

**A MICRONUTRIENT STRATEGY FOR
USAID INDIA**

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TABLE OF CONTENTS

ACRONYMS	ii
EXECUTIVE SUMMARY	iii
1. THE MICRONUTRIENT CHALLENGE	1
1.1 Magnitude and distribution of micronutrient deficiencies	1
1.2 Sources of micronutrients	1
1.3 Physiological consequences of micronutrient malnutrition	2
1.4 Economic consequences of micronutrient malnutrition	3
1.5 Causes of micronutrient deficiencies	4
1.6 Global response to micronutrient deficiency	5
2. GOVERNMENT OF INDIA'S MICRONUTRIENT PLAN OF ACTION AND STRATEGY	6
3. USAID/INDIA'S MICRONUTRIENT ENVIRONMENT	8
3.1 Micronutrient-related activities in USAID/India supported programs	8
3.1.1 Strategic objective 2: reduced fertility in northern India	8
3.1.2 Strategic objective 3: increased child survival and improved nutrition in selected areas	9
3.2 Micronutrient situation in USAID's focus states	12
4. USAID/INDIA'S MICRONUTRIENT STRATEGY	15
4.1 The goals of the USAID with respect to micronutrients	15
4.2 Strategic choices	15
4.2.1 Which micronutrients?	15
4.2.2 Which target groups?	16
4.2.3 Which states?	16
4.2.4 Which interventions?	16
4.3 Success measurement	19
5. THE PROGRAM OF WORK	21
5.1 Introduction	21
5.2 The players	21
5.3 Interventions and settings	21
5.4 Mode of operation	23
5.4.1 Time line	23
5.4.2 Implementation plan	23

ACRONYMS

ANM	Auxiliary Nurse Midwives
CO	Contracting Office
CRS	Catholic Relief Services
CSSM	Child Survival and Safe Motherhood Programme
DA	Development Assistance
FAR	Federal Acquisition Regulations
FY	Fiscal Year
GOI	Government of India
G/PHN	USAID Global Bureau/Office of Population, Health, and Nutrition
ICDS	Integrated Child Development Services
ICN	International Conference on Nutrition
IFPS	Innovations in Family Planning Services
INHP	Integrated Nutrition and Health Program (CARE)
MP	Madhya Pradesh
NFHS	National Family Health Survey (comparable with DHS)
NGO	Non-Governmental Organization
NPA	National Plan of Action
OMNI	Opportunities for Micronutrient Interventions
PERFORM	Program Evaluation Review for Resource Management
PVO	Private Voluntary Organization
PVOH	Private Voluntary Organizations for Health
QCHT	Quality Control for Health Technologies
SIFPSA	State Innovations in Family Planning Services Agency
SO	Strategic Objective
UP	Uttar Pradesh
UNICEF	United Nations Children's Fund
WACH	Women and Child Health Program
WFP	World Food Program
WHO	World Health Organization
WIN	Women's Initiative Project

EXECUTIVE SUMMARY

Micronutrient malnutrition is a serious threat to the health and productivity of more than 200 million people in India. Because of their high prevalence and close association with morbidity and mortality, the three micronutrient deficiencies of greatest public health significance are iron, vitamin A, and iodine. Iron deficiency during pregnancy has severe consequences for both the mother and the newborn infant and lowers the work productivity of others. Vitamin A deficiency is a major cause of child blindness and is associated with increased morbidity and mortality in pre-school children. Iodine deficiency retards physical and mental growth and development in infants and young children and increases the risk of neonatal death. In sum, micronutrient malnutrition has severe implications for the social and economic development of individuals, communities, and the country.

Micronutrient deficiencies, however, are preventable. With the exception of iodine in certain ecological settings, micronutrients are abundant in non-cereal plant foods and animal products. Thus, the major cause of deficiencies is the inadequate intake of micronutrient-rich foods. There are, however, other factors that may predispose individuals to micronutrient malnutrition. These are the increased requirements due to pregnancy and lactation and losses from infections and parasitic infestations, as well as the presence of absorption inhibitors in foods.

USAID's role in increasing the international awareness of micronutrient malnutrition was instrumental in the setting of the worldwide goal to reduce and ultimately eliminate micronutrient deficiencies at the 1990 World Summit for Children. This was endorsed at the 1991 Ending Hidden Hunger Conference and the 1992 International Conference on Nutrition. The goals are the virtual elimination of iodine deficiency disorders; the virtual elimination of vitamin A deficiency and its consequences including blindness; and the reduction by one-third of the 1990 level of iron deficiency anaemia among women of child bearing age - all by the year 2000. It is within the context of the global movement to eliminate micronutrient malnutrition that USAID/India developed its micronutrient strategy.

USAID/India will actively support the transfer of technology, skills, and knowledge on micronutrient-related issues through both technical assistance and institutional capacity development. The strategy aims to take existing technologies and approaches and apply them to USAID's priority states in on-going and proposed USAID supported child survival and population programs. By means of demonstration, the results of these activities will hopefully influence national policy and programs. The micronutrient strategy is consistent with USAID/India's Results Framework and Strategic Objectives 2 and 3; thereby contributing to a reduction of fertility and improvement of child survival and nutrition.

The USAID/India micronutrient strategy will focus its efforts on reducing the prevalence of micronutrient deficiencies in children under 3 years of age and in women of reproductive age, thereby improving their health both before and during pregnancy, which will

contribute to reducing neonatal, infant, child, and maternal mortality. Emphasis will be placed on the broad-scale transfer of technologies, skills, and knowledge to support policy and program objectives that can be integrated into ongoing child survival and Title II programs as well as the IFPS, WACH, and WIN programs. The target groups are infants, young children, and pregnant and lactating women. Priority will be given to programs in Madhya Pradesh. Effective micronutrient interventions will be developed and implemented through collaboration with both the public and private health institutions and organizations. Multiple approaches that include pharmacological supplementation, public health measures, diet diversification, and social marketing and nutrition education will be implemented at the individual and community level.

Specific options include:

1. Conducting a comprehensive situation analyses on the demand and supply for pharmaceuticals that impact on vitamin A and iron status in Madhya Pradesh and Orissa. The findings will be used to strengthen activities to create a demand for supplements at the individual and community level, capacity building of health care personnel, etc, and to strengthen activities to improve the supply of micronutrient supplements.
2. Improving iron status as part of birth spacing. Anemia in pregnancy is serious despite the distribution of iron supplements as part of prenatal care at clinics. A study of the feasibility of iron supplementation to pre-pregnant women will be done in Madhya Pradesh.
3. Helminth treatment in the last trimester of pregnancy. Other factors that reduce anemia include deworming and malaria control. The feasibility of deworming in late pregnancy as part of the iron/folate supplement program and its additional impact on iron status will be studied in Madhya Pradesh.
4. Malaria vector control to reduce anemia. Using CARE's community-based bednet program in Orissa, the effectiveness of malaria vector control to improve iron status of women and young children will be examined. The feasibility of augmenting this impact through the implementation of an effective antihelminth and iron/folate supplement program will also be studied. This may include exploring the possibilities of creating awareness among participants about the need for regular deworming such that people will buy antihelminths.
5. *Post-partum* supplementation with vitamin A. A study to determine the feasibility of providing a vitamin A supplement to mothers within eight weeks of delivery within the existing health care system will be conducted in Madhya Pradesh.

6. Micronutrient indicators for the National Family Health Survey. Appropriate baseline and impact indicators to be reported through the NFHS, such as hemoglobin measurements using the portable, low cost HemoCue; nightblindness during pregnancy that can be used as a proxy for improvements in vitamin A status; and appropriate infant feeding questions that show micronutrient-related behavior change will be developed.
7. Information dissemination. A strategy for information dissemination that includes the translation of scientific findings into effective delivery systems will be developed.

The Strategy will be implemented by USAID/India in cooperation with the Global Bureau's Center for Population, Health, and Nutrition's Opportunities for Micronutrient Nutrition Interventions (OMNI) Project. The Strategy covers the first two years (FY97 and 98), by which time preliminary results will be available that can be used as the basis for future work. This period also coincides with the remaining contract period for the OMNI Project.

1. THE MICRONUTRIENT CHALLENGE

Adequate micronutrient status contributes significantly to maternal as well as child health and survival because micronutrients are vital and integral elements in many physiological processes. The most important micronutrient deficiencies are iron, vitamin A, and iodine. However, there are other biologically significant micronutrients such as selenium, zinc, calcium, copper, folate, vitamins C, D, and the B-complex. These are important in certain settings but are not dealt with in detail in this strategy for India.

1.1 MAGNITUDE AND DISTRIBUTION OF MICRONUTRIENT DEFICIENCIES IN INDIA

Nationally, over 200 million people do not eat sufficient food to meet their basic daily energy and protein needs and the majority of these subsist on diets that lack adequate amounts of essential vitamins and minerals.

Lack of iron manifested by anaemia is the most common nutritional deficiency. It has been estimated that about one in two women in their third trimester of pregnancy is anemic, but anemia is also highly prevalent in non-pregnant women including adolescent girls. Globally, severe anaemia can be an associated cause in 50 percent, and the main cause in 20 percent, of maternal deaths.

Due to poor maternal nutrition, about one in three Indian infants is born with a low birth weight predisposing them to malnutrition from the start. This is reflected in the fact that one in two preschool children is chronically undernourished and between one and two children in five is anaemic.

Vitamin A deficiency tends to cluster by household, community, and geographic location and is recognized as being a public health problem throughout India. An estimated 8 million pre-school children are at risk from vitamin A deficiency in India. Between one-quarter and one-half of the severely deficient children become blind and more than one-half of these die within months of losing their sight.

Iodine deficiency clusters by geographic location. More than 167 million people are at risk of iodine deficiency in India. At least 54 million have evidence of goiter or other overt consequence of iodine deficiency, more than 2 million are cretins, and more than 6.5 million have mild neurological disorders.

1.2 SOURCES OF MICRONUTRIENTS

Iron is available naturally in two forms. As heme iron in meat and, to varying degrees, in all plant food as non-heme iron. In India, as in most developing countries, the majority of dietary iron is non-heme derived from fruits, vegetables, cereals, roots, and tubers. Between

25 and 35 percent of heme iron is absorbed as opposed to only 2 to 20 percent when the iron is in the non-heme form.

The bioavailability of non-heme iron can be enhanced through consumption of vitamin C-containing foods, protein, and heme iron. Given that meat intake is generally low, vitamin C is usually the single most important enhancer of iron absorption. Iron bioavailability may also be improved by limiting the amount of iron absorption inhibitors, such as phytates and tannin, consumed at meals. For infants under 6 months old breast milk is the most important source of iron, because although it is not present in high levels, its bioavailability is as high as 50 percent.

Vitamin A is available as preformed vitamin A or retinol in some animal products, notably liver and milk, and beta-carotene and other carotenoids in plant material, particularly green leafy vegetables, and yellow vegetables and fruits. Carotenoids are converted into vitamin A in the body but their activity is much less than that of retinol. In India, over 80 percent of vitamin A in the food supply comes from plant sources. Colostrum and early milk are rich and readily absorbable sources of vitamin A for newborn infants. Thus, breast milk remains an important source of vitamin A so long as breastfeeding continues.

Iodine is commonly available in the soil and universally in sea water. Iodine, however, is unevenly distributed in earth and iodine deficiency is particularly common in mountainous and flood plain areas such as the Indian Terai. Food grown on iodine replete soils provide sufficient iodine to meet daily requirements.

1.3 PHYSIOLOGICAL CONSEQUENCES OF MICRONUTRIENT MALNUTRITION

Iron plays a central role in transporting oxygen from the lung surface to cells throughout the body; it also plays an essential role in many enzymatic systems.

Rapidly growing infants, children, and pregnant and lactating women are those most vulnerable to iron deficiency. The consequences of this deficiency in infants and children include growth retardation and delayed mental and behavioral development. In pregnant women, iron deficiency is associated with low birth weight and prematurity which, in turn, is linked to perinatal mortality. Although inconclusive, there is evidence to suggest that severe maternal iron deficiency causes reduced iron storage in the fetus and newborn infant, thus predisposing them to iron deficiency anaemia. Severe iron deficiency anaemia in pregnancy increases the risk of maternal mortality in childbirth. Among the population at large, iron deficiency causes diminished learning ability, decreased work capacity, and increased susceptibility to infection.

Vitamin A is required for the proper maintenance and function of epithelial tissues and the immune system. It also plays a vital role in vision and growth.

Young children aged 6 months to 6 years are those most vulnerable to vitamin A deficiency, although older children and pregnant women are also affected. Clinical and sub-clinical vitamin A deficiency among children aged 6 months to 6 years increases their risk of mortality and affects the course and outcome of infectious diseases. For example, vitamin A deficient children are at greater risk of complications and deaths from measles; they are also more prone to severe diarrhoea. In its severest form, vitamin A deficiency results in blindness. Vitamin A deficiency in pregnant women can result in severe xerophthalmia in utero thus increasing the vulnerability of newborn infants to infection and death. Vitamin A deficiency also has adverse effects on fertility.

Iodine is needed to make thyroid hormones. These hormones are essential for normal physical growth and development, normal development and function of the brain and nervous system, as well as for maintenance of body heat and energy.

The one at greatest risk of iodine deficiency is the developing human, beginning in fetal life. In order to protect the developing brain, both before and after birth, women of childbearing age are the prime targets for correcting iodine deficiency, which manifests as goiter, hypothyroidism, and mental retardation. Iodine deficiency among children also results in increased morbidity because resistance to infection and to other nutritional disorders is reduced. Severe iodine deficiency in women results in reproductive failure and a high risk of giving birth to cretins.

Micronutrients act synergistically in the body, thus the lack of a specific nutrient in the diet can have adverse effects on the metabolism of other micronutrients. Vitamin A deficiency, for example, disrupts iron metabolism and there is evidence to suggest that it may compound the effects of iodine deficiency. Protein-energy malnutrition interferes with iodine metabolism and reduces the absorption of carotenoids. Zinc deficiency and high fibre diets also reduce the absorption of carotenoids. Zinc can also compete with iron for absorption thereby disrupting iron metabolism.

1.4 ECONOMIC CONSEQUENCES OF MICRONUTRIENT MALNUTRITION

Micronutrient malnutrition has an adverse effect on social and economic development and thus national development. Individuals who are iron or iodine deficient are mentally slower and less active. They are not only harder to educate but they constrain the efficiency and effectiveness of primary school educational systems. Micronutrient deficient individuals are also less productive in their work and more likely to be absent due to the increased risk of being sick. Furthermore, low worker productivity can have negative effects on wage rates.

Severe deficiencies of both vitamin A and iodine result in more handicapped individuals dependant on others for their care. This has economic implications at the household level in terms of the opportunity cost of caring for the handicapped or the cost incurred in paying for a care taker. At the national level, additional resources will be needed

for special institutions for the handicapped.

Even in their less severe forms, micronutrient malnutrition increases the burden on health care systems due to the increased levels of morbidity resulting from the decreased resistance to infection. Increased morbidity also increases the economic burden on families because of both the medical expenses and the work time lost through tendering the sick.

Because micronutrients act synergistically, investing in the elimination of micronutrient malnutrition has implications that go beyond eliminating clinical aspects of specific deficiencies. Furthermore, the benefits are passed from generation to generation. The economic gain from addressing micronutrient deficiencies, especially in enhancing the returns to investments in health and child survival, primary school education, and labor productivity alone, greatly exceed their costs. While there are no formulae to determine the exact cost-benefit ratios of existing micronutrient intervention programs, there is consensus that the available solutions are cost effective. Investing in the eradication of micronutrient malnutrition, therefore, increases both the availability of human capital and the capacity for future economic growth.

1.5 CAUSES OF MICRONUTRIENT DEFICIENCIES

Iron deficiency results from a range of factors including inadequate dietary intake, poor bioavailability of dietary iron, the presence of iron absorption inhibitors in food (for example, phytates in wheat and other cereals, tannins in tea), and increased iron requirements due to pregnancy or losses from infectious and parasitic diseases.

Vitamin A deficiency can arise from inadequate dietary intake, increased requirements due to pregnancy and lactation, and as a result of losses from bacterial and parasitic diseases. Social and cultural factors may also preclude the consumption of foods rich in vitamin A in young children. Diets low in fat also limit the amount of vitamin A that is absorbed.

Iodine deficiency primarily results from the consumption of animal products and crops grown on soils that are deficient in iodine. In some areas iodine deficiency is exacerbated by the consumption of goitrogen-containing foods that interfere with the utilization of iodine.

While the principal causes of micronutrient malnutrition is dietary deficiency compounded by infection, it is only by addressing the underlying and basic causes of malnutrition that deficiencies can be eliminated. Such underlying causes include poor health infrastructure; poor market networks; inadequate caring capacity and practices; inequitable intra-household food, health and care distribution; low levels of maternal education; and poor sanitation. These causes are often superimposed on poverty; seasonal patterns of disease and food availability; harsh living environments; and detrimental social and cultural practices. Taken together they represent an immense challenge.

1.6 USAID'S RESPONSE TO MICRONUTRIENT DEFICIENCIES

Throughout the last two decades increasing attention has been given by the international community to micronutrient malnutrition. Indeed, the International Nutritional Anaemia Consultative Group (INACG), the International Vitamin A Consultative Group (IVACG), and the International Council for the Control of Iodine Deficiency Disorders (ICCIDD) were all set up to co-ordinate and stimulate action to control and eliminate micronutrient malnutrition at both the international and national level. Together with UNICEF, WHO, USAID, and other bilateral donor agencies, these Consultative Groups have increased the global awareness of the significance of micronutrient malnutrition on both human welfare and national development.

This increased awareness was instrumental in ensuring that micronutrient issues were included in the 1990 "World Summit for Children". Among the goals set for the year 2000 at this summit, and signed by some 80 governments, were three specifically related to micronutrient malnutrition. These were:

- virtual elimination of iodine deficiency disorders as a public health problem;
- virtual elimination of vitamin A deficiency and its consequences, including blindness; and
- reduction by one-third of the 1990 levels of iron deficiency anaemia among women of child bearing age.

The 1991 Montreal conference "Ending Hidden Hunger" and 1992 International Conference on Nutrition's (ICN) "World Declaration and Plan of Action for Nutrition", which pledged to meet the World Summit goals, was signed by 159 governments and fully supported by the international community and non government organizations (NGOs). In addition to micronutrient malnutrition, the World Summit for Children and the ICN also addressed the topics of child survival, household food security, and the nutritional needs of the socially and economically deprived, including the victims of drought and famine as well as girls and women. These paradigms are all embodied in the goal to eliminate micronutrient malnutrition.

Within the context of the global movement to eliminate or control micronutrient malnutrition, USAID/India has developed the strategy presented in this paper. This strategy is based on needs or demand rather than being supply driven. It also takes into account USAID's Strategic Objectives 2 (reduced fertility in North India) and 3 (increased child survival and improved nutrition in selected areas) and incorporates USAID's concern for sustainability, cost-effectiveness, and gender issues. While its main thrust lies in institution building and infrastructural development, it also addresses issues of research in areas where there are gaps in the knowledge necessary to implement key elements of the program.

2. GOVERNMENT OF INDIA'S MICRONUTRIENT PLAN OF ACTION AND STRATEGY

In 1995, the Government of India (GOI) identified 10 National Nutrition Goals, which include the *elimination of blindness due to vitamin A deficiency* and the *reduction in iron deficiency anemia among pregnant women to 25%*. The overall strategy includes increasing the awareness of energy and micronutrient deficiencies and empowering household and communities to tackle them through existing resources. Fourteen sectoral Plans of Action were developed and, as Table 1 shows, many include specific objectives that cover micronutrients. The Department of Women and Child Development is responsible for coordinating, monitoring, and regulating the implementation of the National Plan of Action on Nutrition.

Table 1
Sectors Included in the National Plan of Action on Nutrition and
Specific Micronutrient Related Objectives

SECTOR	SPECIFIC OBJECTIVE
1. Agriculture	To give due emphasis to the development of horticulture and promote the production of vitamin A (beta-carotene) and iron rich foods and increase awareness to improve consumption
2. Civil Supplies and Public Distribution	(nothing explicit)
3. Education	To incorporate basic health and nutrition education in school curriculum
4. Food	(nothing explicit)
5. Forestry	To identify forest species rich in different nutrients with special emphasis on beta-carotene for different geographical regions and adopt in Social/Farm Forestry Programme
6. Maternal and Child Health (Family Welfare)	Elimination of blindness due to vitamin A deficiency and reduction of Bitot's spots in preschool children to less than 0.5% Reduction of iron deficiency anaemia among pregnant women to 25% Universal coverage under Child Survival and Safe Motherhood (CSSM) Programme Reduction in incidence of low birth weight babies to less than 10%
7. Food Processing Industries	To develop and produce low cost instant health foods particularly for children To undertake fortification and enrichment of common foods with vital nutrients like vitamin A, iron, and iodine
8. Health	Promoting appropriate diets and healthy life styles
9. Information and Broadcasting	Allocating free time for communicating nutrition messages during the prime time on Doordarshan Screening all commercial advertisements having a bearing on nutrition and health of people with a view to check misinformation reaching the people
10. Labor	To ensure optimum nutrition besides safety, health, and welfare To review policy related to special target groups such as women and child labour with a view to incorporate nutrition component in the same
11. Rural Development	(nothing explicit)

12. Urban Development	To contribute towards the achievement of mid-decade and NPA Goals with specific reference to improving the nutritional status of groups at risk including women; adolescent girls, children 0-2 years and preschool children among the urban poor with emphasis in Class I and Class II size cities/towns which comprises over 70% of urban populations
13. Welfare	To incorporate nutrition components in the form of nutrition education and training in tribal development programs, education programs for tribal girls, welfare of the disabled, drug addiction etc To prevent disabilities due to nutritional deficiencies
14. Women and Child Development	To undertake fortification of foods with essential nutrients like iron, vitamin A etc To control support of micronutrient deficiencies by sensitizing policy makers, professional groups, programme personnel, extension workers, and beneficiaries

Complementing the nutrition strategy, and partly in response to the 1994 Cairo International Conference on Population and Development's Plan of Action, GOI has begun to place much more emphasis on reproductive health and less on meeting quotas for family planning. This refocus within the family planning program has also affected other GOI programs. For example, GOI is actively encouraging the Ministry of Health and Family Welfare to work more closely with the Ministry of Women and Child Development, which is responsible for the Integrated Child Development Services (ICDS). The resulting coordination between the *anganwadi* worker of the ICDS with the auxiliary nurse midwife (ANM) of the Health Ministry will be critical to the success of the large USAID supported Title II program managed by CARE.

3. USAID INDIA'S MICRONUTRIENT ENVIRONMENT

3.1 MICRONUTRIENT-RELATED ACTIVITIES IN USAID/INDIA'S SUPPORT PROGRAMS

USAID/India overall goal is sustainable development with four sub-goals:

- a. Accelerate broad-based economic growth;
- b. Stabilize India's population;
- c. Enhance food security; and
- d. Increase environmental protection.

These sub-goals relate directly to the Agency's overall goal in a results framework of (i) broad-based economic growth achieved (Strategic Objective (SO) 1); (ii) world's population stabilized and human health protected in sustainable fashion (SO 2 and SO 3); (iii) lives saved, suffering reduced, and development potential reinforced (SO 3); and (iv) environment managed for long term sustainability (SO 4, 5, 6). The Mission has six Strategic Objectives (SOs) and two Special Objectives.

An impact on micronutrient malnutrition can be achieved through changes in all four Agency goals and each of the Mission's Strategic Objectives. Most significant in the short to medium term, however, are the results to be achieved by the Mission under Strategic Objectives 2: Reduced fertility in North India; and 3: Increased child survival and improved nutrition in selected areas. Together, these two SOs represent approximately one-half of the Mission's total Development Assistance (DA) funds for FY96 and the allocation is expected to increase over the next few years. When DA funds are combined with the contribution from Title II food aid, in terms of food and its monetization, the scale of the amounts of Mission resources under SO 2 and SO 3 are substantial.

3.1.1 Strategic Objective 2: Reduced fertility in North India

The Mission is committed to assisting GOI to reduce fertility rates by 25 percent in two key states, Uttar Pradesh (UP) and Madhya Pradesh (MP) from 1992 to 1998. These trends will be tracked through the USAID funded National Family Health Surveys (NFHS); the second of which is scheduled for 1998. The intermediate result is the increase in the contraceptive prevalence rate, which will be achieved through NGO programs and GOI policy changes.

The main activity for achieving fertility reductions is through the **Innovations in Family Planning Services (IFPS) Project**, which works with the public sector and NGOs to broaden the choice of contraceptives available and to improve the delivery of the choices, especially in UP. A major part of the IFPS program focuses on six districts with special attention to technical training for medical officers as well as training on family planning counseling mainly targeted to ANMs. The program also targets private rural practitioners to

increase the demand for child spacing methods.

In UP, the Mission provides family planning through more than 35 local NGOs working with grants under the IFPS Program that are implemented through the State Innovations in Family Planning Services Agency (SIFPSA), an NGO. SIFPSA has a NGO training center in Lucknow, the state capital, which provides information and training in proposal development, management, financial reporting, and technical areas related to service provision, maternal and child health interventions, gender sensitization, etc. SIFPSA receives funds based on achievement of certain benchmarks that will be monitored through the Program Evaluation Review for Resource Management (PERFORM) system of indicators. The program in UP combines health, literacy, and income generation programs with innovative family planning inputs.

USAID/India is currently designing the **Women and Child Health (WACH)** program that is expected to start in 1997, which will focus on interventions that address infant and child mortality (especially neonatal mortality) and improved women's health, concentrating on improved accessibility and use of contraception methods in MP. There is also an interest to target adolescent girls. Among the interventions being considered that will improve micronutrient status are iron supplements, deworming pregnant women, malaria control, and dietary diversification.

A related activity under SO 2 and SO 3 is the **Women's Initiative Project (WIN)** that is also in the design phase. The project aims to empower women to achieve greater control over their reproductive and productive lives.

Research grants made available through the USAID/Global Bureau's **Opportunities for Micronutrient Interventions (OMNI)** project are being used to study the integration of the ICDS program and Family Welfare Centers for improved delivery of iron supplements through a home based delivery system; the distribution of a multivitamin and antihelminth package at selected tea plantations to employees, including pregnant women; and development and operationalization of a replicable system for delivery of iron supplements to adolescent girls in MP. In the short term, these results will increase the coverage of micronutrient supplements to women of reproductive age, thereby reducing the prevalence of anemia and improving reproductive health in this group. In the long term, delivery of iron supplements in various regions throughout India will be expanded.

3.1.2 Strategic Objective 3: Increased child survival and improved nutrition in selected areas

The Mission's sub-goal of enhanced food security is mostly addressed by its SO 3. Many of the activities under SO 3 also contribute to the SO 2 of reduced fertility in North India. Among the projects that have SO 2 and SO 3 in common are the on going IFPS; the Private Voluntary Organizations for Health (PVOH-II) project that is ending mid-1996; the Quality Control for Health Technologies (QCHT) that is on going; and the WACH Project.

Immunization has been the focus of a large activity implemented through the **Private Voluntary Organizations for Health II Project (PVOH)**, which has expanded coverage by working with over 130 NGOs. By funding service organizations working in the villages, the PVOH project has been able to lever matching funds from the local NGOs and implement training in local institutions to provide improved community based health care. The foundation established with the PVOH project will feed into the WACH project.

PVOH has also supported the first phase of the national polio eradication initiative which uses annual campaigns to immunize all children under the age of five years by the year 2000. USAID contributes, therefore, to the immunization of over 93 million children. GOI is currently discussing whether vitamin A supplements should be delivered as part of the polio eradication campaign.

USAID's largest **Title II Food Aid Program** managed by the international PVOs, CARE and CRS, is a significant component of SO 3. The Title II programs cover the five USAID focus northern states (Bihar, UP, Rajasthan, MP, and Orissa) as well as others (such as West Bengal, Andhra Pradesh, and the north eastern states).

During FY95, CARE/India reached 6.6 million children under six years of age, pregnant women, and lactating women in rural and tribal areas through their support with Title II commodities and other resources. CARE works through GOI's ICDS programs in over 750 blocks, which is over 13 percent of all blocks in India. The combination of food supplementation with ancillary health and nutrition education services at the village level, where coordination of government services is erratic at best, provides an opportunity of capturing the synergy between food and health care. The contribution to the ICDS program by USAID, CARE, and its partners has significant implications for child survival and delivery of basic services and follows the policy guidance of USAID to use food aid more effectively.

CARE's Title II program of activities falls under their larger Integrated Nutrition and Health Program (INHP) which draws funds from USAID and other donors. The INHP program aims to combine resources to address health among children under two years old and improve the reproductive health of women and adolescent girls. The INHP has many innovative components including an impregnated bednet project for malaria vector control in Orissa.

CARE envisions approximately 45 percent of the program areas will have improved basic provisioning of Title II commodities. Another 30 percent of program areas will have improved targeting, immunization, and iron/folate supplementation through capacity building. High Impact Blocks, where comprehensive inputs will be provided, will initially constitute about 3 percent of the program areas and will include better disease management, family spacing, and prenatal care. Over the next five years (FY97-FY01), High Impact Blocks will expand by 2 percent per year while the intermediate capacity building intervention will increase by 15 percent per year.

The High Impact Blocks will enable a number of critical areas for improving the ICDS to be tested. They will also serve a demonstration function for the remaining CARE supported blocks. Improvements in CARE's managed blocks by this approach is of interest to other donors (e.g. UNICEF, the World Bank, WFP) and the GOI. The proposed set of activities for the Title II program not only contributes directly to the USAID Mission's strategic objectives but has a potential for influencing policy for ICDS programs throughout India.

Catholic Relief Services (CRS) is the other major PVO whose program covers maternal and child health, food for work, human capital development, and humanitarian assistance. CRS's FY95 program included an estimated 588,600 participants in the health, education, and humanitarian assistance components. An additional 1,168,000 were food-for-work participants. Approximately 200,000 pregnant women, lactating women, and children enrolled in safe motherhood and child survival (SMCS) programs received Title II commodities in 1996. The general relief program covers various sites throughout the country and its main activity is to provide food for institutions who support and care for the most vulnerable groups. CRS targets groups most disadvantaged in the caste system; over two-thirds of its participants are either schedule caste, schedule tribe, or other culturally conservative groups.

For the coming 5 year period (FY97-FY01), CRS/India has established an over-arching goal that focuses its activities on food security. CRS/India will specifically address the food security needs of the poorest segment of the population - women, landless laborers, schedule caste, scheduled tribe population, students, children, and the indigent. A child survival grant was recently approved for Bihar state that will link directly with the Title II effort. Similarly, CRS's SMCS draws heavily on their extensive experience with child survival, making it of the models for effective use of Title II food aid and other resources.

CRS will be distributing approximately 30 percent of its food to 940 SMCS centers throughout the country. It is projected that by 2001, 290,000 pregnant women, lactating women, and children under the age of 3 years will be receiving Title II rations. Like the CARE improved ICDS service, CRS will strengthen the food security impact of the Title II food aid by ancillary services for early illness detection and treatment, supplementation with Vitamin A and iron/folate tablets, immunization, and health and nutrition education.

Unlike CARE, CRS's proposed health program has the added advantage of providing direct health inputs through their community based health programs. CARE must rely on a stronger link between the ANM and the ICDS *anganwadi* worker. CRS, through its operating partners, operates in non-ICDS locations and provides the health inputs.

Under its Human Capacity Development program to empower girls and women (which falls under SO 2), CRS is focusing on encouraging girls to remain in the formal education sector starting at the time they enroll in the SMCS program for children under 3 years old through pre-school (or *balwadis*), primary school, and boarding school. While the support to schools is in the provision of a supplement or meals (for boarding schools), a very small

program supported by CRS is a home economics course for young wives. Called the "grihini" program, CRS proposes to provide literacy, numeracy, health, nutrition, hygiene, family planning, household economics and income generation skills for adolescent girls lacking formal education.

In addition to the Title II program, SO 3 is also embedded in the new WACH project for MP and the WIN project.

Under SO 3, most of the performance indicators that the Mission will report on annually relate to the Title II programs and include immunization rates, infant feeding practices, iron/folate supplementation of pregnant women, food supplementation coverage for children under two years old, and an indicator on birth spacing.

Research grants made available through the USAID/Global Bureau's **Opportunities for Micronutrient Interventions (OMNI)** project related to SO 3 are being used to study methods of effective communications to resolve micronutrient deficiencies, including face-to-face and social marketing techniques. In the short term, there will be an increase in knowledge and awareness of how to resolve micronutrient deficiencies that will be translated in to effective food behavior changes that will have a positive impact on micronutrient status. In the long term, effective communications strategies that can be used in different settings, for example schools, will have been developed.

3.2 MICRONUTRIENT SITUATION IN USAID'S FOCUS STATES

There are no data on micronutrient deficiencies at the State level although *ad hoc* data are available. Tables 2 and 3 show prevalence data for anemia and vitamin A deficiency, respectively, in USAID's five focus states over the last 10 years. Limited information is available on the quality and representativeness of these data, including the definitions; thus they need to be used with caution.

Table 2 shows there is a dearth of data on anemia in Bihar, UP, and Rajasthan states and none for MP and Orissa states. The little data available for pregnant women indicate that at least two-thirds of them are anemic.

Vitamin A deficiency is a serious public health problem among preschool children in Bihar, UP, Rajasthan, MP, and Orissa states with prevalence levels exceeding 1 percent in all the surveys except among infants in the last survey listed for Orissa (Bhubaneswar/Cuttack), where the sample size is too small for meaningful interpretation (Table 3).

Given USAID's focus on improving reproductive health and reducing neonatal mortality, integrating micronutrient activities in reproductive health and child survival programs are very likely to show impact.

Table 2
Prevalence of anemia in Bihar, Uttar Pradesh, Rajasthan, Madhya Pradesh, and Orissa states

STATE	DISTRICT	AGE GROUP (SAMPLE SIZE ¹)	PREVALENCE (YR ²)
Bihar	Vaishali, Muzzafarpur, Gaya, Dhanbad, Khagaria, Madhubani	Pregnant women (n=559)	81 (?1987)
Uttar Pradesh	Mirzapur, Pilibhit, Banda, Bareilly, Moradabad, Ghazipur	Preschool urban (n=?)	56 (?1987)
		Preschool rural (n=?)	76 (?1987)
		Adolescent rural (n=?)	50 (?1987)
		Pregnant women (n=666)	87 (?1987)
	Not stated	Pregnant women (n=531)	84 (?1989)
	Varanasi rural	Children (n=469)	91 (?1989)
	Varanasi rural	6-14 yrs (n=?)	51 (?1990)
	Not stated	12-18 girls (n=?)	2-15 (?1991)
	Varnasi	Pregnant women (n=297)	63 (?1992)
Rajasthan	Not stated	Pregnant women	86 (?1989)
	Udaipur	Pregnant women	98 (?1992)
Madhya Pradesh	No information		
Orissa	No information		

¹ ? = sample size not provided

² ? = year of publication because date of survey not provided

Source: Kapil. U. 1996. Profile of iron deficiency anemia in different states of India. AIIMS.

Table 3
Prevalence of vitamin A deficiency in Bihar, Uttar Pradesh, Rajasthan,
Madhya Pradesh, and Orissa states

STATE	DISTRICT	AGE GROUP (SAMPLE SIZE ¹)	PREVALENCE (YR ²)
Bihar	Not stated	0-6 yrs rural (n=2009) 0-6 yrs urban (n=1196) Total (n=3205)	11.4 (1986-89) 4.9 (1986-89) 9.0 (1986-89)
	Ranchi	<5 yrs (n=?)	16.7 (?1986)
Uttar Pradesh	Not stated	0-6 yrs rural (n=1843) 0-6 yrs urban (n=262) Total (n=2105)	8.3 (1986-89) 3.0 (1986-89) 7.6 (1986-89)
	Varanasi	<5 yrs (n=2304)	22.3 (?1988)
	Aligarh	Not stated (n=?)	3.3 (?1993-94)
	Varanasi	" "	0.5 (?1993-94)
	Etah	" "	4.2 (?1993-94)
	Mirzapur	" "	1.5 (?1993-94)
Total	" "	2.4 (?1993-94)	
Rajasthan	Not stated	0-6 yrs rural (n=2245) 0-6 yrs urban (n=328) Total (n=2573)	10.4 (1986-89) 2.1 (1986-89) 9.4 (1986-89)
Madhya Pradesh	Not stated	0-6 yrs rural (n=3070) 0-6 yrs urban (n=674) Total (n=3744)	8.3 (1986-89) 7.1 (1986-89) 8.1 (1986-89)
	Gwalior	Not stated (n=?)	3.8 (1993-94)
	Jabhua	" "	3.1 (1993-94)
	Datia	" "	3.3 (1993-94)
	Dhar	" "	4.0 (1993-94)
	Total	" "	3.6 (1993-94)
Orissa	Not stated	0-6 yrs rural (n=1400) 0-6 yrs urban (n=191) Total (n=1591)	2.3 (1986-89) 2.6 (1986-89) 2.3 (1986-89)
	Koraput, Puri, Sambalpur, Dhenkanal, Bolangir, Ganjam, Sundergarh, Cuttack	Preschool (n=911)	1.1 (?1988-90)
	Kalahandi	Not stated (n=?)	1.5 (?1993-94)
	Phulbani	" "	3.9 (?1993-94)
	Karaput	" "	2.5 (?1993-94)
	Ganjam	" "	1.7 (?1993-94)
	Total	" "	2.4 (?1993-94)
	Bhubaneswar/Cuttack	Infants (n=18) Preschool (n=241) School age (n=136) Adolescents (n=42) Adults (n=285)	0.0 (?1993-94) 2.5 (?1993-94) 5.9 (?1993-94) 0.0 (?1993-94) 0.0 (?1993-94)

¹ ? = sample size not provided

² ? = year of publication cited because date of survey not provided

Source: Kapil. U. 1996. Profile of vitamin A deficiency in different states of India. AIIMS.

4. USAID/INDIA'S MICRONUTRIENT STRATEGY

4.1 THE GOALS OF USAID/INDIA WITH RESPECT TO MICRONUTRIENTS

USAID/India is committed to assisting the GOI in fulfilling the micronutrient goals set for the 1990s at the World Summit for Children, endorsed at the 1991 Ending Hidden Hunger Conference and the 1992 International Conference on Nutrition. These overall goals, require the concerted effort of governments, donors, and international agencies. There are, however, a number of specific operational goals where USAID/India can be expected to have a direct influence. These are:

- to help GOI, donors, international agencies, and the private sector to identify the options for interventions and develop the criteria to design broad based multisectoral nutrition and health packages and thus combat micronutrient malnutrition;
- to empower households and communities to act on their own behalf thereby increasing the availability and consumption of micronutrients; and
- to gain the political support that is a prerequisite to effective action.

In this context USAID/India has defined as its target the following strategy.

To reduce the prevalence of micronutrient deficiencies in children under 3 years of age and in women of reproductive age, thereby improving their health both before and during pregnancy, which will contribute to reducing neonatal, infant, child, and maternal mortality.

4.2 STRATEGIC CHOICES

The problems of micronutrient malnutrition and the associated opportunities for intervention in India far exceed USAID/India's capacity to respond. Thus, in order to respond to the strategy statement above a number of choices have to be made. In making these choices, the Mission has considered the level of resources potentially available, the capacity and need of the GOI, and the state of the art in the field of micronutrient malnutrition. The basic choices of micronutrients, target groups, states, and interventions are outlined below and discussed in detail in the following sections.

4.2.1 Which micronutrients?

Through the support given to the ICDS program through the Title II program and other bilateral population and health programs, the Mission's micronutrient activities have focused almost exclusively on vitamin A and iron deficiencies. While iodine is regarded as equally important other institutions, notably UNICEF, continue to support GOI in pioneering efforts to combat iodine deficiency. USAID/New Delhi, therefore, will continue to **focus on vitamin A**

and iron.

4.2.2 Which target groups?

The groups at most risk of micronutrient malnutrition are **infants and pre-school children and women of child bearing age**, in particular pregnant and lactating women, thus these will continue to be the prime target groups of the program. Where possible, special attention will be given to adolescent girls at high-risk of anaemia so as to eliminate their risk of iron deficiency before they become pregnant.

4.2.3 Which states?

Micronutrient activities can be included in any of the five focus states where USAID supports Title II, population, and health programs. Focusing micronutrient activities through the Title II program appears more feasible than through the IFPS, WACH, and WIN programs as the infrastructure for broad-based Title II programs is already in place, while the above population and health programs are either at the end of the start-up phase or in the design phase. Using existing programs to demonstrate and refine specific micronutrient interventions will facilitate their inclusion in the Mission's new programs, for example WACH and WIN, as they come on line. Given the above, cooperating sponsors in both **MP and Orissa** have components to which micronutrient activities could be added without causing undue burden to the program; thus it would seem two states would be good choices. In addition, the WACH program will be implemented in MP, so any micronutrient-specific activities could be incorporated in the program as it develops.

4.2.4 Which interventions?

Effective micronutrient interventions include pharmaceutical supplementation, public health measures, diet diversification, and food fortification, although there are overlapping aspects between the various approaches to intervention. The choice of intervention will be determined, in part, by the extent of both clinical and sub-clinical deficiencies. Clearly, where clinical deficiencies exceed the WHO levels for public health significance, immediate, short term interventions are warranted until long term programs are put in place. Regardless of the type of intervention, nutrition education and social marketing are key components. For this reason they are considered an integral part of all interventions rather than as a separate intervention activity.

Supplementation: Pharmacological doses of vitamin A capsules or oral suspension, and iron tablets are widely used to control and eliminate micronutrient malnutrition on the basis that they are a quick acting, cost-effective, short term intervention. Increasingly, however, questions are being asked about the sustainability and cost-effectiveness of using this method of intervention as a control measure given that supplements do not correct the underlying cause of micronutrient malnutrition. Additionally, in India, health-care delivery systems are

weak and health resources limited. Despite these valid concerns, supplement programs remain the most practical means of alleviating micronutrient deficiencies for the most vulnerable groups in areas of high prevalence until such time as micronutrient intakes are increased through dietary modification or food fortification. **USAID/India will focus its activities on the provision on vitamin A to children under 3 years old and mothers *post partum* and iron supplements to women of reproductive age through on-going programs.**

Integration with public health care: Efforts to control and eliminate micronutrient malnutrition can be promoted through different components of health-care delivery systems, for example programs that address essential drug, immunization, diarrhoeal disease, family planning, pre- and post-natal care, growth monitoring, supplementary feeding, malaria prevention, deworming, and school health. All of these programs play a vital role through both their educational components and as delivery points for micronutrient supplements to high-risk individuals in high-risk areas. In this way, micronutrient activities that are complementary to public health measures can result in a more effective use of limited health resources. **USAID/India will support use the various contact points to deliver effective information on micronutrient malnutrition as well as the distribution of supplements.**

The integration of micronutrient supplements into ongoing health-care programs will often require nutrition education for health-care professionals and paramedics at all levels. This will ensure that health-care deliverers understand their vital role in combating micronutrient malnutrition and thereby demand and prescribe the appropriate supplements. Social marketing of micronutrient malnutrition must be designed to reach all levels of the health-care delivery system and all segments of the population. This will help to increase the public's awareness of the consequences of micronutrient malnutrition and promote demands on the government to allocate more resources to implement effective and sustainable programs. **USAID/India will support strengthening micronutrient-related training and communication activities within on-going programs.**

Dietary modification: Two of the most important causes of micronutrient malnutrition are the availability of local food sources and, for vitamin A and iron, the adequacy of intake, and absorption. Dietary modification that leads to increased consumption of micronutrient-rich foods is the safest and most sustainable long term measure to improve micronutrient intakes and overall nutritional status at both the individual and the household level.

Plant sources of both vitamin A and iron are common even in areas where vitamin A deficiency and anaemia exist. Edible green leafy plants that grow wild, and yellow-colored, non citrus, seasonal fruits such as mangos and papaya are examples of under used dietary sources of vitamin A. Opportunities, therefore, exist for households to make better use of the available wild leafy vegetables and seasonal fruits. The potential also exists to introduce new micronutrient-rich vegetables and fruits to households/communities who already have home gardens, and to those who do not but who have access to the land, water, and inputs needed for a home garden. Growing micronutrient-rich foods in urban areas is also possible. Program

issues related to seasonality in the production of micronutrient-rich foods include improved preservation and storage methods, for example solar drying.

In many communities micronutrient rich vegetables and fruits are under used in the diets of young children and pregnant and lactating women, even in the absence of food taboos. Poor digestibility and low palatability of some green leafy plants is often stated to be a reason for not giving these foods to young children. However, these constraints can be overcome through simple, minimal-cost modifications in food preparation procedures such as boiling and mashing the leafy vegetables, mixing them with the local staple, and preferably adding a little oil. The addition of oil or oil rich foods in the diet is important as it will increase the absorption of carotene thereby improving vitamin A status, which in turn can improve iron status. Promoting increased consumption of vitamin C-rich foods, such as citrus fruits, and simple modifications in food preparation procedures to reduce the iron inhibitors found naturally in foods may improve the absorption of iron thereby reducing the risk of anaemia.

Breast milk is the most important source of micronutrients for infants under 6 months of age. Thus the promotion of proper infant feeding practices, that is exclusive breast feeding for the first 4 to 6 months, will help to prevent micronutrient malnutrition. This not only ensures that infants receive the micronutrients in breast milk but it also reduces the risk of pathogen contamination, and thus diarrhoeal diseases. The latter is an important cause of micronutrient malnutrition and is often associated with the too early introduction of complementary foods. As important as promoting exclusive breastfeeding for the first four to 6 months is the introduction of appropriate foods to infants by the age of 6 months; thus this will also be given attention.

Dietary modification, however, is only likely to take place if people are motivated to change their behavior and the appropriate foods are readily available at the household. This means that individuals need to be educated about the problem and how to solve it. Thus, nutrition education and social marketing activities that address breastfeeding practices, food purchasing practices, food preparation, intra-household food distribution and, where necessary, food production, storage, and preservation methods are essential components of all dietary modification programs. **USAID/India will support activities to affect improved dietary behaviors.**

Food fortification: Food fortification is accepted as being a cost-effective, sustainable, but underutilized means of increasing micronutrient intakes in developing countries, especially among target groups with limited access to micronutrient rich foods. Paramount among these are the beneficiaries of welfare programs and supplementary feeding programs especially where food aid is used. The 1996 Farm Bill identified that further studies on the stability of micronutrients in fortified PL480 commodities are warranted and US\$500,000 was allocated for this activity. The Title II program in India is one of USAID's largest food aid program and the Mission would consider supporting this work being done in India through the Global Bureau's SUSTAIN project in partnership with CARE and CRS.

In contrast to targeted fortification, universal fortification of foods can only succeed in improving micronutrient nutrition if consumption varies little throughout the year and the intended beneficiaries participate in the market economy; thus the most deficient groups may derive little or no benefit. Furthermore, the success of fortification programs is largely dependent upon there being the political will and commitment to implement the criteria needed for a proper fortification program. These include start-up incentives to the food industry, proper quality assurance, and a system to enforce food industry compliance. Clearly, however, the food industry sector has to be actively involved from the beginning so that they participate in both solving the problem and in implementing a solution. Although GOI has stated that food fortification is an option to be pursued, consumption data do not exist to identify appropriate vehicles; thus the program is very much in its infancy. For this reason, **USAID/India will assist to the extent possible through the sharing of micronutrient related documents, but it will not invest in fortification activities.**

The potential also exists to fortify foods with micronutrients at both the community and household levels. Community based fortification using locally available fortificants can be made by preserving seasonally surplus fruits and vegetables through solar drying. Local fortificant(s) can be added to food during cooking or used as a snack during the months when fruits and vegetables are not available. **USAID/India will indirectly support household level fortification activities through nutrition and health-based communications activities.**

4.3 SUCCESS MEASUREMENT

It is against the operational goals outlined above, and the need to track the World Summit goals, that the success of USAID's micronutrient activities will be measured. Success is defined as the sustained improvement in micronutrient intake and the elimination or control of micronutrient deficiencies. While the indicators to determine levels of success need to be further developed, there are some basic principals from which to start.

Without effective action, micronutrient policies will have limited impact. The extent to which health and nutrition policies that affect micronutrient status are implemented in USAID/India's five priority states will be tracked.

Given the urgency to eliminate micronutrient deficiencies, pharmacological supplements will have to be used in the interim. Monitoring and mandatory reporting on both the availability and use of supplements is essential for ensuring that supplements are both available in sufficient quantities, and dispensed, as well as for determining the success of supplementation programs.

The ultimate goal of micronutrient interventions is to eliminate deficiencies through increased intakes from micronutrient-rich foods, be they home-grown or purchased. Thus changes in behavior patterns, including food production, food purchasing patterns, food use, and food consumption need to be monitored and reported on a regular basis.

Clinical screening for, and reporting on, micronutrient deficiencies at facilities in the health care system will also be used to monitor the success of interventions. For Vitamin A this includes reporting on clinical symptoms of vitamin A deficiency, including the presence of nightblindness during the last pregnancy, and for iron hemoglobin levels.

Improved biological outcomes as a result of micronutrient interventions, which is the ultimate goal, can be collected through the National Family Health Surveys. The indicators to use may include the prevalence of nightblindness in pregnancy as well as hemoglobin levels in women of reproductive age and young children. USAID/India will support developing and testing micronutrient indicators that can be included in the NFHS and other program information systems.

5. THE PROGRAM OF WORK

5.1 INTRODUCTION

USAID/India's micronutrient activities are centered around the broad scale transfer of technologies, skills, and knowledge to program support, training, institutional development, and communications. The focus is on identifying situation appropriate micronutrient programs, integrating micronutrient activities into selected ongoing projects, addressing the policy issues, and solving operational problems.

5.2 THE PLAYERS

As an entry point to effectively demonstrate that micronutrient activities can be an integral component in all population and health care programs, USAID/India will focus its micronutrient activities within the framework of both its cooperating sponsors as well as national institutions. The results of these initial activities that will take place primarily in MP, but also Orissa state, can be applied to the WACH project as it becomes operational.

In working through national program and institutions, it may be possible to influence policy at both the state and national level, through the testing and scaling up of new delivery systems. This partnership will also allow for the identification and resolution of bottlenecks, such as information gaps, availability of supplies, and so forth.

5.3 INTERVENTIONS AND SETTINGS

An important starting point will be to conduct a comprehensive situation analyses on the demand and supply for pharmaceuticals that impact on vitamin A and iron status; that is micronutrient supplements and antihelminths, in both the public and private health sectors in MP. This will identify perceptions within the health sector about vitamin A and iron deficiencies, the need for and use of supplements, the effectiveness of the distribution system, reporting procedures, and so forth. The findings will be used to strengthen activities to create the demand for supplements that may include developing partnerships with the private pharmaceutical sector, capacity building of health care personnel, etc, and to strengthen activities to improve the supply system.

The ICDS and other health care programs in India promote the distribution of iron supplements as part of prenatal care. Nevertheless, anemia in pregnancy is remains a serious health problem. One problem is that women may have little opportunity to become iron-replete before they become pregnant or after childbirth. For this reason **USAID/India will support testing whether it is possible to improve iron status of women as part of birth spacing programs.**

Although the bioavailability of iron in food is the single most important factor in

determining iron status, there are other contributory factors that should not go ignored. These include deworming and malaria control. There is evidence from Sri Lanka that deworming women in the last trimester of pregnancy has a significant impact on iron status. This finding is likely to be true for India. For this reason, **USAID/India will support a study to see whether including helminth treatment in the last trimester of pregnancy as part of the iron/folate supplement program is more cost-effective in reducing the prevalence of anemia in pregnant women than the provision of iron/folate supplements alone.**

Data from both Tanzania and Ghana show that effective vector control in malaria programs can have a significant impact on iron status of children (and presumably others). Both of these programs use insecticide impregnated bednets as is done in CARE's community-based program in Orissa. **USAID/India will support testing the hypothesis that effective malaria vector control does impact on iron status, and this impact can be augmented through the implementation of effective antihelminth and iron/folate supplement programs.** The CARE program has established that it is possible for the bednet program to be self-financing and sustainable. For this reason, **USAID/India will also support exploring the possibilities of creating awareness among participants about the need for regular deworming such that people will buy antihelminths rather than rely on free handouts that are rarely available.**

It is now well established that post-partum supplementation of mothers within eight weeks of delivery is an effective way to ensure there is increased availability of vitamin A in breast milk, which will protect breastfed infants against vitamin A deficiency. Vitamin A deficiency is known to increase the severity and case-fatality rate of some childhood infections, particularly diarrhea and measles among deficient populations. **USAID/India will support a pilot study to test whether this is a viable delivery system.**

The most comprehensive way to show program impact is through the NFHS. In other countries such as Kazakhstan and Peru, hemoglobin measurements using the portable HemoCue have been included in the USAID's Demographic and Health Surveys as a micronutrient indicator. Given the success of this experience, **USAID/India will support the development and testing of appropriate micronutrient indicators that can be used in the NFHS.** For example the acceptability of determining hemoglobin measurements using the HemoCue; identifying local words for nightblindness that can be used as a proxy for improvements in vitamin A status where nightblindness in pregnancy decreases over time; and development of appropriate infant feeding questions that will show micronutrient-related behavior change. In addition to the above, the Mission will support testing micronutrient indicators that can be gathered through ongoing programs. This includes, for example, testing for anemia using low-cost technologies such as copper sulfate densitometry.

Although there is a lot of interest to combat micronutrient malnutrition in India, the ongoing programs, particularly those for iron, have not been very effective. **USAID/India will**

support the development of an information dissemination strategy to facilitate a dialogue between researchers, policy makers, and programmers so as to develop more effective micronutrient delivery systems.

5.4 MODE OF OPERATION

In addition to adhering to the principles of supporting programs that are sustainable, cost effective, and have a significant potential for influencing policy, there are three factors that need to be considered in designing the implementation of the strategy laid out in this paper. These are involving national institutions; developing close linkages among USAID cooperating sponsors involved in existing and future programs that influence micronutrient malnutrition; and the OMNI Project's capability to implement the strategy following USAID rules and regulations.

5.4.1 Time line

The strategy is divided into two stages. The first stage covers FY97 and FY98, which coincides with the remaining contract period of the OMNI Project. The current OMNI supported research will be completed by 1997, after which their findings can be incorporated into ongoing micronutrient programs. The next two years will likely see a consolidation of a number of key GOI and donor programs in the area of micronutrients. The World Bank, UNICEF, and the European Community are currently reviewing major programs of support to the GOI and these are likely to be operational by FY99.

The second stage of the USAID/India program could start in FY99, by which time preliminary results will be available from the micronutrient supported activities supported in stage one that can be used to develop the work for Stage 2. The Title II program, managed by CARE and CRS, will also be in its mid-term; thus it will be possible to review progress and make any necessary program changes so as to maximize the impact on improving reproductive health and child survival through improvements in micronutrient status.

5.4.2 Implementation plan

The following describes the activities to be done in the three phases of the first stage (May 1996 - September 1998) over the next two years. It also outlines the steps that OMNI needs to take to ensure timely and relevant interventions to support the Mission.

Phase I (May - June, 1996):

- a. Assist the Mission in developing its micronutrient strategy within which interventions designed to enhance micronutrient malnutrition will be formulated and future research proposals assessed.
- b. Specify the Mission and allocated G/PHN field support funds for activities to

- c. address micronutrient malnutrition and make recommendations for their use.
- c. Identify indigenous institutions that could participate in implementing the strategy.
- d. Obtain consensus on the strategy and agreement as to what will constitute the contractual mechanisms for carrying out Phase II of the program.

Phase II (July - September 1996):

- a. OMNI develops an detailed work plan for FY97 and FY 98.
- b. Identify an OMNI Program Manager in Washington to oversee the technical and administrative steps and develop a Scope of Work for a National Micronutrient Coordinator to work in India with a coordinator in the key state(s).
- c. Identify sub-contractors and field sites. Define technical requirements and negotiate contracts with cooperating sponsors in India.
- d. Provide OMNI technical assistance to develop the implementation plan.
- e. Submit modifications to the Delivery Order (if necessary) and contract requests to the USAID Contracting Officer for the OMNI Project.

Phase III (October 1996 - September 1997):

- a. Conduct a comprehensive situation analyses on the demand and supply for pharmaceuticals that impact on vitamin A and iron status in MP and possibly Orissa.
- b. Implement work in MP on
 - i. improving the iron status of women through the distribution of iron supplements as part of prenatal care;
 - ii. determining whether improving the iron status of women through helminth treatment in the last trimester of pregnancy as part of the iron/folate supplement program is more cost-effective in reducing the prevalence of anemia than the provision of iron/folate supplements alone;
 - iii. determining whether it is feasible to provide *post-partum* supplementation of vitamin A to mothers within the existing health care system;
 - iv. developing and testing appropriate micronutrient indicators that can be used in the NFHS.
- c. Implement work in Orissa to determine whether effective malaria vector control affects iron status, and whether this impact can be augmented through the implementation of an effective antihelminth and iron/folate supplement program. This may include exploring the possibilities of creating awareness among participants about the need for regular deworming such that people will buy antihelminths.
- d. Develop and help implement an information dissemination strategy.

- e. **Mid-term review of progress in micronutrient activities.**