were substantial differences in the reduction of anemia prevalence across ecological zones (**Table 3**). For women of reproductive age, the reduction in prevalence of anemia in the Hills and Mountains zones combined was approximately 67%, more than twice the reduction of 30% in the Terai. For comparison purposes, the reduction in preschool children in the Hills and Mountains combined was approximately 49%, also substantially larger than the 27% reduction in the Terai.

Explaining the differences in these reductions may help us better understand the causes of anemia and the effectiveness of programming efforts to address it. Seasonality may have a variable impact on anemia prevalence across ecological zones and, since the timing of the two surveys was different in the Terai, this may have reduced the apparent reduction there. The field work in the Terai in 1998 was carried out between late December and early February (12/22/97-2/10/98). In 2006, because of the conflict situation, field work in the Terai was delayed and took place in May-June during the 'hungry season' and peak incidence of infections associated with the monsoon rains. The extremely high prevalence of wasting among preschool children at that time (25%) indicated a period of very high nutritional stress. There are no data on seasonal variation of hemoglobin concentrations in Nepal, but we expect that a higher incidence of infections, perhaps exacerbated by food shortage, would increase the prevalence of anemia. This could explain some of the difference in anemia reductions across zones.

Factors not directly related to IIP activities that might help explain some of the reductions in anemia prevalence include:

- **Improved micronutrient content of the diet, particularly iron and vitamin A.** Diet quality indicators for women were reported in the 2006 DHS but not in 2001 and so data on changes in diet quality are not available. In 2006, the proportion of women with "iron-rich" diets in the Mountains, Hills and Terai

A. National monitoring data in Nicaragua are available for 'women of reproductive age' and not pregnant women. The maternal anemia program in Nicaragua includes several interventions in addition to IFA supplementation during pregnancy, most notably mass fortification programs of wheat flour with iron and sugar with vitamin A.

were 17%, 31% and 32%, respectively. For “vitamin A-rich” diets, the percentages were 67%, 78% and 77%, respectively, in the three zones.

- **Decreased prevalence of vitamin A deficiency in women.** Night blindness (XN) is an indicator of severe vitamin A deficiency that occurs most commonly during pregnancy. The prevalence of XN was measured in both the 2001 and 2006 DHSs.^A Nationally, XN decreased from 7.5% to 5.2% and the decreases were similar across the three ecological zones. In both surveys, the prevalence of XN in the Terai was higher than the prevalences in the Mountains and the Hills.
- **Increased coverage with postpartum vitamin A supplements.** The proportion of Nepali women receiving a vitamin A supplement shortly after delivery increased sharply between 2001 and 2006 (10.3% to 29.4%). The increase was similar across the three ecological zones.
- **Decreased fertility.** Longer intervals between births are associated with lower anemia rates. Nationally, birth intervals increased from 31.8 months in 2001 to 33.6 months in 2006. This increase was similar across all three zones (1.4 months in the Mountains and Terai, and 2.4 months in the Hills).
- **Increased literacy rates.** Higher literacy rates among women are associated with improved nutritional status and health indicators. The literacy rate among Nepali women was 54% in 2006 compared to 2001 (35.3%). The increase in the Mountains was higher (93%) than in either the Hills (47%) or the Terai (58%). The 2009 IIP evaluation reported consistently better compliance in literate women in all districts, regardless of whether the program had been implemented. The program was shown to increase substantially coverage and compliance with IFA among illiterate women.
- **Strengthened health system.** Efforts to strengthen the public health system in Nepal are likely to have improved the performance of all programs being implemented, including maternal health programs. For example, the Safe Motherhood program promoted ANC attendance during this period and would have increased IFA coverage and deworming rates independently of the IIP. A stronger health system would have also increased access to health facilities and ORCs providing ANC and postnatal care.

All the above factors probably contributed to the reduction in anemia rates observed in Nepal in 2006. However, none help explain the difference in reductions of two-thirds seen in the Mountains and the Hills as opposed to the one-third reductions seen in the Terai. It is expected that the data from the 2011 DHS will allow analyses that will shed some light on this difference and also will provide the data required to determine impact of the program on prevalence of maternal anemia.

It is notable that the maternal mortality ratio (MMR) in Nepal decreased from 539 deaths per 100,000 live births in 1996 (95% CIs: 392, 686) to 281 in 2006 (95% CIs: 178, 384). There was no overlap in the confidence intervals for the two ratios,

A. There is some debate about the method DHS uses to identify XN from other vision problems. Since we are more interested here in change of prevalence than absolute prevalence, this uncertainty is not relevant.

indicating a statistically significant decrease. As identified in the 2006 DHS report, factors likely to contribute to the reductions in maternal deaths include: improved quality of care, the frequency of ANC visits, the percentage of births delivered at health facilities, the percentage of births assisted by a skilled birth attendant, and the percentage of women receiving postnatal care.

Although less well-known, there is compelling evidence of a strong, likely causal, association between maternal mortality and prevalence of maternal anemia. Stoltzfus et al.^(ibid) observed in a meta-analysis that in pregnant women with hemoglobin levels between 5 and 12 g/dL, a 1 g/dL increase in hemoglobin was associated with a 20% decrease in the risk of maternal mortality. An unpublished study by Murray-Kolb et al. in 2010 updated the earlier analysis and is reported to have found a very similar result.

Kahn et al.^(ibid) identified anemia, independent of the postpartum hemorrhage, as the second-most-common cause of maternal mortality in the Asia region. The decrease in maternal mortality in Nepal observed between 1996 and 2006 appears to be entirely consistent with decreases that would be predicted from the observed decrease in prevalence of maternal anemia. Further analyses are warranted to determine the extent to which the decrease in maternal anemia may have contributed to the decrease in maternal mortality.

Issues for consideration in the future implementation of the program

The objective of this case study was to describe the IIP and its outcomes, not to evaluate it or make recommendations for its future design and implementation. However, during discussions about the program with stakeholders, a number of issues emerged that are important to the future of the program. These issues are identified and briefly annotated below in the hope that this will provide a useful basis for further discussion by program stakeholders.

- **Continued motivation of the FCHVs.** Several issues were raised, including:
 - **The risk of work overload** – the FCHV's community-based delivery of a number of interventions has helped several programs achieve enviable coverage. With this recognition has come interest from organizations seeking to expand delivery of additional interventions and the risk of “asking too much of volunteers.”
 - **The adequacy of monetary incentives for FCHVs** – Currently FCHVs receive small allowances twice annually to cover their expenses in participating in training updates. The adequacy of this financial incentive was questioned by many who suggest that the service of the FCHVs is being unfairly exploited. Others suggested that increasing financial incentives would: a) decrease the “status” that the volunteers' service has established for them in their communities, b) raise the expectations of community members that FCHVs provide a “more professional” level of service because “the government is paying them”; and c) weaken the “bridge of trust” between communities and the health system that the FCHVs have established.

- **Some FCHVs have become politically mobilized** – This is not surprising given the nature of the democratic process, and this reality has added a further dimension to the discussions/negotiations concerning the future of the FCHV program.
- **Clear guidance from FHD on the future of the FCHV program** at the national level, together with strong coordination and implementation of that guidance by district authorities, were suggested as needed by some.
- **Reaching the hard-to-reach:** Some suggested that review and planning of the program implementation at the district level were required to target those population groups not currently being covered.
- **Apparent under-reporting of FCHV activity through the current HMIS:** Some suggested there was a need to explore options for reviewing how FCHVs monitored and reported their distribution of IFA in the HMIS data system. Is the current system too onerous for FCHVs? Is the supply of registers adequate?
- **Changes in the cadre of VHWs:** VHWs have provided the key link between the FCHVs and the health facilities. The changes currently under way in this cadre threaten that link.
- **Standardizing messages:** There are some data suggesting that confusion existed among both health workers and volunteers about whether iron supplementation was really necessary *in pregnancy*. Some nutrition messages were interpreted as saying that food-based interventions were adequate, without IFA, to prevent and treat anemia for the entire population. These messages did not include the caveat that this was not true for pregnant women. This message was misinterpreted by many as meaning that iron supplementation was not needed during pregnancy and thus these messages became an important barrier to advocating for IFA consumption. While the message that food-based interventions prevent anemia is true and useful for diets in many population groups, it is certainly not true for pregnant women with any diet. All programs addressing maternal anemia need to ensure consistent messaging that supplementation with iron is essential during pregnancy to meet its substantially increased requirements.
- **Program review:** The program design, implementation, training and communication materials were last modified in 2006. Some suggest it is time to review and modify/strengthen the entire program and its components, as needed. The Program Assessment Guide would provide one mechanism with which to do this.

Transferring the Nepal IIP model to other countries

Given the success of the IIP in increasing ANC attendance and coverage with IFA supplementation and treatment for worms, what can be learned and applied to strengthen programs in other countries? The Nepal program demonstrated that the following are required:

1. Government awareness of maternal anemia as an urgent public health priority and a commitment to incorporate into the public health system the necessary and multiple interventions required to address it as key components of standard ANC.
2. A sustainable mechanism for community-based delivery that increases access to iron supplements. Coverage and compliance with daily supplements depends upon supplies and counseling that facilities simply cannot deliver.
3. An institution capable of effectively launching the program within the selected unit of the health system responsible for managing the program once it is launched. A local group would be more likely than an expatriate group to lead this process and have the cultural insights needed to develop the active participation in, and local ownership of, the program and to be able to motivate health workers and community volunteers in ways that create a sustainable program.
4. A monitoring system through which accurate information flows from the community up to the national level and that allows action to be taken at the appropriate level in a timely manner.
5. Refresher training provided to all program functionaries.
6. Systematic and patient scale up over a period of years that is determined by the capacity of all components of the health system that are required to support the program.
7. An external donor willing to provide predictable financial support and technical assistance over a period of a decade or more.

CONCLUSION

The Nepal program substantially increased coverage and compliance with IFA and other anemia interventions. This success has resulted from:

- A combined health facility and community-based delivery platform of motivated and respected FCHVs. These “near-peers” are trusted by the community and their activities have built community trust in the health system;
- Increased awareness of anemia in the health system and communities that resulted in increased demand for both quality care and products;
- A strengthened logistics system that greatly expanded access of products with improved packaging.
- Addressing the key preventable causes of anemia, particularly deworming; and,
- Effective monitoring at the community, district, and national levels.

The multiple causes of anemia and multiple programs being implemented make attribution difficult. The 2011 DHS will provide the data required to determine the impact of the program on the prevalence of maternal anemia.

The Nepal program demonstrates that maternal anemia programs can, indeed, be implemented effectively. The authors believe it is likely that the Nepal program will join the maternal anemia programs in Thailand and Nicaragua in demonstrating that effectively implemented programs result in substantial reductions in maternal anemia. Current skepticism concerning the feasibility of implementing effective maternal anemia control interventions as components of ANC is not warranted.

Tables

Table 1: Overview of Key Events of the Nepal Iron Intensification Program and Other Events Related to Addressing Maternal Anemia

Year	Event	Significance	Source/Report
1980s	Nutrition Policy recommends daily IFA for pregnant and lactating women	IFA to be distributed by health workers from facilities. IFA provides 60 mg iron as ferrous fumarate/sulfate. Donors support IFA procurement	
1988	FCHV program established within Family Health Division, replaces predecessor CHL program	Establishes community-based delivery platform used by Iron Intensification Program, among other interventions	
1995	FCHV program completes selection of volunteers in all 49,000 wards of the country	Involvement of FCHVs in National Vitamin A supplementation program is recognized by many as invigorating/motivating the cadre, establishing FCHVs in their communities as trusted and respected 'near-peers,' building trust between communities and the Gov't health system	Getting to the Roots. UNICEF, http://www.ntagonline.org/images/img/Publications/gettingtotheroots.pdf
1996	Nepal DHS I carried out with USAID funding	Provides ANC coverage data, no assessment of IFA coverage or hemoglobin; maternal mortality rate 539 deaths per 100,000 live births	
1997	Nepal Multiple Indicator Surveillance (Fifth Cycle) undertaken with UNICEF funding	Provides ANC coverage data, assessment of IFA coverage	http://www.ciet.org/en/project/nepal-children-six-surveys-on-health-nutrition-water-and-san/
1998	Nepal National Micronutrient Survey undertaken with MI funding	Among other nutrition findings, establishes anemia in women and children as severe public health problem. Uses same sampling frame and methods as DHS I. 75% of pregnant women are anemic	Hard and e-copy available at MI Nepal office.
1999	Operations research in 2 districts to determine effectiveness of FCHVs delivering IFA	UNICEF and MI provided financial and technical support to HKI and NTAG to implement this study. The study demonstrated effective IFA delivery through FCHVs	Hard copy available with MI Nepal.
1999	Operations research in 2 districts to determine effectiveness of FCHVs delivering vitamin A to postpartum women	MI funded HKI to implement the study, which demonstrated effective delivery of vitamin A capsules to postpartum women through FCHVs (around 90% coverage achieved)	Hard copy available with MI Nepal.
2001	Nepal DHS II carried out with USAID funding	Provides ANC coverage data, 23% of pregnant women take any IFA, no assessment of hemoglobin	www.measuredhs.com/pubs/pdf/FR191/FR191.pdf
2001	MI commissions review of anemia situation in Nepal, includes an update on international anemia programming experiences	Conclusions inform development of Iron Intensification Program (IIP) and Five-Year Plan to Control Anemia	Malla S. Anemia in Nepal, review report. MI. E-copy available at MI Nepal.
2003	MI, UNICEF, and WHO provide financial and technical support to Nutrition Section/CHD to launch IIP in 5 districts	Donor support enables team including MI to design and produce training curriculum, communication materials. NTAG contracted to provide trainers to implement the program	
2004	Iron Intensification Program launched in 3 districts (jointly with a pilot project on low-dose vitamin A supplementation for treatment of night blindness among pregnant women)	UNICEF supported (with funding support from MI in two out three districts) expansion of IIP along with the night blindness treatment pilot project. NFHP provided M&E support for the pilot project	
2004	Evaluation of IIP in first five districts	Results from monitoring survey in 5 MI-supported districts are sufficiently encouraging to move forward with scale up to an additional 36 districts over 3 years	MI internal documents such as the 3-year project agreement signed with Social Welfare Council in 2004 for providing support to expand the program to 36 districts
2005-2008	Monitoring surveys undertaken annually from 2005 – 2008 (except in 2007)	MI funds monitoring surveys to describe coverage and compliance	Latest available is 4th endline survey in published in 2008

Table 1: Overview of Key Events of the Nepal Iron Intensification Program and Other Events Related to Addressing Maternal Anemia (continued)

Year	Event	Significance	Source/Report
2005	Five-Year Plan of Action for the Control of Anemia among women and children in Nepal 2062/63-2066/67 (2005/06-2009/10) developed with technical support from MI and other partners	Recommends Action Plan with 8 components to address anemia comprehensively; endorses IIP and provides program a broader policy context; Endorses IIP as primary intervention addressing maternal anemia; Documents Government approval for FCHVs to distribute IFA	Hard copy available at Nutrition Section/CHD and e-copy available at MI Nepal
2005-2011	Systematic scale up to cover 70 of 75 districts by 2011. MI supports 12 in 2005, 12 in 2006, 2 in 2007, 9 in 2008, 10 in 2009, 6 in 10 and 2 in 2011. UNICEF supports 7 in 2006-07. WHO and PATH each support 1 in 2005-06.	MI is primary donor supporting scale up in 60 districts. NTAG provided initial training support in 68 districts. While DHO organized training in one district with WHO funding support, a local NGO conducted training in one district with funding support from Plan Nepal	Mapped in Figure 7.
2003-2011	MI engages consultant to assist in monitoring program performance in all districts	In initial few years, the consultant was contracted for full time and later years gradually reduced (25% of time in 2011)	
2003-2006	Meeting of all NGOs/INGOs convened to provide guidance for consistency of messaging and implementation	Coordination with NFHP, CECL, Impact Nepal, Care Nepal, Plan Nepal, Population and Reproductive Initiative (PARI) established	
2006	Nepal DHS III with USAID support	Includes both hemoglobin assessment and ANC coverage; percent taking IFA; identifies substantial reductions in anemia since 1998 for both women (68%-36%) and children (78%-48%); maternal mortality rate reduced to 281	www.measuredhs.com/pubs/pdf/FR191/FR191.pdf
2007	Nepal Plan of Action for Nutrition (NNPAN) presented to National Planning Commission (NCP)	Comprehensive review of food security and nutrition status and programs, endorses continuation of IIP. Not endorsed by NCP	
2008	Fourth Endline survey commissioned by MI.	New Era survey compares coverage and compliance in 2008 in the 5 districts MI initially supported with baseline data. Confirms sustainability of process and impact on coverage and compliance	Hard copy available at MI Nepal
2009	Evaluation of the IIP commissioned by MI, confirms sustained effectiveness in increasing coverage and compliance in districts covered by the program. Identifies relatively high coverage and compliance in some districts for which no plans had been developed to implement the program.	Compares program performance in three sets of districts: A-districts with program established more than 12 months, B-districts with program to be implemented in 2010, C-districts where there are no plans to implement program in 2010	Hard copy available at MI Nepal.
2009	Nutrition and Gap Analysis (NAGA) process initiated	Builds on 2007 NPAN to recommend multi-sectoral plan of action endorsed by NPC in 2010. Endorses continuation of IIP	
2011	Revision being undertaken to Five-year Plan of Action for the Control of Anemia among women and children in Nepal	MI commissions consultant to review and update Five year plan.	
2011	PAG mini-workshop in Nuwakot District	Pilot PAG establishes a potentially useful mechanism for districts to review and strengthen their maternal anemia programs	Electronic and hard copy available through A2Z Project

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