THE OMNI EXPERIENCE: USING GLOBAL LESSONS TO MOVE LOCAL PROGRAMS

OPPORTUNITIES FOR MICRONUTRIENT INTERVENTIONS

A USAID-FUNDED PROJECT

MANAGED BY JOHN SNOW, INC.

FINAL REPORT

1993-1998

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ACKNOWLEDGMENTS

Since 1990, there has been a global recognition of the massive problem of micronutrient malnutrition and an encouraging international response to this challenge. The United States Agency for International Development (USAID) has long been in the forefront of the battle against micronutrient malnutrition, with its early support of vitamin A research and programs that led to the realization that vitamin A deficiency impacts child mortality. Following its support to Johns Hopkins University, Helen Keller International, and other institutions that set the stage and led to the recognition of the importance of vitamin A, USAID funded the VITAL project in 1989 to address vitamin A deficiency. In October 1993, through the Opportunities for Micronutrient Interventions (OMNI) Project, USAID extended its support and vision to other micronutrients, in particular to iron and iodine, and greatly expanded the range of possible interventions and the number of countries in which active programs are taking place. In 1997, USAID's Population, Health, and Nutrition Center asked an outside team of experts to advise USAID on an Agency Portfolio Review of Micronutrient Interventions, which has provided guidance in overall planning direction.

USAID staff who took part in the planning, development, and implementation of these efforts are to be congratulated for their breadth and depth, and the vision involved. Particular appreciation goes to the cognizant technical officer (CTO) of the project, Dr. Frances Davidson; Dr. Tim Quick, Micronutrients Research and Program Advisor; and the Chief of the Child Survival Division, Dr. Victor Barbiero; as well as staff in the USAID Missions in countries where OMNI has focused its efforts--Bolivia, Eritrea, Indonesia, Nicaragua, Philippines, and Zambia. The support from the Regional Bureaus and the Missions has been consistent and very enabling in an additional 22 countries, including Ecuador, in which there was also OMNI representation.

OMNI's work has been the combined effort of many dedicated individuals. Equal recognition goes to OMNI staff at John Snow, Inc. headquarters in Arlington and in the countries where OMNI had offices, to colleagues among the OMNI partners, as well as to the local project teams without whose expertise, commitment, and patience, OMNI would have been left far from its goals. Finally, gratitude and respect must be extended to our country counterparts whose efforts, on behalf of the poor and undernourished populations that are our ultimate clients, were the key to the successes that have been achieved. There remains much to be done, and USAID has acknowledged that it clearly intends to continue its efforts, and even extend the range of micronutrient interventions. It is the sincere hope of those of us on the OMNI project that our experiences, and those of our colleagues in-country in bringing micronutrients to those in need, will provide useful lessons for the Agency so that the most cost-effective use of funds will lead to the greatest positive impact in the country programs being targeted.

This report was prepared by Dr. Ian Darnton-Hill, Project Director, Karen Canova, and Deanne Bolasny, with significant contributions from Dr. Robin Houston, Rebecca Kohler, Margie Ferris-Morris, Serena Rajabiun, Dr. Tina Sanghvi, Dr. Herbert Weinstein, and Steve Wilbur. Other OMNI staff and the OMNI partners had a role in reviewing the report, and their input is also gratefully acknowledged.

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Dr. Ian Darnton-Hill

Project Director

ACRONYMS

AIDS.....acquired immunodeficiency syndrome
ASAP.....Araw ng Sangkap Pinoy ("Day of Micronutrients," Philippines)
AVSC.....Association for Voluntary Surgical Contraception
BASICS.....Basic Support for Institutionalizing Child Survival (USAID project)
CARMI.....Central America Regional Micronutrient Initiative
CDC.....U.S. Centers for Disease Control and Prevention
CE.....cost-effectiveness
CIDA.....Canadian International Development Agency
CRS.....Catholic Relief Services
DHS.....Demographic and Health Survey
DOH.....Department of Health
EPI.....Expanded Program on Immunization
FCHV.....female community health volunteers
FDA.....Food and Drug Administration
GDP.....gross domestic product
GHAI.....Greater Horn of Africa Initiative
HIV.....human immunodeficiency virus
HKI.....Helen Keller International
ICCIDD.....International Council for the Control of Iodine Deficiency Disorders
ICH.....Institute for Child Health
ICN.....International Conference on Nutrition
IDA.....iron deficiency anemia
IDB.....Inter-American Development Bank
IDD.....iodine deficiency disorders
IEC.....information, education, and communication
IEF.....International Eye Foundation
IFT.....Institute of Food Technologists
ILSI.....International Life Sciences Institute
INACG.....International Nutritional Anemia Consultative Group
INCAP.....Institute of Nutrition of Central America and Panama
IU.....international unit
IUFST.....International Union of Food, Science, and Technology
IUNS.....International Union of Nutritional Sciences
IVACG.....International Vitamin A Consultative Group
JHU.....Johns Hopkins University
JSI.....John Snow, Inc.
LGU.....local government units
M&E.....monitoring and evaluation
MI.....The Micronutrient Initiative
MinPak.....Minimum Package of Nutrition Interventions
MN.....micronutrient
MOH.....Ministry of Health
MOU.....memorandum of understanding
NFNC.....National Food and Nutrition Commission (Zambia)
NGO.....nongovernmental organization
NID.....National Immunization Day
NTAG.....Nepal Technical Assistance Group
OMNI.....Opportunities for Micronutrient Interventions Project
PAHO.....Pan American Health Organization
PAMM.....Program Against Micronutrient Malnutrition
PATH.....Program for Appropriate Technology in Health
PCFMI.....Philippines Chamber of Food Manufacturers, Inc.
PHN.....USAID's Population, Health and Nutrition Center
PVO.....private voluntary organization
QA.....quality assurance
QC.....quality control
SANA.....Sustainable Approaches to Nutrition in Africa Project (USAID-funded)
SCF.....Save the Children Fund

TA.....technical assistance
TAG.....technical assistance group
UNICEF.....United Nations Children's Fund
USAID.....United States Agency for International Development
USI.....universal salt iodization
VAC.....vitamin A capsule
VAD.....vitamin A deficiency
VITA.....USAID's Vitamin A Enhanced Effort
VITAL.....Vitamin A for Health Project
WB.....World Bank
WHO.....World Health Organization

EXECUTIVE SUMMARY

In the 1980s, USAID supported research showing that restoring vitamin A sufficiency to young children could prevent up to one-third of all deaths in developing countries, stimulating a sense of immediacy about treating vitamin A deficiency. Following several international fora, such as the 1990 World Summit for Children and the 1992 International Conference on Nutrition (ICN), common goals were globally endorsed:

- **Elimination of vitamin A deficiency as a public health problem;**
- **Substantial reduction of iron deficiency anemia by one-third; and**
- **Elimination of the iodine deficiency disorders as a public health problem.**

Opportunities for Micronutrient Interventions (OMNI)--a five-year project of USAID's Population, Health and Nutrition (PHN) Center--has been an important player in the subsequent international collaboration between countries and other agencies to eliminate micronutrient malnutrition. It did this through working with integrated national micronutrient programs in six countries with populations identified as at high risk of micronutrient malnutrition; providing technical assistance to over 22 other national programs; providing global technical leadership and conducting operational research; and disseminating a vast amount of information globally. The OMNI project was managed by John Snow, Inc. with partners from universities, several nongovernmental organizations (NGOs), and the private sector(1). With the support of USAID, both globally and in the field, the project was able to maximize opportunities by working with UNICEF, WHO, the World Bank, and many national and international NGOs and PVOs. Country offices and activities have involved many of the same partners as above, and also Ministries of Health and other Ministries, local universities, along with international and national NGOs, from the very large to some that were village-specific. Particularly useful, especially in-country, has been the working relationship with other USAID projects such as BASICS, LINKAGES, MotherCare, and SUSTAIN.

ACHIEVEMENTS

The over-arching achievements were accomplished through a multi-pronged approach, and can be grouped under the three micronutrients addressed:

- **Increased vitamin A coverage;**
- **Increased iron availability; and**
- **Improved monitoring of the iodine deficiency disorders interventions.**

Increased Vitamin A Coverage

Vitamin A coverage was increased through:

- **Increased coverage with supplements, i.e., vitamin A with National Immunization Days (NIDs) and routine health services, other innovative distribution approaches, such as the private sector, schools, factories, and village-level health workers;**
- **Fortification of sugar, flour, and other commercial foods;**
- **Health center delivery, including the "MinPak" approach, postpartum supplementation, increased delivery through local community approaches, and improved guidelines and training;**
- **Nutrition education, advocacy at all levels, and use of social marketing techniques ; and**

- **National micronutrient plans and high-level endorsement by governments.**

Increased Iron Availability

Iron availability was increased through:

- **Widespread adoption of wheat flour fortification (usually with folate and B vitamins);**
- **Innovations in iron supplement supplies through private sector sales, schools, factories, and community workers;**
- **Accumulation of greater technical background on bioavailability of iron in the diet, and analysis of supply, demand, and compliance issues; and**
- **Other public health measures such as deworming, bednets against malaria, and MinPak at service delivery points and in the community.**

Improved Monitoring of IDD Interventions

Monitoring of IDD interventions was improved through:

- **Improved quality assurance/quality control tools, techniques, and training;**
- **Enhanced monitoring and evaluation methods with international partners;**
- **An emphasis on Africa; and**
- **Support of national legislation and policymaking.**

APPROACHES

The OMNI project used a variety of approaches to achieve maximum impact, working with countries and USAID Missions for results in four broad program areas: operational research, policy, behavior change, and service delivery. Activities can be categorized by the four major thrusts that have characterized the project.

- **Increased sustainability through countries adopting national micronutrient plans, conducting cost-effectiveness analysis, and strengthening local capacity;**
- **Increased sustainability and impact through collaboration between the private and public sectors in the fortification of foods with micronutrients in Asia, Africa, and Latin America;**
- **Increased awareness of the importance of vitamin A and other micronutrients through global information dissemination and national information, education, and communication campaigns, leading to healthy behaviors; and**
- **Increased sustainability and impact through improved health care delivery of micronutrients integrated within child survival activities (establishing guidelines, training, MinPak, and analysis of supply and demand).**

The countries and settings in which these activities took place will be identified throughout the report. The format of the report provides some background to the project, overall objectives, achievements, and different methods for prevention and control, and country examples. Twelve case studies are also included to provide specific examples of OMNI's activities and achievements in vitamin A, iron, and iodine. These include country-specific examples, such as vitamin A activities in Nepal, Philippines, Bolivia, and Zambia; iron activities in South and Central America and Indonesia; and iodine activities under the Greater Horn of Africa Initiative and in Eritrea. Topical case studies (the cost-effectiveness initiative, and two experiences on integrating micronutrients into child survival activities: MinPak and National Immunization Days) are also included. The report then identifies some existing constraints, lessons learned, and important issues for the near future that USAID may wish to address. Appendices to the report include a chart that captures the activities by Intermediate Result; a list of OMNI staff and partners;

a list of the publications produced and disseminated by the project; and tables showing micronutrient status in selected USAID and OMNI countries.

LESSONS LEARNED AND NEXT STEPS

Vitamin A Deficiency (VAD)

UNICEF estimates that there has been a 40 percent decline in vitamin A deficiency prevalence over the last 10 years. Vitamin A capsule coverage has increased in much of Asia, on average, from around 33 percent only four years ago (1994) to over 80 percent. The rate of decline of vitamin A deficiency "is about 70 percent of the global rate required to eliminate clinical vitamin A deficiency by the year 2000" (as calculated by UNICEF). If the current rates were maintained, clinical VAD would be eliminated in South Asia by 2007. Other countries in Asia and Latin America may well reach the year 2000 goal. Africa is concurrently assessing the magnitude of the problem while starting programs, but most likely will not reach the end-of-decade goals.

A mix of interventions will give governments greater sustainability, incorporating a subsidized vitamin A capsule program as well as non-subsidized consumer-funded vitamin A interventions, such as fortification of food, and home gardening in some settings. In an appreciable number of countries, supplementation with vitamin A will be a necessity for some years to come.

Lessons Learned

- **Adding vitamin A to NIDs, and/or other campaign approaches is necessary to achieve national coverage of over 75 percent. This can be sustainable for at least three years but requires a relatively large initial external input;**
- **Fortifying sugar with vitamin A can reduce vitamin A deficiency prevalence (e.g., Guatemala, Honduras) and the process can be successfully transferred to African countries (e.g., Zambia). Fortification of wheat flour with vitamin A is technically feasible;**
- **Some of the symptoms of vitamin A deficiency (e.g., maternal night blindness) can be significantly reduced by dietary approaches (e.g., Bangladesh); and**
- **Longer term sustainable measures, such as local community and decentralized vitamin A activities, will require NGO/PVO support for some time yet.**

Next steps

Programmatic:

- **Transitioning from reliance on universal supplementation to a mixture of fortification, other food-based approaches, and targeted supplementation;**
- **Identifying and using other EPI mechanisms and other routine health service delivery for vitamin A after polio eradication is completed;**
- **Supporting provision of high-dose vitamin A to mothers within eight weeks of delivery; and**
- **Addressing women's nutritional and health status, leading to a life-cycle approach.**

Research:

- **Studying the form and dosage regimen of supplements (retinol or beta-carotene, smaller intakes weekly, daily as component of multi-micronutrient supplement, or 200,000 IU every four to six months);**
- **Analyzing HIV transmission reduction and the role of vitamin A; and**
- **Assessing whether there is a role for vitamin A in malaria case management and mitigation.**

Iron Deficiency Anemia (IDA)

Although it is the most prevalent of the three deficiencies, and its millennial goal is the most modest, IDA control has been the least successful. The Standing Committee on Nutrition of the United Nations has drawn attention recently "to the lack of progress in tackling iron deficiency anaemia which affects the health and development of tens of millions of children and women in spite of the availability of practical, low-cost interventions." Constraints are multiple, starting with the fact that it is a harder problem to tackle programmatically. Logistics are complicated; compliance with supplements is often low; bioavailability in the diet--especially in the diets of the poor--is low, and further reduced in many largely vegetarian diets; and the status is worsened by coexisting conditions of parasite infection and malaria. Because of these obstacles, IDA prevention and control has been less successful.

Lessons Learned

- **Fortification of wheat flour with iron (and B vitamins) can be successfully implemented as a cost-effective public/private sector partnership in less-industrialized countries (e.g., Latin American countries);**
- **Where fortification is happening, regional harmonization of standards, regulations, and quality assurance issues is feasible, and even welcomed;**
- **Supply of iron/folate tablets continues to be a major constraint for women, and lack of a suitable formulation, a constraint for infants and young children;**
- **Dietary interventions (aimed at iron alone) are unlikely to have a significant impact;**
- **Need for increased detection, treatment, and surveillance of severe anemia; and**
- **Hemocue and other anemia detection methods can be used more for monitoring, counseling, and referral.**

Next steps

- **Greater emphasis on IDA as the other two micronutrients show progress;**
- **Life-cycle approach targeting adolescents;**
- **Use of other delivery mechanisms (schools, factories);**
- **Weekly vs. daily dosing;**
- **Logistics (procurement, distribution, delivery systems);**
- **Modification of iron supplements to improve acceptability (taste, odor, side effects, packaging, and brand names);**
- **Fortification (including iron and vitamin A simultaneously); and**
- **Emphasis on cost-effectiveness with regard to the health and productivity-increasing effects of interventions.**

Iodine Deficiency Disorders (IDD)

On average, UNICEF estimates 60 percent of all salt is currently being fortified, meaning that 1.5 billion people are now consuming iodized salt for the first time worldwide. Although 19 countries continue to have significant iodine deficiency, iodized salt availability has gone from 10 percent to more than 50 percent in Southeast Asia and to more than 60 percent in Africa (on average). This has had a significant effect on the goiter rate in those regions. Over 12 million infants each year are being protected from mental retardation and loss of their intellectual potential. The number of cretins being born has been halved in the last decade from approximately 120,000 to 60,000 annually.

OMNI and its partners identified the constraints to complete success in the elimination of IDD. These include lack of adequate coordination and communication between sectors; a continuing need for advocacy, communications,

and training at all levels; insufficient quality assurance and monitoring; and a remaining need to stimulate public demand. There is also a need for increased advocacy; modernization of the salt industry; legislation, regulations, and enforcement; improved communications, information, and management; strengthened laboratory management; and international collaboration and private sector involvement. In some countries, price differential and poor accessibility remain constraints, as does an inattention to costs and sustainability. While USAID, through OMNI, PAMM, and ICCIDD, was involved at the global level with manuals on quality assurance and monitoring and evaluation of programs, this now needs to receive increased attention at the national level.

Lessons Learned

- **Fortification of salt is technically feasible, but appropriate quality assurance/quality control of both salt production and iodization is usually lacking;**
- **Countries that may have limited resources and infrastructure can still have success with this micronutrient (e.g., Eritrea, Madagascar); and**
- **Success with IDD interventions appears to give countries the confidence and impetus to tackle other micronutrient deficiencies such as vitamin A. In particular, salt iodization is the first experience of many countries with food fortification.**

Next steps

- **Strengthening of quality assurance and quality control;**
- **Accelerating existing programs;**
- **Eliminating pockets of IDD in unreached populations; and**
- **Ensuring sustainability of current programs.**

OTHER MAJOR TRENDS

One of the major achievements of the OMNI project was its support of approaches that have now become routine, as outlined above. At the same time, the project has identified other major trends that will continue to need to be addressed. These have been identified as increasing the spread of fortification; greater involvement of the private sector; multi-micronutrients; sustainability of scaled-up and national programs; cost-effectiveness of programs; and behavior change and nutrition education.

CONCLUSION

The goals of eliminating vitamin A deficiency and iodine deficiency disorders, and substantially reducing iron deficiency anemia have been endorsed as achievable by virtually all countries of the world. There has been wide acceptance over the last five years of the need to see micronutrient interventions as a priority at a national level to improve child and maternal health, and USAID, through the OMNI project, has been involved in supporting some considerable successes over this period. The cost-effectiveness of most micronutrient interventions continues to need assessment and advocacy to policymakers: overall, it has been estimated that for "less than 0.3 percent of their GDP, nutrient deficient countries could rid themselves of these entirely preventable diseases, which now cost them more than five percent of the GDP in lost lives, disability, and productivity." Given the recent success of many programs, the chance of achieving the ICN goals for many countries seems possible for vitamin A deficiency and iodine deficiency disorders. Iron deficiency anemia will continue to be a challenge. The experience and lessons learned of the last five years have moved countries measurably closer to the international goals.

THE OMNI EXPERIENCE: 1993-1998

Opportunities for Micronutrient Interventions (OMNI)--a five-year project of the Population, Health and Nutrition Center of USAID--has been an important player in an international collaboration among countries and other agencies to eliminate micronutrient malnutrition as a primary approach to improve the survival and health of populations. The following goals for the year 2000 were globally endorsed at the World Summit for Children in 1990 and the International Conference on Nutrition in 1992:

- **Elimination of vitamin A deficiency as a public health problem;**
- **Substantial reduction of iron deficiency anemia by one-third; and**
- **Elimination of iodine deficiency disorders as a public health problem.**

The OMNI project was specifically designed to address the above health goals. It did this through working with integrated national micronutrient programs in six countries with identified high risk; providing technical assistance to 22 other national programs; providing global technical leadership and conducting operational research; and disseminating a vast amount of information globally. The OMNI project was managed by John Snow, Inc. with subcontractors from universities, several nongovernmental organizations (NGOs), and the private sector[(2)]. With the support of USAID, both globally and in the field, the project was able to maximize opportunities by working with UNICEF, WHO, the World Bank, and many national and international NGOs and PVOs. Country offices and activities have involved many of the same partners as above, Ministries of Health and other Ministries, and local universities, along with a host of international and national NGOs, from the very large to the village-specific. Particularly useful, especially in-country, has been the working relationship with other USAID projects, such as BASICS, LINKAGES, and MotherCare.

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Improved Monitoring of IDD Interventions

Monitoring of IDD interventions was improved through:

- **Improved quality assurance/quality control tools, techniques, and training;**
- **Enhanced monitoring and evaluation methods with international partners;**
- **An emphasis on Africa: and**
- **Support of national policymaking.**

APPROACHES

The OMNI project initiated a variety of approaches to achieve maximum impact. It worked with countries and USAID Missions to achieve results in four areas: operational research, policy, behavior change, and service delivery. Transfer of successful experiences in one country to be used by other countries in other regions has been a favored mode of operation during the project. One example is the fortification of sugar with vitamin A in Zambia. OMNI was involved from the first stage, provided technical assistance to Zambia, and facilitated travel of Zambians to Guatemala, a Central American country with considerable history in the fortification of sugar. Equipment and Latin American expertise and other technical support, including from the Mission, were also provided to Zambia, and starting on May 13, 1998, the sugar in Zambia was fortified. The impact on the health of Zambian children (and their mothers) is likely to be considerable and could result in saving up to 32,000 lives every year. This experience is described in greater detail later in the report.

Another approach has been to take country experiences and apply them regionally, both to exchange know-how and to ensure harmonization of approaches and regulations. This was done successfully under the Central America Regional Micronutrient Initiative (CARMI) which built on the widespread fortification of wheat flour with iron to forge common agreement on harmonization of regulations, technical standards, and application of international guidelines such as the Codex Alimentarius. This experience is also described later in the report. A regional approach has also been taken by the Greater Horn of Africa Initiative, starting from the successful restoration of the salt-producing capacity of Eritrea after the war to now exporting iodized salt to other countries in the region such as Ethiopia and Tanzania. Fortification possibilities of other foods, and the role of commercialization has been explored with both the private and public sectors in Kenya, South Africa, Tanzania, and Uganda.

The project has learned several lessons regarding the sustainability of micronutrient activities. The first is the need to have strong host country government commitment. There has been active support of the National Micronutrient Task Force in the Philippines, the National Micronutrient Committees in Ecuador and Nicaragua, the GAIN Committee in Madagascar, and a large regional meeting in Malawi where government representatives committed themselves to monitoring the universal iodization of salt, now estimated to be reaching as much as 70 percent of the population in much of Africa. Support of micronutrient activities by First Ladies has been an important factor in Bolivia, Honduras, and Nicaragua. Globally, it is also necessary to strengthen consensus. The activities of the International Vitamin A Consultative Group (IVACG) have been instrumental in informing governments and the scientific community of advances and experiences in vitamin A, and helping to gain commitment by policymakers, as in the last meeting in Cairo, when the First Lady of Egypt opened the IVACG meeting. The ILSI Research Foundation, one of the OMNI partners, has been secretariat for both IVACG and the International Nutritional Anemia Consultative Group (INACG).

Establishing the cost-effectiveness analyses of micronutrient approaches, as recognized by the World Bank and the World Health Organization, has also been critical to ensuring government commitment to sustainable programs. OMNI has worked to build capacity for countries to use cost-effectiveness analyses to determine the best combination of intervention approaches to take, developing a manual and an interactive software tool for this purpose. IVACG has had an important role since 1994 in promoting the cost benefit discussion. Peru, the Philippines, and South Africa have all been examining the different policies and programs for tackling vitamin A deficiency and the relative costs and advantages of the different delivery approaches. The three governments have indicated that they will use these results in further developing national policies. In Indonesian factories, OMNI has worked with a national team to determine the cost of the supplementation of women in factories with iron/folate. This has complemented other work in the country in which the feasibility of selling iron/folate supplements through the small *warang* shops was examined by OMNI partner, PATH. Helen Keller International has also been looking at a life-cycle approach by supplementing Indonesian schoolgirls with iron folate and vitamin A to ensure adequate micronutrient status before pregnancy rather than trying to improve their status during pregnancy. The results of this research are likely to be applied nationally.

In achieving these results, OMNI has formed a unique partnership among NGOs, universities, and other groups that represent leadership in international nutrition. At the country level, OMNI has collaborated with national and local governments; both national and international NGOs and PVOs, and local institutions of higher learning. This has been a critical factor in all of the successful country programs. At the global technical leadership level and in-country, working with the university partners (Johns Hopkins University in Sri Lanka and Zambia; Emory University in Eritrea, the Philippines, and Russia; University of Arkansas in Latin America and Africa; and the University of California, Davis) has resulted in sound technical backup to the country activities. In the area of behavior change, The Manoff Group has produced numerous communications materials (radio and television spots, posters, counseling cards, brochures, newsletters, etc.) and has been collecting real experiences, especially in Latin America, as to what constitutes a successful social marketing intervention. PATH has liaised with the U.S. FDA, and the Philippines FDA, to ensure that the laboratories in-country can back up the private/public sector interventions for vitamin A fortification.

The above brief introduction to some of the activities can be categorized by the four major thrusts that have characterized the project:

- **Increased sustainability through countries adopting national micronutrient plans, cost-effectiveness analysis, and strengthened local capacity;**
- **Increased sustainability and impact through collaboration between the private and public sectors in the fortification of foods with micronutrients in Asia, Africa, and Latin America;**
- **Increased awareness of the importance of vitamin A and other micronutrients through global information dissemination and national information, education, and communication campaigns, leading to healthy behaviors; and**
- **Increased sustainability and impact because of improved health care delivery of micronutrients through child survival activities (establishing guidelines, training, MinPak, and analysis of supply and demand).**

BACKGROUND: THE PROBLEM

In 1992, over two billion people, or more than one out of three individuals throughout the world, were estimated to be at risk of vitamin A, iron, and iodine deficiencies. Although many countries of Asia and Latin America generally showed a remarkable decline in the proportion of malnourished children, micronutrient deficiencies remained significant public health problems. Countries in Africa have identified micronutrient malnutrition as a public health problem (usually with USAID support of deficiency prevalence surveys) in greater numbers over the last few years[(3)]. South Asia, despite some moderate successes over the last five years, still has the highest number of malnourished children, including micronutrient malnutrition.

Women and children are most vulnerable to micronutrient deficiencies because of their added requirements for reproduction and growth. Vitamin A, iron, and iodine deficiencies were predominantly targeted by the project because of their high prevalence, close association with childhood illness and mortality, and their great public health significance.

Vitamin A

Globally, over three million preschool children are estimated to have clinical signs of vitamin A deficiency with resulting serious risk of blindness and early death. Subclinical vitamin A deficiency has now also been shown to be prevalent in preschool and school children, adolescents, and pregnant women in some settings; may have an important role in HIV transmission from mother to child; and may be a significant contributor to maternal mortality. The main causes of vitamin A deficiency in the developing world are insufficient dietary intake of vitamin A and poor bioavailability of provitamin A sources (vegetables and fruits). Other important contributing factors include the increased requirements at certain stages in the life-cycle; increased utilization of vitamin A during infection, especially measles, and possibly AIDS; diarrhea; and sociocultural factors such as intra-household distribution and gender.

While Asia and Latin America have shown notable success in controlling and preventing VAD, some countries, and particularly socially disadvantaged areas within countries, still show levels of prevalence that WHO defines as a public health problem. OMNI has reflected USAID's priorities in that two-thirds of its resources and efforts have been directed toward vitamin A.

To some extent, the problem of vitamin A deficiency is still being defined in Africa, although that has not stopped programs from moving forward where there is a recognized problem. Sometimes, the baseline is acquired as the program starts, e.g., in Zambia, where the National Immunization Day was used to collect blood for vitamin A status assessment, as well as distribution of vitamin A capsules. This approach of national campaign days to improve coverage of vitamin A supplements has been extremely successful in the Philippines, Nepal, and Nicaragua, and the experience has been transferred to Africa in Eritrea and Zambia with OMNI's technical assistance. Other countries with current vitamin A activities, especially in IEC, food fortification, and cost-effectiveness analysis are Ecuador, El Salvador, Honduras, Indonesia, Nicaragua, Peru, and South Africa.

Iron

Conservative estimates indicate that 1.5 billion people are anemic worldwide, over 90 percent of whom are in the developing world, mainly in South Asia and Africa. This includes over half of all women in developing countries. Iron deficiency is the main cause of mild-to-moderate anemia, and contributes to low birth weight, prematurity, and maternal mortality associated with severe anemia. In a survey in India, 62 percent of adolescent girls in urban areas and 81 percent in rural areas were anemic. In most countries with an iron deficiency problem, the situation is worsened by other dietary factors (deficiencies of folate, vitamin A, vitamin B_{12}, and inhibitors), malaria, hookworm, and other chronic infections (including HIV/AIDS). Iron deficiency anemia (IDA) is prevalent in infants and young preschoolers, and while there are no global data on prevalence of IDA in infants, in some sample populations prevalence of anemia reaches 70 percent or higher. IDA is recognized as an important cause of cognitive deficit in this age group, and OMNI was one of the co-sponsors of a workshop at Oxford University that highlighted this. With physical work capacity being reduced even in moderate anemia, iron deficiency also has a profound effect on productivity. This has economic implications for countries in which anemia is a significant public health problem. OMNI, working through INACG and others, has provided global technical leadership through a series of reviews and consensus workshops that identified key areas that need addressing, manuals for assessing prevalence (with PATH), increasing bioavailability of the iron in diets (with the University of California, Davis), and establishing program guidelines (with Johns Hopkins University).

Iodine

Globally, iodine deficiency disorders (IDD) are potentially a significant public health problem in 118 countries because of iodine-poor environments. Iodine deficiency is the most common cause of preventable intellectual impairment in the world today, and it has negative effects on the pregnancy outcomes and on economic productivity. Children born in iodine-deficient areas have been estimated to lose the potential of at least 10 IQ points compared to those born in iodine-replete areas. A recent report from Indonesia also raises the possibility that IDD has a significant impact on deaths in infants, as iodine supplements given to infants 6-10 weeks of age halved the risk of death in the four months following supplementation.

USAID has worked through OMNI on limited but critical aspects of IDD in Eritrea, Guatemala, Philippines, and regionally in East Africa and the Greater Horn of Africa countries to improve the quality of salt iodization. In Russia, where the coverage of iodized salt has declined dramatically in the last decade, OMNI worked with the government, PAMM, and UNICEF to make iodized salt more accessible and increase awareness of IDD among the Russian population. OMNI also participated in a regional workshop on micronutrient malnutrition in Tbilisi, Georgia. Globally, OMNI has worked with ICCIDD, PAMM, The Micronutrient Initiative, and UNICEF to produce state-of-the-art documents, especially on quality assurance, that will be used by countries and international agencies to monitor progress toward IDD elimination.

TACKLING THE PROBLEM: OPTIONS FOR PREVENTION AND CONTROL

These micronutrient deficiencies clearly remain major problems in the world today, despite significant progress over the past few years. Given the demonstration of apparent political will, how are countries, with the support of USAID/OMNI and other national and international agencies, addressing micronutrient malnutrition?

One commonly used categorization of interventions is:

(*i) supplementation,* e.g., vitamin A capsules and iron/folate supplements;

***(ii) food-based approaches* including fortification and dietary diversification; and**

***(iii) public health interventions* such as control of infectious diseases, collaboration with National Immunization Days, EPI, and promotion of breastfeeding.**

The important point about these different approaches is that they are complementary, and an important lesson learned has been that they should be started in concert, as they may have different timeframes and differing feasibility depending on local circumstances. Achieving lasting behavior change is an essential part of whatever method is being used, whether through communications campaigns, social marketing methods, and/or nutrition education. Choosing the appropriate strategy requires understanding the cost-effectiveness of each intervention. OMNI has developed tools to assist countries in selecting the appropriate intervention, given resource constraints. Increasing health providers' and policymakers' awareness of deficiencies and their effects on the population is a prerequisite to sustained action.

Supplementation

OMNI has calculated that if vitamin A status could be ensured, the lives of nearly one million children in 24 countries where USAID is active might be saved. One effective way of doing this is through supplementation. The rationale of preventive supplementation with high doses of vitamin A rests on the fact that this fat-soluble nutrient can be stored in the body, principally in the liver. Periodic (four to six months) high-dose supplementation protects against vitamin A deficiency and builds reserves of the vitamin for periods of reduced dietary intake or increased needs. National coverage of all preschool children with vitamin A capsules has been hard to sustain over time and often does not reach many children who may be most at risk. Where possible, the OMNI project has promoted linking vitamin A capsule distribution with National Immunization Days. This has been a successful recent experience with high levels of coverage in the Philippines, Nicaragua, and Zambia. Other national campaign days that were not attached to immunization drives have been used successfully in Eritrea, Indonesia, and Nepal. Other approaches are also being examined to reach the most at-risk groups, generally children under five years of age and also pregnant women. Such approaches complement the targeted therapeutic supplementation of children with vitamin A when they come to health centers with measles, malnutrition, and diarrhea. The guidelines for supplementation in these situations have just been revised by WHO/UNICEF/IVACG. Another approach has been to give a vitamin A capsule to a mother immediately postpartum and to strongly promote breastfeeding.

Iron supplementation has been the traditional approach for iron, particularly during pregnancy, but coverage is often poor. Lack of compliance is usually blamed, but two reviews of the topic have implicated distribution and logistical problems as equally important factors. Consequently, OMNI has been conducting operational research and programs to improve the supply of and demand for supplements in Bolivia, Honduras, India, Nicaragua, and Sri Lanka and attempted to find innovative ways of delivering supplements. In Indonesia and the Philippines, the private sector's ability to deliver supplements was examined, as well as the feasibility of using Indonesian schools and factories as possible conduits for delivery of supplements.

USAID, among others, (but not through the OMNI project) is supporting promising work in a number of health centers examining the efficacy of intermittent dosages, once or twice a week, suggesting that this may be a possibility for prevention, although not for treating anemia in pregnancy. It does appear appropriate to recommend a dosage regimen of one or two times per week before pregnancy, i.e., to adolescents and young women in schools and factories if compliance is good (since the consequences of missing a weekly supplement would be considerably greater than missing a daily supplement). OMNI has been working through HKI in Indonesia on such approaches, and the results that are expected in the near future will be important in the design of future USAID work. It is presumed that this approach would encourage compliance, reduce side effects, and reduce costs, but perhaps not logistic requirements, which are a constraint in many settings. With iron

supplementation and reduced anemia, gains in productivity and take-home pay have been shown to increase 10-30 percent, and the cost-effectiveness of this has been explored in Indonesia. Consequently, there are important reasons, in addition to the already compelling health, cognitive development, and reproductive consequences, to accelerate programs to prevent and control iron deficiency anemia. INACG has recently produced much-needed international guidelines on appropriate supplementation regimens.

(ii) Food-based approaches

Improving Diets

With the exception of iodine (and selenium) in certain ecological settings, micronutrients are found abundantly in many plant foods and animal products. However, because poor families usually do not have enough to eat and their diets are not likely to include much nutrient-rich food, their diets are usually low in vitamins and minerals as well as energy. This low accessibility to food sources is aggravated by low bioavailability, and it is poor dietary quality, rather than quantity, that is considered to be the key determinant of impaired micronutrient status. In poorer communities where more than 80 percent of the diet is of plant origin, as in many of the countries in which OMNI has been working, it appears that dietary diversification, combined with reduced burdens of infection, may be adequate to prevent vitamin A deficiency, but not to cure it. In diets characterized by poverty, iron sources in the diet are unlikely to be adequate during pregnancy.

Nevertheless, improving dietary diversification through increasing the variety and frequency of micronutrient-rich food sources through nutrition education and horticultural approaches has been shown to be effective in some settings. Interventions that were implemented to achieve dietary diversification include nutrition education and promotion of seasonal foods and recipes (El Salvador, Nepal, and Nicaragua); education concerning available foods (Ecuador, El Salvador, Indonesia, and Nicaragua); horticultural approaches such as home gardens (Bangladesh, Indonesia, and Nepal); and improved methods of food preparation, preservation, and cooking that conserve the micronutrient content (global technical leadership reviews and India). OMNI has brought together important scientific expertise in reviews of plant sources of vitamin A in foods, and bioavailability of iron in diets.

Fortification

The most effective food-based approach to improving nutrient availability and accessibility is fortification. This can be of both staple foods and more processed commercial products. Fortification of an appropriate food vehicle with specific nutrients has been a clear success in many countries. The OMNI project, in partnership with other organizations, has been enormously successful in enhancing country capabilities in fortification, especially vitamin A in sugar, but also in other vehicles such as flour; iron and folate in wheat flour; and the voluntary fortification of processed foods.

In the past, fortification efforts have been less effective, both in terms of start-up and sustainability, in developing countries compared with the more industrialized world. However, in the last few years, the experience in many countries of Latin America and Asia suggested that the time was right for a considerable expansion of fortification as a prime approach to addressing micronutrient malnutrition. USAID, through OMNI and other programs, has been able to make substantial contributions to these efforts with all three micronutrients. Perhaps the most successful has been in Latin America (working with INCAP/PAHO, UNICEF, and national governments). The regional approach has been supported in Central and South America, the Greater Horn region of Africa, and in Southeast Asia. Vitamin A fortification was strengthened in Latin American countries by enhancing quality assurance issues; started in Africa with Zambia, with other countries such as Uganda now showing interest; and moved into the private sector with other vehicles in Southeast Asia.

Micronutrient interventions, and particularly fortification, have been identified by the World Bank as among the most cost-effective of all health interventions. A major lesson learned has been that fortification is only one arm of a strategy, but by becoming commercially viable, it can reduce the size of the at-risk population needing other measures such as supplementation. Where the costs are passed on to the consumer, and the food industry routinely fortifies, sustainability is potentially high, and passing costs on is feasible.

(iii) Related Public Health Interventions

For maximum impact, other public health interventions are essential. These include control of infectious diseases, expansion of measles and other childhood immunization interventions, deworming for intestinal parasites (hookworms), malaria control, promotion of breastfeeding and complementary feeding, and proper health care such as oral rehydration therapy, all of which have an impact on micronutrient status. The OMNI project has been instrumental in the development of the minimum package (MinPak) approach, as a way of integrating

micronutrient deficiency prevention and control into health management of the child. The MinPak approach ensures that several micronutrient interventions for vitamin A and iron, and the use of iodized salt, are routine, as well as improved breastfeeding and complementary feeding practices. This intervention is currently being evaluated by the BASICS project in conjunction with OMNI.

With the recognized interaction between infectious disease and malnutrition, addressing just malnutrition or just disease control in isolation is unlikely to be successful. Infectious disease can have an effect on micronutrient intake, absorption, and utilization. Vitamin A deficiency and iron deficiency anemia can affect immune status; vitamin A deficiency is now associated with an approximate 25 percent increased likelihood of child death, especially from diarrheal disease and measles.

Because of the coexistence of multiple micronutrient deficiencies and interactions between micronutrients, and because micronutrients are generally ingested as part of the daily diet, it appears logical to pursue an integrated approach covering more than one micronutrient. For example, treating iron deficiency anemia with both iron and vitamin A has a greater effect than either of the two micronutrients alone. This clearly has important programmatic and policy implications. Women and children, especially those in poverty, are most at risk for all three micronutrient deficiencies (vitamin A, iron, and iodine). Integrated activities have taken place in Bolivia, India, Indonesia, Madagascar, Nicaragua, the Philippines, and Zambia.

WHERE ARE WE NOW?

Is success in eliminating vitamin A deficiency and iodine deficiency disorders and significantly reducing iron deficiency anemia obtainable by the year 2000? Of the three micronutrients being discussed, the elimination of iodine deficiency disorders is probably closest, although considerable progress has been made in vitamin A. This section will look at where some of the USAID/OMNI-assisted countries are in terms of achieving the international goals for vitamin A, iron, and iodine.

Increased Vitamin A Coverage

Experience with vitamin A supplementation has been significant in the Asia region, especially in gaining national expertise and then transferring it to other countries. Indonesia has been declared "xerophthalmia-free," although it is recognized that a problem of subclinical deficiency persists, especially in the rural areas. Indonesia and the Philippines have both seen national prevalences of clinical vitamin A deficiency drop to below levels designated by WHO as a public health problem although pockets of high prevalence still exist, particularly in poorer provinces. India, and now Bangladesh, have demonstrated a decline in prevalence, particularly of severe xerophthalmia. Latin America, where the problem has been mostly subclinical, has shown remarkable drops, e.g., in Honduras where a USAID-supported survey, with technical support from OMNI, showed a drop in prevalence from 40 percent to 14 percent, and in Guatemala where prevalence declined from 26 percent to 16 percent, both presumably largely due to sugar fortification.

For two decades now, at least three Asian countries in which USAID has been working (Bangladesh, India, and Indonesia) have had programs implementing a universal approach to supplementation of vitamin A capsules. According to the World Bank, this is one of the most cost-effective of health interventions, but questions of sustainability remain. A successful strategy has been the distribution of capsules during mass campaigns such as National Immunization Days, as in Bangladesh, Nicaragua, and the Philippines, and more recently, in Eritrea and Zambia. OMNI has been instrumental in transferring expertise to countries just starting-up, in monitoring coverage, and identifying possible "fatigue" factors such as in the Philippines. Coverage has been consistently maintained in several countries at over 80 percent for more than three years now. Currently 12 countries in Asia and 10 countries in Africa have been successfully providing vitamin A capsules during National Immunizations Days or other mass campaigns. With these accomplishments, dramatic declines in child mortality would be expected. One of the major challenges for USAID, as well as for other agencies and institutions, will be to demonstrate this impact or explain why it has not happened.

In Nepal, supplementation has been consistently expanded through delivery by community health workers, and has now been extended to 42 districts with a coverage of 90 percent. Indonesia has been able to show a coverage of approximately 60 percent through health centers. These are important examples as more countries move towards decentralized health systems. Through HKI, OMNI has been working with local government units in the Philippines to field test the enhanced sustainability of micronutrient activities once they are devolved to local communities.

India has a long history of vitamin A supplementation through the Integrated Child Development Services program, which has delivered vitamin A to children under five years of age as part of its comprehensive activities

since 1975, but appears to have had a relatively small effect on subclinical vitamin A deficiency. OMNI has worked in close association with the local USAID Mission, national NGOs, and CARE to identify some of the reasons for this. This preliminary work will provide important information upon which future USAID micronutrient activities can build.

A recent review by UNICEF has shown that since 1994, vitamin A supplementation has increased on average from 52 to 75 percent in South Asia, and from 25 percent to 86 percent in East Asia and the Pacific. In just one year, in seven states of India alone, supplementation (if there was sufficient coverage) could save 175,000 to 250,000 child lives. Ten countries in Asia (including Bangladesh, Cambodia, India, Indonesia, Nepal, and the Philippines) have policies of giving postpartum high-dose vitamin A to mothers within eight weeks of birth, although coverage is unknown.

Vitamin A fortification has been important in reducing deficiencies of vitamin A, especially in Latin America with the fortification of sugar (including a private sector approach in Bolivia with OMNI and UNICEF technical support). USAID had an early role in margarine being fortified with vitamin A in the Philippines, and its efficacy has been demonstrated. OMNI has also assisted Nicaragua in assessing the feasibility of using oil as a vehicle. There is ongoing work in the Philippines testing the efficacy of vitamin A in a wheat flour product, *pandesal,* and the technology of fortification with both vitamin A and iron. The president-elect of the Philippines has announced that he will be legislating for vitamin A and iron fortification of flour, largely through the efforts of the OMNI office in the Philippines, HKI, Johns Hopkins University, and the Nutrition Center of the Philippines. Noodles (or the accompanying sauce) are increasingly being fortified with vitamin A, and a recent assessment of Indonesian households found 29 percent of households, even in rural Sulawesi, to be using fortified noodles.

Increased Iron Availability

IDA is probably the most prevalent nutritional problem in the world. Since many pregnant women enter pregnancy already anemic, the majority of women in the developing world are anemic at some stage of their pregnancy. Anemia remains the micronutrient deficiency for which programs need the greatest acceleration, but ICN goals are unlikely to be reached in most countries.

There has been significant effort during the course of the project to enhance delivery of iron/folate supplements through innovative approaches, including using the private sector, as in Indonesia. In Bolivia, community promoters were used, with the promoters receiving training, delivering the supplements, and following up. Compliance issues and different regimens are also starting to move beyond research into operational research and programs, and operational research is ongoing in Honduras, India, Indonesia, Nicaragua, Sri Lanka, and Zambia. Fortification of foods with iron has increased and will have an effect on anemia levels, particularly as commercial food companies begin to fortify. At the same time, it is increasingly recognized that other factors must be addressed at the same time, e.g., malaria, through impregnated bednets and anti-malarials (particularly in pregnancy), and deworming, as the project has determined in India.

Fortifying commercially produced foods and flours with iron (and B vitamins, and more recently, folate), has been successful in much of the industrialized world in reducing levels of IDA, and wheat flour fortification has been recently strengthened or introduced in more than 15 countries in Latin America, including Bolivia, Ecuador, Nicaragua, and Peru. Work with Sri Lankan universities, government, and USAID/OMNI, is ongoing there to test the effectiveness of an iron-fortified wheat flour intervention.

Improved Monitoring of the Iodine Deficiency Disorders Interventions

The reduction in iodine deficiency is approaching a global success which began to show significant results in 1992. While universal salt iodization (USI) has been the overwhelmingly predominant approach, countries have used a variety of programs to complement this main thrust.

Salt iodization programs which began during the middle of this century, and other sources of dietary iodine, have effectively abolished IDD in countries that routinely iodize their salt. This experience has now been adapted to many different local environments, from relatively easy adaptations by major industrial salt producers, to support for small producers to enable them to iodize salt without losing income. OMNI has been active in IDD elimination globally through support of several monitoring and quality assurance expert groups and resulting guidance manuals; support of a database on IDD prevalence and control with ICCIDD, The Micronutrient Initiative, and UNICEF; the ICCIDD newsletter; and an important East African regional workshop in Malawi. OMNI, PAMM, ICCIDD, UNICEF, and WHO have also developed and tested a major tool that will allow countries to evaluate their progress toward the IDD goals.

At the country level, OMNI provided technical assistance to national activities in Eritrea, Guatemala, and the Philippines to improve salt quality and iodization. The main lesson learned in these three countries is the essential need to have the salt producers firmly committed, and that government must also see it as a priority. UNICEF estimates that among countries with a recognized IDD problem, all but seven have passed appropriate legislation to ensure universal iodization.

THE OMNI EXPERIENCE:

This section of the final report consists of country-specific and topical case studies to provide a detailed account of selected OMNI activities, achievements, and lessons learned.

INCREASED VITAMIN A COVERAGE

The National Vitamin A Program in Nepal: A Supplementation Success Story

Vitamin A deficiency is a significant problem in Nepal. General poor nutrition and very high childhood infection rates both contribute to the high mortality rates there. In this setting, vitamin A deficiency is a significant contributor to childhood mortality, with supplementation having the potential to avert at least 25,000 deaths annually. Johns Hopkins University (JHU) and other institutions, with support from USAID, have researched various aspects of vitamin A deficiency, its effect on the Nepalese population, and the most efficient means to address the problem. Four vitamin A surveys conducted in different areas of the country between 1988 and 1994 demonstrated that Nepal was one of the most severely affected countries in the world, with Bitot's spots prevalence as high as 8.2 percent in some regions.

In response to the growing recognition of the impact of vitamin A deficiency on child survival, Nepal established a national vitamin A program in 1993, consisting of four components: nutrition education; case management; home gardening; and vitamin A supplementation. The supplementation component (the subject of this case study) is being systematically introduced throughout the country, and, as of Spring 1998, had reached 42 of 75 districts providing semi-annual supplementation to no less than 80 percent of children in those 42 districts 6 to 60 months of age at a cost estimated to be less than $0.50 per child.

The supplementation and nutrition education components are carried out by unpaid, often illiterate female community health volunteers (FCHVs) who deliver high-dose capsules twice a year and are supervised and supported by the Ministry of Health (MOH). There are currently 42,000 trained FCHVs in Nepal; adding vitamin A to their existing activities (family planning and health promotion, oral rehydration therapy and immunization support) gives them more prestige and status in their communities and serves as a very cost-effective mechanism for delivering vitamin A capsules and community education.

The Ministry of Health includes a Child Health Division, and within this division, the Nutrition Section oversees the implementation of the National Vitamin A Program. The country has faced chronic difficulty with staffing, training of staff, provision of basic medications to health posts, and establishment of demand for and use of services provided at health posts. The MOH, therefore, requested assistance in developing and implementing the vitamin A supplementation program from USAID and UNICEF. The VITAL project, and OMNI, through Helen Keller International (HKI) and now JSI, have assisted the program through technical assistance and support to the Nepal Technical Assistance Group (NTAG, now an independent Nepali NGO). NTAG provides orientation and training of FCHV trainers from the MOH districts through two vitamin A campaigns in one year. Further campaigns are the responsibility of the MOH. Five new districts are added to the program each campaign, ensuring competent introduction of the capsule distribution and nutrition education components of the program, without overextending resources at the national level. The program is monitored closely using mini-surveys in selected program districts, during various phases of program implementation. Districts which have been managed solely by the MOH are still reporting over 85 percent coverage.

The MOH revised the National Vitamin A Program in 1996, adding a postpartum maternal supplementation component, and planning to continue phased expansion of the children under five supplementation component from the initial 32 priority districts to all 75 districts of the country.

Several aspects of the program have contributed to its success:

- **Establishment of research sites to explore both epidemiologic and programmatic issues has helped define the**

strategy, and guide the program over time;

- **Use of a technical assistance group has helped an overburdened government infrastructure initiate the program in each district and strengthens implementation;**

- **Use of FCHVs has allowed distribution to reach all areas of the district, and increased the community respect for these unpaid workers; and**

- **Use of mini-surveys to estimate coverage for districts in different phases of program implementation has provided immediate feedback to both program managers as well as district staff as they take over responsibility for distribution.**

Lessons Learned

USAID, through OMNI/HKI and JSI/Nepal, has had a critical presence in vitamin A activities in Nepal. The experiences of USAID in addressing vitamin A deficiency in Nepal, and accompanying lessons learned, are as follows:

1. Creation of a study site where longitudinal research can help define and refine intervention strategies for the country is valuable. While the early research in Nepal received international attention in its demonstration of mortality reduction from correction of vitamin A deficiency, subsequent work has helped both to establish the national program and to refine the interventions chosen.

2. Use of a Nepali NGO to help advise the government and establish the program in selected districts has been very successful. The Nepal Technical Assistance Group (NTAG), whose activities continue to be supported by USAID through HKI and now JSI/Nepal, has been critical in helping districts establish the program. NTAG provides training, logistic support, supervision, and assistance with implementation for the first two distribution cycles. After this, support is reduced, and the effort is transferred to an experienced district team. To date, coverage estimates remained high, even after transferring full responsibility to district staff.

3. Distribution of the supplements through FCHVs has had several important results. The FCHVs have been extremely motivated in carrying out the semi-annual distribution. District staff and village health workers have ensured availability of capsules, and FCHVs have helped motivate caretakers to bring their children to central locations to receive the capsules. In addition, FCHVs understand the demographics of their communities, and sometimes actively seek children requiring dosing by visiting households. Since FCHVs are not paid, their motivation depends on some sense of importance or contribution expressed by the communities they serve. Due to their widely recognized success in the National Vitamin A Program, many organizations are now involving FCHVs directly and indirectly in their programs, such as literacy classes.

4. The use of innovative monitoring activities to assess program achievements and provide coverage information to complement more periodic national survey data has been beneficial. District-level mini-surveys have been successful in providing accurate coverage figures, as well as helping to understand program constraints. The mini-survey method is relatively simple to implement, and involves limited staff for less than two weeks per district. Since the method involves representative sampling of households, it could be useful for answering a variety of district-level program questions. The experience can be transferred to district government staff, who should be able to implement such surveys to meet a variety of needs for various programs, thus moving responsibility for using data for decision making down to the level where the decisions need to be made.

By the end of November 1997, a total of 99 district level mini-surveys were completed. In this process, district staff were trained in the methodology, and currently a cadre of technical support staff who have implemented the surveys are available to assist district staff. The surveys have consistently demonstrated coverage greater than 80 percent, regardless of the phase of the program, geographic area, or degree to which the program has been turned over to MOH staff.

5. Despite the above, the sustainability of the program is not ensured, as with any capsule distribution system relying on external funds. Nevertheless, as noted above, the MOH has decided to expand the program to all 75 districts.

Possibilities to Improve the Model

The Nepal vitamin A high-dose supplementation program has been very successful. Yet there are a few aspects of

the program which might have been strengthened. As other countries adapt this model, these aspects should be considered.

Due to the immediate need and uncertain MOH staffing, an external group was contracted to advise the government and establish the program within the Ministry in selected districts. The NTAG provides initial orientation and training to district and health center staff who train and supervise Female Community Health Volunteers for the vitamin A campaigns. While key to successful implementation in Nepal, this may have led to some perception of the program as an external project, slowing its acceptance as an integral part of the health system. Other countries will need to assess this model in their own context to ensure that there will be governmental ownership and sustainability as early as possible. Second, while training was conducted to implement treatment protocols in all districts, capsule distribution was a priority and case management received less attention in non-priority districts. Third, pre-service training for doctors and nurses to provide up-to-date vitamin A knowledge could be strengthened.

Anticipated Impacts

Calculating the deaths averted from the supplementation program is complex, and requires several assumptions. Recently an expert group reviewed the original research findings on mortality reduction and the overall program coverage. Assuming a mortality reduction of 30 percent (from data in both the Terai and mountain regions of Nepal) and a coverage of 85-90 percent (from mini-survey data), and using current population figures, at least 25,000 child deaths could be averted annually if coverage remains high.

It is likely there are additional benefits from this program, aside from the direct impact on child survival. Support for the ongoing research effort has resulted in additional treatment recommendations for younger children and for women, with further implications for child survival. Improvement in the FCHV program in the treatment of pneumonia, for example, will also have implications for child survival. Finally, the experience in Nepal, apparently so successful and with good documentation of program activities, can be helpful for other countries in their efforts to prevent and control vitamin A deficiency.

The Vitamin A Program in the Philippines: Working With the Public and Private Sectors

Vitamin A deficiency has long been identified as an important public health problem in the Philippines, where one out of every three children has low or deficient vitamin A levels. For the past two decades, strategies to combat VAD have been underway, including efforts to improve local diets and dose children with vitamin A capsules semi-annually, as well as continual efforts to work with the private sector to fortify foods with vitamin A. These efforts have moved the Philippines from levels of xerophthalmia higher than the WHO cut-off point indicating a public health problem, to a position where the national survey results released in 1993 showed a significant improvement nationally. However, the problem is still severe in some localities, and subclinical VAD remains widespread. The Government of the Philippines is committed to eliminating VAD by the year 2000.

The Philippines was one of the first countries in the world to add vitamin A to a National Immunization Day (NID) for polio, with continuing success, as measured by coverage rates that consistently reach over 90 percent. On World Food Day in 1993, the Government of the Philippines launched a three-year national campaign, popularly known as ASAP (*Araw ng Sangkap Pinoy*), primarily as a means to distribute the second six-month dose of vitamin A to children one to five years of age. Literally translated as "A Day of Micronutrients," ASAP has also been used to distribute iodized oil capsules and promote access to micronutrient-rich foods, including distributing plant cuttings and packets of vegetable and fruit seeds to all families. Regular targeted supplementation of vitamin A is also being done in all health centers and hospitals to identified specific population groups. ASAP has been a successful and aggressive campaign, reaching record numbers of the target groups. OMNI assisted in the post-campaign evaluations of ASAP, which in 1996 demonstrated a 92 percent coverage rate. The government then decided to continue the delivery of vitamin A capsules through 1999. Results from the ongoing Fifth National Nutrition Survey (expected in late 1999) will help the government determine if a shift from its nationwide massive supplementation program to more localized province-wide supplementation is justified. OMNI/HKI has also been involved in capacity building of local government units to enable this transition to proceed smoothly.

As part of the micronutrient strategy, the government introduced the Sangkap Pinoy Seal Program. This program is a food fortification strategy designed to encourage food manufacturers to fortify their products with vitamin A and other micronutrients at levels approved by the Philippines Department of Health (DOH). The program provides guidelines to help private sector manufacturers develop appropriate specifications and quality control measures to ensure safe levels of micronutrients in processed foods, and awards the seal to those manufacturers that meet the standards for high quality fortification. The seal helps consumers identify which food products are fortified and accepted by the DOH. Under the program, food companies have to conduct their own research and product development, usually with the assistance of private and government laboratories which conduct the

product testing. OMNI has worked with the Philippines FDA, the U.S. FDA, and PATH in standardizing laboratories. They have to comply with the food fortification guidelines which state that a daily serving of the fortified foods should contain at least one-third of the recommended daily allowance for the specific micronutrient to qualify for the seal. After a company has been granted the seal, the fortified products are monitored through market sampling by the DOH and sent to laboratories for analysis to be paid for by the company. At present, the DOH has authorized food manufacturers to use the Sangkap Pinoy Seal on ten food products.

OMNI organized and supported the launching of the seal program in August 1996, with three companies already approved for the seal. During the launching, the companies--business rivals--worked together for the success of the activity. They shared the fee for the public relations firm to handle the communications campaign for the launch and worked closely together in planning the event. The activity was a major success, based on the increase in number of seal inquiries and applications after the launch. Much of its success is attributed to the partnership of the public sector, the private sector (industry), and the NGO community.

The success of the Sangkap Pinoy Seal Program, however, has not been fully sustained. Many fortified foods are being made available that do not have the seal. Although the seal program launch may have assisted the companies in developing and marketing the fortified foods, the fact that they do not see the importance of the seal as part of their marketing strategy is an issue that needs to be analyzed. In February 1997, through the efforts of ILSI and OMNI/PAMM, a memorandum of understanding was signed by the Philippines Chamber of Food Manufacturers, Inc. (PCFMI) with the Departments of Health, Agriculture, Science and Technology, and Education, Culture, and Sports supporting food fortification. A Committee on Nutrition was created within PCFMI to initiate dialogue on nutrition with the different departments. Through the course of regular meetings that are now conducted between PCFMI and the Department of Health-Nutrition Service, PCFMI identified the following issues to be resolved in order to increase food industry participation in the fortification program, particularly the Sangkap Pinoy Seal Program:

- **Whether the current program supports an enabling environment for the industry to fortify;**
- **Why most companies fortifying products do not carry the seal and rely on their own marketing and promotional expertise to promote their fortified products. Do companies perceive the seal program as ineffective for marketing their fortified products?;**
- **Whether cost requirements are a deterrent to the program; and**
- **Whether the current process protects consumers', companies', and/or the government's interest.**

It is anticipated that through this continuous process of dialogue between the food manufacturers and the government, the solution to strengthening and supporting an effective fortification program is imminent. The right components are in place for this to happen: fortification of flour, harmonization of laboratories, strong government commitment, and interest from the food manufacturers. Consumer awareness and demand for fortified foods will need to be more intensively addressed.

The Philippines is one of four countries that have participated in OMNI's cost-effectiveness initiative, launched in November 1996. The aim of this initiative was to improve country micronutrient strategies by conducting more and better economic analyses related to intervention choices. The Philippines workplan objective was to determine the most cost-effective package of interventions to achieve the elimination of vitamin A deficiency in the next few years. The study also addressed the cost-effectiveness of the intervention programs currently underway--supplementation and fortification of flour--and the timing for gradual phase-out of national support (with the phase-in of local government unit support) for universal dosing. The results of this study will provide important insights into the development of vitamin A strategies for the next national plan period (1998-2003), and has already been used by the government, through the National Nutrition Council, to develop policy for the next five-year cycle. USAID/OMNI assisted with the development of this strategy.

As part of the government's broader strategy of decentralization of health care delivery, OMNI, through HKI, assisted the Department of Health-Nutrition Service to forge a partnership with local government units (LGUs) to eliminate micronutrient deficiencies. With the enactment of the Local Government Code of 1991, which decentralized many central government functions, including health and nutrition, the DOH no longer focuses on the direct provision of health services. Instead, it concentrates on the provision of technical assistance to provinces and municipalities, the formulation of plans, policies, and programs, standard setting, resource allocation, and monitoring and evaluation. OMNI/HKI assisted the DOH with strategies to facilitate the decentralization of specific aspects of its micronutrient program. To assist the DOH in strengthening its ability to provide technical assistance to LGUs, OMNI/HKI helped establish a technical resource pool of local experts tasked with

communicating DOH micronutrient policies and programs to the provinces. Equipped with a "micronutrient talking points and transparency guide," the technical resource pool provided micronutrient program and policy updates to provincial and municipal health workers.

Based on findings from an OMNI/HKI-supported qualitative assessment among LGUs, OMNI/HKI implemented a series of workshops to re-engineer local nutrition councils. The process resulted in reactivated councils, which, in turn, developed and published provincial health and nutrition situation reports and action-oriented, data-based nutrition plans. In addition, substantial increases in LGU budget allocation for nutrition interventions were achieved. To assist LGUs in monitoring and evaluating supplementation coverage, OMNI/HKI supported the field test of a micronutrient cluster survey implemented by provincial LGU employees. The results of the survey indicated 95 percent vitamin A capsule coverage among one to four year old children, significantly higher than the 78 percent average coverage level attained nationally.

When this decentralization process began in 1996, a series of workshops and discussions were conducted, with assistance from both OMNI and HKI. DOH and OMNI organized a successful round-table discussion entitled, "DOH-LGU Partnership Towards Health for Women and Children," with the Secretary of Health presiding and numerous local and national officials, as well as the press, in attendance. A workshop on nutrition program advocacy for LGUs was held at the end of June 1996, the first in a series of advocacy meetings conducted by HKI. Outcomes from these workshops include identifying the components of the nutrition program appropriate to municipal and barangay (village) levels, identifying the available tools for LGUs to use for nutrition program materials and training, and developing an advocacy strategy for promoting the nutrition package at the LGU level. A recent report to the USAID Mission demonstrated great appreciation by LGU officials in the strengthened capacity they now have, and, perhaps even more importantly, appreciation for the effect that local data can have on understanding their programs and for planning. This will be essential if decentralization is to be truly effective.

The Philippines government identified fortification of foods with micronutrients as one of its key strategies to achieving the goals of the National Plan of Action for Nutrition. The government has looked at fortifying rice with iron, salt with iodine, and flour and sugar with vitamin A. For a variety of reasons, the most successful fortification effort, to date, has been flour with vitamin A, which is currently being done on a voluntary basis by two out of the country's twelve millers. The new president-elect of the Philippines has announced that he will launch, within his first 100 days in office, the fortification of flour with vitamin A, and subsequently with iron. A significant amount of this flour goes into producing wheat flour buns, known locally as *pandesal*. Given that the president-elect campaigned as the poor people's candidate, and *pandesal* is the breakfast of many poor children, especially in urban areas, his endorsement of wheat flour fortification seems appropriate. OMNI, with the Nutrition Center of the Philippines, JHU, and HKI, has supported all steps in the process that led to the presidential endorsement, including stability trials, taste testing, and technological backup. An efficacy trial of vitamin A-fortified *pandesal* in school-age children is currently being analyzed. The next step, adding iron, along with the vitamin A, is currently being prepared for with stability trials. The *pandesal* study in the Philippines is another example of a productive partnership between the national government, industry, academia, and USAID.

Zambia's Vitamin A Program: A Model for Africa

Child mortality in Zambia is high, with an overall rate of 197 deaths per 1,000 births in children under five years of age. One factor contributing to childhood morbidity and mortality is vitamin A deficiency, which represents a serious threat to child survival in Zambia. Vitamin A deficiency rates are very high throughout the country, with a 1997 study (carried out by the National Food and Nutrition Commission (NFNC) and supported by USAID/OMNI and others) showing 43 percent of children under five years of age suffering from moderate to severe deficiency. Further analysis gives more recent results, which still need to be confirmed, showing a severe public health problem in both children under five years of age (65.7 percent) and in women (22.1 percent) when using serum retinol levels less than 20g/dl. In some parts of the country, VAD is so severe that childhood blindness is occurring. It has been estimated that the elimination of VAD in Zambia would reduce mortality by 20-30 percent, saving an estimated 32,000 children each year. Although the problem had been identified through limited district surveys in 1996, effective programs had not gotten off the ground, and, along with an ongoing drought, conditions worsened.

In the course of one year (1997-1998), Zambia has become a model for micronutrient activities, primarily vitamin A, with rapid decisions to: 1) distribute high-dose vitamin A capsules as part of the National Immunization Day campaign and through a second biannual dose through health posts, 2) conduct both national vitamin A and iron deficiency surveys, and 3) fortify sugar with vitamin A. A series of key decisions by the Ministry of Health, USAID, and the private sector (namely, the Zambia Sugar Company) helped to make Zambia a center of micronutrient activity in a relatively short time period and an example to much of the rest of Africa in the process. These decisions were encouraged by prior policy advocacy work by OMNI, and facilitated by the active support of

USAID/Zambia, a timely visit by USAID/G/PHN personnel, and dedicated efforts of the National Food and Nutrition Commission (NFNC) of Zambia. The decisions were implemented through responsive collaboration among OMNI partners: PAMM of Emory University, The Manoff Group, and Johns Hopkins University. A number of other agencies and donors, including UNICEF, The Micronutrient Initiative (MI), the Canadian International Development Agency (CIDA), and European donors, also played significant roles in Zambia's micronutrient program.

The Government of Zambia committed itself to lowering morbidity and mortality among children under age six from various causes, including vitamin A deficiency. The government, through the NFNC, adopted the following strategy to decrease vitamin A deficiency in the population:

1. Dietary diversification through the increased production and consumption of vitamin A-rich foods by target groups.

2. Treating mothers of newborns shortly after delivery and treating infants and children six months to six years of age twice annually with high-dosage vitamin A capsules.

3. Promotion of exclusive breastfeeding from 0 to six months, and breastfeeding with nutritious complementary foods for children up to two years of age.

4. Fortifying sugar with vitamin A.

In August 1997, for the first time, high-dose vitamin A capsules were distributed in conjunction with the country's intensified polio eradication campaign, with 65 percent coverage of all children six months to five years of age, or a total of almost 1.5 million children receiving a vitamin A supplement along with the oral polio vaccine. OMNI and NFNC worked closely in the planning for the National Immunization Days (NIDs), while UNICEF, CIDA, and MI coordinated efforts to ensure an adequate supply of vitamin A capsules country-wide. A second round of vitamin A capsule distribution took place in March 1998, during a Vitamin A Awareness Week campaign. The Manoff Group assisted NFNC with a social marketing campaign to encourage caregivers to bring their children to primary health care centers for the second round. PAMM assisted with strengthening the distribution system through existing Ministry of Health clinics, training health workers, and identifying and eliminating bottlenecks to the availability of capsules through the health system.

Zambia is an interesting case study of vitamin A supplementation with its once-a-year combination of vitamin A capsule distribution with the NIDs, followed six months later by a health clinic-based delivery during the designated Vitamin A Awareness Week. As mentioned above, the August 1997 NIDs campaign was a success based on high coverage rates, while the Vitamin A Awareness Week round had, as might be expected in the first year, lower coverage. Nevertheless, the latter generated a considerable amount of excitement and media coverage with marches on the street, banners, speeches, television and radio spots, and theater groups performing in communities. The next NID will be conducted in July 1998. Promotion of vitamin A capsules and their availability from health workers is being implemented before the NID by NFNC. The promotion campaign stresses that children receiving the dosage during the NID will need another one six months later and that the capsules can be obtained at health centers. An important finding from the formative research in Zambia was that mothers take their children to clinics only until the vaccination cycle is finished (at about two years of age). Therefore, the promotion campaign is emphasizing the importance of vitamin A for all children up to six years of age, even if they are healthy.

One of the key objectives of the vitamin A communications strategy in Zambia was to create demand for routine vitamin A supplementation for children six months to six years of age. There was some initial confusion over the vitamin A capsule message and how often it is needed. The challenge was to avoid confusion between the need for vitamin A in the child's diet every day, and the need for supplementation once every six months. One of the challenges in promoting vitamin A is that it does not have any immediate tangible or visible benefits, whereas with malaria, for example, one feels the symptoms and often the relief when it is treated. This was the first year a Vitamin A Awareness Week was held (1998), but the hope is that the benefits of holding such a promotional campaign will be seen and continued with government support so that routine doses of vitamin A (two per year) will occur.

It was determined that vitamin A surveys would be conducted prior to and following implementation of a national sugar fortification program to provide a basis for measuring the progress of existing interventions and to guide future policies and programs. In August 1997, OMNI assisted in the collection of nationally representative data on the vitamin A status of mothers and their children ages 6 months to 59 months in conjunction with the NIDs campaign. Because vitamin A capsules were being administered to the children at the NID, it was both necessary

and expedient to conduct the vitamin A assessment prior to the NID. In this way, a picture of the baseline levels of serum vitamin A (retinol) could be determined in the sampled children, unaffected by the addition of the vitamin A supplement.

Thirty geographically representative NID sites were randomly selected for the collection of survey data and blood samples for serum retinol analysis. For the first time in a major survey, capillary blood was obtained by finger-prick, an innovative approach that provides a relatively low-cost, rapid vitamin A assessment. This capillary blood technique may be appropriate for other countries that are conducting either NIDs for polio eradication, Demographic and Health Surveys (DHS), or other types of campaigns. In a beneficial spin-off of the survey, not only was the capacity of the NFNC enhanced, but the Tropical Diseases Research Centre (TDRC) in Zambia performed the vitamin A analysis of the samples, with quality assurance provided by the University of Stellenbosch in South Africa. Preliminary results show a 43 percent prevalence of subclinical vitamin A deficiency in children, and 11 percent in women of reproductive age. Compliance among women and their children at the NID sites in Zambia was extremely high, with well over 90 percent of those asked submitting to blood collection. This technique was also used in the April 1998 anemia survey conducted by OMNI, PAMM, and NFNC in Zambia. Based on the positive experience in Zambia, the U.S. Centers for Disease Control and Prevention (CDC) plans to use similar capillary blood techniques for both vitamin A assessment and anemia assessment in conjunction with an upcoming DHS in El Salvador. It is important to note, however, that this capillary blood technique has not been validated against venous blood (although Johns Hopkins University has proposed to do this).

With the launch of vitamin A-fortified sugar on May 13, 1998, Zambia became the first country in sub-Saharan Africa to fortify all domestically-consumed sugar with vitamin A. After considerable advocacy by the government, OMNI, and its partners, the Zambia Sugar Company, the sole producer of sugar in the country, launched its new "White-Spoon VitA-Fortified" brand. Sugar fortification in Zambia is an important case study demonstrating the impact of USAID's contribution that helped to develop fortification legislation requiring the fortification of all sugar, conduct market research of consumer consumption patterns, put quality control measures in place, and leverage funds to cover the costs of equipment. The sugar fortification program has been planned since January 1997, when the National Vitamin A Working Group (renamed the Micronutrient Task Force) was formed. The Working Group, comprised of a diverse mix of private sector and public sector organizations, includes the NFNC, the Zambia Sugar Company, the National Council for Scientific Research (NCSR), the Ministry of Health, the National Food and Drugs Control Laboratory, the Ministry of Finance, UNICEF, USAID/Zambia, OMNI, the Society for Family Health, the Embassy of Japan, BASF Company, and Roche Pharmaceuticals. The extraordinary public-private partnership nurtured and supported by the Vitamin A Working Group created the ideal enabling environment for undertaking the array of legal, financial, technical, operational, and communications challenges that were faced.

Initially, through a request from the USAID Mission, OMNI provided basic information about vitamin A sugar fortification, as well as technical assistance to initiate the process. A household sugar consumption study, commissioned in November 1997 to measure intra-household use of sugar, suggested that both rural and urban populations in Zambia consume sugar in amounts that made sugar a good choice as the food vehicle for fortification. One of the most significant events in the fortification planning process was a USAID/OMNI-sponsored trip by several Zambian food scientists to Guatemala--where sugar has been fortified with vitamin A since the mid-1970s--to observe first-hand the realities of the fortification process. Through visits to several mills, the group was exposed to all the critical components of the process, including a pre-mix plant and a distribution center, where bulk sugar is packaged into consumer-size portions. The remainder of the trip focused on training to reinforce what the Zambians observed in the mills and laboratories, especially with regard to quality control and quality assurance. Marketing techniques and campaigns were also emphasized. OMNI provided further support through follow-up technical assistance in Zambia to review plant procedures and quality control methods. In addition, a sugar market penetration study was done in spring 1998, and a comprehensive vitamin A information campaign for fortified sugar was designed and implemented.

Zambia, as one of the first countries in Africa to implement large-scale fortification, is well-positioned to offer guidance to other countries in the region wishing to pursue vitamin A sugar fortification. Representatives from Uganda attended the launch ceremonies in Zambia for the fortified sugar, and are now enthusiastic about implementing sugar fortification in Uganda, with hopes for a launch there in 1999. Since the May 1998 launch, government and private sector teams from Uganda and Mozambique have visited the Zambia Sugar Company.

In early 1997, the concept of a Nutrition Minimum Package of child survival interventions (MinPak) was introduced under the sponsorship of USAID's OMNI and BASICS projects to simplify and strengthen the incorporation of core nutrition interventions in the health infrastructure of the Government of Zambia. The concept of a nutrition minimum package was intended as a mechanism to assist in: a) nutrition policy development, b) provincial and district planning, and c) improving community-based nutrition activities. By emphasizing the six priority nutrition behaviors (described in further detail later in this report), MinPak was designed to help focus the

government's efforts on interventions most likely to reduce child mortality.

During this period, the Government of Zambia was in the midst of an impressive major restructuring of its health system, decentralizing all interventions to the district level. This resulted in the complete revision of health budgeting, the generation of district planning guidelines, reallocation of district staff and major staffing changes, and periodic moratoriums on all training during this restructuring period. Donor agencies, supportive of this process, worked closely with the government to develop collaborative plans with respect to nutrition interventions. It was within this context that MinPak was introduced. While national policy was being developed, and was influenced by MinPak concepts, implementation is now primarily at the district level, with newly created regional offices just beginning to define their roles.

Although it may be too early to determine the impact of MinPak on nutrition behaviors, several observations have been made by those working on health policy and implementation of nutrition interventions in Zambia. MinPak was seen as helpful in guiding national policy development by focusing on selected interventions, by emphasizing results, and by moving forward those action plans that are most likely to achieve these results. National policymakers "bought" the MinPak concept, and specific interventions gained momentum. For example, with sugar fortification, MinPak may have helped focus attention on vitamin A goals, as well as the potential for sugar fortification to help achieve those goals. At the district level, where program implementation decisions are increasingly being made, incorporation of the MinPak concept has been slower. In the future, MinPak may help guide district staff in the development of nutrition components of their health programs. NFNC, serving as the centralized technical advisory body for MinPak, has begun to focus more on results in their supervision visits.

Overall, Zambia represents the triumph, under difficult conditions, of good will, strategic partnerships between donors and between the private and public sectors, and the use of existing expertise in the country to implement a truly integrated micronutrient strategy in the country.

Bolivia: Social Marketing of Vitamin A-Fortified Sugar

The Government of Bolivia recognizes the key role micronutrients play in improving maternal and child health, and in the last decade has placed high priority on reducing micronutrient deficiencies. In accordance with the ICN goals, in 1994, the Government of Bolivia introduced the *Programa Nacional Contra la Malnutricion de Micronutrientes* (PNCMM). PNCMM set the goals of 1) ensuring 90 percent of children consume adequate vitamin A, 2) reducing anemia during pregnancy by 30 percent by the year 2000 by reaching all pregnant and lactating women with iron sulfate tablets from 1997 on, and 3) eliminating goiter and achieving universal salt iodization. To achieve these goals, the government has utilized an integrated approach focused on strengthening the delivery of micronutrient supplements to vulnerable target groups and food fortification.

USAID's OMNI project provided technical assistance to the Government of Bolivia and to nongovernmental organizations with the design and implementation of supplementation and fortification programs to reduce micronutrient deficiencies. Since 1994, OMNI has provided technical assistance with the social marketing and quality assurance programs for fortified foods, in particular, sugar with vitamin A.

Under USAID's VITAL project (1989-1993), a survey of the poorest regions of Bolivia found the prevalence of vitamin A deficiency to be 11 percent in children ages one to five years (serum retinol level below 20 g/dl), with the highest prevalence, nearly 20 percent, in the rural altiplano. The national survey recommended continued supplementation of vitamin A through health services, and the implementation of a national program to fortify sugar with vitamin A. Sugar was selected as a good vehicle for fortification since it was consumed by 90 percent of the population with a per capita consumption of 30g/day. In addition, it was seen as a potentially successful intervention since it had been implemented for nearly a decade in Guatemala, and programs had been recently initiated in Honduras and El Salvador.

Through the OMNI project and in collaboration with PAHO and UNICEF, USAID assisted the Government of Bolivia and a private sugar company, UNAGRO, in implementing a pilot program to fortify sugar with vitamin A in the department of Oruro. Each project partner had a critical role in the implementation of the project: UNICEF provided technical and financial assistance with the production of fortified sugar, PAHO with drafting legislation and norms, and USAID/OMNI with social marketing and the establishment of a quality assurance system.

For OMNI, the objectives of the program were twofold: 1) demonstrate the success of voluntarily fortified sugar by the private sector that would eventually lead to universal fortification, and 2) gain consumer acceptability of the fortified sugar. It was anticipated that success of the program would lead to tangible consumer and business

benefits. A social marketing campaign utilizing mass media and print materials was implemented in the department of Oruro.

Under USAID's VITAL project and in collaboration with UNICEF, the Government of Bolivia and the National Sugar Producers Association began negotiations for universal sugar fortification following the success of programs in Central America. In Bolivia, however, legislation mandating fortification was not viewed as politically attainable. The sugar producers as a group were reluctant to accept sugar fortification without being convinced that a market existed, and the government was not willing to legislate a policy that would incur an extra expense to the sugar producers who are politically powerful and set prices in the country. It was clear early on that private sector participation was critical to a fortification program being implemented in Bolivia. The first agreement to fortify sugar was reached between the government and the Bermejo sugar mill based in Tarija. However, Bermejo rescinded its commitment just days before the launch of the program due to changes in its board of directors. The program was in jeopardy until UNAGRO, a Santa Cruz based company and second largest sugar producer, agreed to donate 85,000 quintales (approximately 4,300 tons) of sugar to the pilot program in Oruro.

The campaign consisted of radio and television messages broadcast for the period of August 1995- March 1996. An evaluation of the program was conducted in February 1996 in which it was decided by the coordinating committee to expand the market to other cities and departments where the population is larger to help increase sales. The market was expanded to La Paz, Cochabamba, and Santa Cruz, and a number of distributors were employed by UNAGRO to distribute the sugar to wholesalers and retailers. Point of sale materials for wholesalers and retailers and new radio and television messages were broadcast advertising the fortified sugar.

A government-sponsored assessment of the project found that among consumers surveyed, the number who reported purchasing the fortified sugar were 28.6 percent in Oruro, 11.3 percent in La Paz, 14.7 percent in Santa Cruz, and 2.8 percent in Cochabamba. While sugar sales started to increase in Oruro, sales were quite slow in the major cities. One of the major problems was the distribution of the sugar. In March 1997, the coordinating committee held focus group discussions with the wholesalers in Santa Cruz to understand their knowledge and perceptions of the vitamin A-fortified sugar. Plans were made to print more materials with support from UNICEF, and OMNI provided technical assistance with monitoring and with the distribution. However, it was later decided by the donors, with the change in government, to support the legislative efforts rather than re-initiate a social marketing campaign. During the 1997-1998 season, the primary emphasis was on drafting legislation and on negotiations between the government and the producers to secure universal sugar fortification.

Lessons Learned

Importance of securing a good and reliable distribution network for the fortified product: **During the first evaluation of the project in Oruro, consumers reported problems of not finding the fortified sugar in stores. Better communication was needed between wholesalers and retailers to ensure that the product was available to the consumer. During the national launch, new distributors were hired but these were not the normal distributors for UNAGRO sugar and it is likely that very little follow-up was done with these distributors to promote the product. The wholesalers also acknowledged that they were not promoting the sugar because they did not believe the benefits of the sugar would outweigh their perceptions of the change in taste.**

Selection of the test market site: **Oruro was selected as the principal test market site because the original sugar company, Bermejo, was the principal sugar supplier for the department. However, Bermejo decided not to participate in the pilot project and UNAGRO, a Santa Cruz based company, agreed to be the supplier. For UNAGRO, the Oruro market represented only five percent of their market share. The decision was made to keep the pilot program in Oruro despite the change in company and its nominal influence on sugar distribution in Oruro, but it was felt that this decision was justified because of the higher VAD prevalence rate in the Oruro area.**

Securing a guaranteed market: **The sugar market in Bolivia is controlled by five sugar companies who are loosely affiliated and control the market by setting prices with the government. In this situation where the sugar producers were reluctant to agree to universal fortification, to motivate them to produce fortified sugar, it would have been advantageous to ensure that sugar provided through government support programs, such as military, hospitals, schools, food for work, was fortified. This represents a substantial share of the sugar market for a company.**

Brand selection: **Following a pretest, the fortified sugar was given a brand name, *Vitazucar*, to differentiate it from normal sugar in the market. The sugar was packaged and labeled as *Vitazucar* in all market sites, and all campaign materials and radio and television spots promoted the fortified sugar using this brand. In most market sites, particularly in Oruro, the brand name was helpful in creating awareness among the consumer about the fortified sugar. However, in Santa Cruz, a post-evaluation study of the market trial that was conducted by the sugar company, found that people associated the name with a pharmaceutical company in Santa Cruz named "Vita,"**

and therefore expressed unwillingness to buy the product because of its association with medicinal purposes rather than a food product.

Seasonality affects consumers: **The market study conducted in Oruro also indicated that consumers purchased sugar in quantities of one and two kilograms rather than larger sacks such as a quintal (40 lb.) or 50 lb. sacks. However, these quantities would fluctuate, particularly during the Christmas season, as households increase their purchase of sugar.**

Feasibility: **Given the many factors involved, such as change of personnel in the company, demographics of coverage by a particular brand, and change in government, it is not possible to conclude that a totally private sector initiative, without legislation, would be successful in a similar setting. Information on cost recovery and profit will be essential, as the program proceeds to help answer some of these questions.**

INCREASED IRON AVAILABILITY

Wheat Flour Fortification in Latin America

One of the major achievements in which OMNI played a role has been the widespread fortification of wheat flour with iron and B vitamins in countries in Latin America. It is anticipated that this will have a significant effect on the iron status of their populations. While food fortification has been used for decades in many industrialized countries as a means to deliver nutrients to the population at large, fortification is becoming more feasible for less developed countries as their economies and technical capabilities grow and the food industry develops. The primary advantage of fortification is that it is a reliable, safe, and cost-effective means to control micronutrient deficiencies where a widely consumed and centrally processed food can be used as the vehicle. Fortification is now widely recognized as one of the most cost-effective and sustainable approaches to controlling iron deficiency anemia (IDA). Therefore, in addition to iron supplementation of pregnant women and young children to help control IDA in Latin America, fortification of an appropriate food vehicle with iron is part of the PAHO interagency plan of action for the region, and is an area in which USAID/OMNI and other partners, such as INCAP/PAHO, UNICEF, and the World Bank, have been particularly active.

IDA is a significant public health problem in Latin America, affecting 55 percent of children 6-18 months of age, 30 percent of preschool-age children, 20 percent of women of childbearing age, and 35 percent of pregnant women. It is estimated that approximately 77 million children and women of childbearing age suffer from IDA in the Latin America and Caribbean Region. The problem is so severe in some Andean countries that more than 40 percent of the pregnant women are anemic.

Wheat is the most widely produced cereal in the world, most of which is destined for human consumption. Wheat flour's contribution to energy intake is significant, especially in the Americas, even in Latin American countries where maize flour is the predominant staple. The technology for fortifying flour is simple and relatively low-cost, making it a suitable vehicle for delivering iron and other micronutrients. Engaging the private sector in wheat flour fortification has been found to be less difficult than in the fortification of other vehicles. The very low per unit cost of the fortificant pre-mix (less than 0.5 percent) means that there is little, if any, price increase in the finished product to pay for the fortificant. Manufacturers are already familiar with adding nutrients (for restoration, to replace nutrients lost during milling), baking aids, whiteners, and other ingredients during the wheat milling process. Many mills in Latin America have been adding iron and B vitamins for restoration for a number of years; therefore, the idea is familiar, most machinery is already in place, and the quality control approaches are already known. Also, because most wheat is imported and processed through a few mills, the need to advocate for iron fortification among many millers is limited.

Given the severity of the IDA problem in Latin America, and some of the factors above, fortification of wheat flour with iron has been adopted by countries across the region. By the end of 1997, all seven countries in Latin America in which OMNI worked were fortifying wheat flour: Bolivia, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, and Peru. This success is the result of policy advocacy by many organizations at both national and regional levels over the course of several years. OMNI played a key role through the provision of technical and policy advice to all seven countries and facilitating exchanges of experience. OMNI has provided technical assistance in advocacy, legislation, policy development, and quality assurance, quality control, and monitoring.

Wheat flour fortification gained momentum in the Latin America region as a result of strong partnership between governments and industry, with assistance from international donors, including USAID. Wheat flour fortification at levels of 55-65 ppm of elemental iron was initiated in Guatemala in 1993 and in El Salvador in 1995. In 1997, several countries initiated wheat flour fortification with iron and B vitamins (Bolivia, Ecuador, and Nicaragua), some of them upgrading from restoration to fortification levels (Honduras), while Peru initiated iron restoration

(to replace nutrients lost during milling). Some Central American countries are exploring the feasibility of fortifying nixtamalized (lime-soaked) corn flour with iron and other micronutrients.

USAID recognized that there are clear advantages to a regional approach for fortification in terms of trade, harmonization of standards, quality assurance and control systems, and common legislative strategies. Together with national governments and regional groups, such as UNICEF and INCAP/PAHO, OMNI has been involved in a regional effort to harmonize fortification practices, standards, and regulations throughout Central America, focusing primarily on wheat flour fortification. In early 1997, the Central America Regional Micronutrient Initiative (CARMI) was formed, administered through a partnership of INCAP and USAID's BASICS, OMNI, and SUSTAIN projects. CARMI developed an assessment and situation analysis of fortification throughout the region, from which it prepared and subsequently implemented a workplan to strengthen fortification activities. Another key regional effort has been OMNI's work with ALIM (Asociacion Latinoamericana de Molineros). Its members--wheat millers--approved a declaration of commitment in November 1997 to fortify wheat flour, regardless of government requirements.

CARMI focused on four countries: El Salvador, Guatemala, Honduras, and Nicaragua. CARMI put particular emphasis on the fortification of wheat flour with iron, and stressed regional harmonization of legislation and technical specifications related to fortified foods, such as levels of fortificants, labeling, packaging, quality control practices, inspection, monitoring, and surveillance. INCAP was designated as the technical support center for the initiative, coordinating regional workshops, as well as the follow-on technical assistance in policy advocacy, legislation, quality control, and monitoring.

The first regional CARMI workshop in July 1997 resulted in major agreements among all seven Central American countries, including the four CARMI countries, as well as Belize, Costa Rica, and Panama. The principal accomplishment was the agreement by all representatives from the seven countries to a basic set of regulations for the fortification of wheat flour with iron and B-complex vitamins, including folic acid; of sugar with vitamin A; and of salt with iodine. Agreement was also reached on a basic design for the quality assurance and monitoring program, which was developed under the OMNI Research project and is based on controlling products at the factory level (monitoring), as well as at the household level (surveillance). A significant achievement was the firm commitment by all countries in the region to work together on the harmonization of legislation and technical specifications, and to look at problems and issues from a regional perspective.

A subsequent regional workshop in January 1998 brought together key representatives of governments and food producers for review, discussion, and ratification of the proposed Central American harmonized technical specifications for fortified foods. This meeting continued the development of a mutually rewarding public-private sector partnership. The CARMI experience was evaluated at a recent workshop and the lessons learned will be available for the follow-on project to OMNI. Among the other things identified was the need to have explicit goals, recognized leadership, and clear roles for the partners.

OMNI recognized the essential role that training plays in proper quality assurance and control systems to ensure that the micronutrients in fortified products are reaching consumers at prescribed levels. With OMNI's support, a permanent training program for wheat millers in Latin America in the critical areas of quality control/quality assurance and monitoring of wheat flour fortification programs was established at the regional training center of the Latin American Association of Wheat Millers (ESLAMO), located near Caracas, Venezuela. By committing to incorporate this training into its regular curriculum, ESLAMO will sustain the activity long after USAID/OMNI assistance has ended. At least two Latin American millers and BASF, a major producer of fortificant, have already committed to supporting participants for the next training from their own funds.

A two-phase training effort was developed and implemented for ESLAMO. The first phase involved "training of trainers" during a comprehensive three-week training program at the American Institute of Baking (AIB) and Kansas State University in Kansas, with extensive visits to commercial flour mills, commercial bakeries, and nutrient and premix suppliers, such as General Mills Flour Mill, ConAgra Flour Mill, Cargill Flour Mill, Fresh Start Bakery, and American Ingredients. In the second phase, a similar course was repeated at the ESLAMO facility for a different group of millers, with the "trained trainers" conducting the training and supervised by representatives from AIB, OMNI, the University of Arkansas, and Kansas State University.

The next major steps will be the actual implementation of the quality assurance protocols in the countries and their day-to-day use. In the next two to three years, a proper evaluation of the effect of widespread fortification on the iron and micronutrient status of the countries' populations, and the impact on health will demonstrate the importance of this effective collaboration between the private and public sectors.

Iron Interventions in Indonesia

USAID, through OMNI and its partners, Helen Keller International (HKI) and the Program for Appropriate Technology in Health (PATH), and Indonesia's Ministry of Health, supported a series of complementary activities to increase iron intake among Indonesian women and children. Sustainable approaches to establish or improve iron stores as part of the life-cycle were emphasized, along with integration into routine government health and nutrition activities. A critical feature of the program is that each component strengthened local capacity by involving local experts and fostering a partnership between the private and public sector. Other USAID-supported micronutrient program activities in Indonesia included capacity building at the provincial level in the social marketing of vitamin A, as well as iron.

Indonesia's Ministry of Health (MOH) established a goal in 1993 of improving the iron status of all women of reproductive age, including adolescents. The government's multifaceted strategy of improving micronutrient status includes iron supplementation of pregnant women at health centers; distribution of iron pills at schools, plantations, and factories; nutrition education; and fortification of foods with iron. USAID, through OMNI, funded a four-component program, three components of which focused on iron. Each component offered innovative ways of delivering iron, especially to young women, through the private sector, factories, and schools. At the same time, the project collaborated with Indonesian colleagues on examining the cost-effectiveness of various iron interventions, and the government has indicated its intention to continue this work, based on the analysis of the iron interventions.

Improvement of Reproductive Health by Reducing Chronic Anemia in Indonesia Among Women of Reproductive Age Through Private Sector Approaches

This component featured an innovative approach to reducing anemia by creating a partnership between the private pharmaceutical company, PT Kimia Farma, and the Ministry of Health. PATH developed a strategy for improving the production, distribution, and consumer demand for introducing iron tablets through a pilot program in Lombok with the goal of testing the feasibility of this private sector strategy locally and examining its potential for implementation nationwide. The program addressed sustainability by intending to demonstrate that it is in the financial self-interest of those supplying iron supplements to continue the supply. By stimulating knowledge and awareness about the tablets among potential consumers, a pilot study in Lombok showed increased consumer demand. USAID was supporting similar work in other parts of Indonesia through the MotherCare project.

PT Kimia Farma's brand of iron tablet, Aktifon, was launched with new packaging and a logo in an intensive media campaign promoting the benefits of iron supplementation. However, the country's economic crisis in 1998 coincided with the product launch, and is likely to have had an adverse impact on the ability of people to purchase iron tablets.

Improvement of Reproductive Health Through Increasing Micronutrient Status of Female Adolescents in Urban and Rural Schools

This component recognized that because pregnancy is too short a period to overcome anemia that exists when women enter pregnancy, it is important to address anemia in women at earlier ages for longer periods of time. Schools were chosen because it is easier to reach a large number of adolescent girls through schools than through any other means. The GIRLS Project, managed by HKI, was conducted in Surabaya and Madura in East Java through 34 state-run and private schools. It included education and supplement intervention for vitamin A and iron, and deworming for 7,000 students. While boys were also included, girls 12-15 years of age comprised the target group. Preliminary results showed that 30.2 percent of the girls and 22.8 percent of the boys were anemic.

This component centered on the feasibility and potential impact of school-based programs for improving the health of adolescent girls. By intervening at this point in the life-cycle, HKI hopes that building iron stores in adolescence will help prepare girls for the eventual nutritional demands of pregnancy and breastfeeding, as well as ensure a healthy start for their future newborns. Data are currently being analyzed, and early results show that in anemic girls, the dietary intervention demonstrated a significant increase in hemoglobin.

Improvement of Reproductive Health Through Increasing Micronutrient Status of Adolescent and Young Women Working in Factories

In Indonesia, one out of three female factory workers is anemic. This model program managed by PATH sought to improve the reproductive health of female factory workers under age 25, by improving nutritional status, food consumption, and micronutrient supplementation. The program, conducted at PT Pakabaya, a match and

chopstick factory, and PT Solihin Java, a stove and oven factory, involved approximately 2,500 young female workers.

The project also helped food vendors and cafeteria managers understand the importance of providing healthy and nutritious meals to the factory workers, who often eat on-site due to their short lunch breaks. It also provided free iron tablets and vitamin A capsules to the workers with the hope that they would later buy the supplements on their own. The educational component of the project taught women to integrate iron and iron-rich foods into their diets.

The project serves as a potential model to assist governments, NGOs, and private industry to carry out similar programs at other worksites, as the government recently mandated that the private sector should provide on-site iron supplementation to female workers. However, without specific guidelines and support, many in the private sector are ignoring the mandate.

Lessons Learned

Many private companies were not interested in the public/private partnership with MOH due to concerns about profitability. A considerable constraint to the initiative is that factory management did not see a benefit in participating in the program. NGOs, such as PATH, can play an important intermediary role to coordinate the programs and strategies of MOH to reduce chronic anemia among girls and women, and the sale and marketing goals of the commercial partner, PT Kimia Farma. In Nicaragua, OMNI was able to play a similar intermediary role between the private sector and government in getting wheat flour fortified with iron. PT Kimia Farma agreed to the partnership after PATH explained that the marketing emphasis on life-cycle health could create a large potential market for iron pills among women from adolescence onward.

PT Kimia Farma experienced some delays due to product approval, production of the final package, and determination of the wholesale price of the tablets. PATH had to be flexible, as private sector operational issues can affect the implementation of promotion strategies. PATH provided PT Kimia Farma with marketing assistance with the type of packaging women prefer, the size and pricing they like, and research on the most effective messages that both educate women about the product and encourage them to buy it.

Efforts were made to employ the same format and message in pamphlets and in radio and television spots so that the intended audience would receive mutually reinforcing information. Radio reaches even the most rural areas, and cloth banners are a very popular mass medium. To promote the Aktifon brand of iron tablets, PATH used a red blood drop graphic similar to that used by MOH to promote its iron pills, ensuring consistency between MOH marketing efforts and Aktifon. PATH anticipates that women will be reminded to purchase tablets by seeing displays and banners where they shop for food and household goods. Making the tablet as accessible as other everyday items, such as aspirin and cold remedies, will make it easier for women to make a habit of taking iron tablets.

Research determined that women confuse the term MOH has chosen for the iron tablet, "tambah darah," which means "increased blood," with the Indonesian term "darah tinggi" which means high blood pressure. Pregnant women fear that "increased blood" could cause the fetus to grow too large, creating problems during delivery, and they sometimes resist supplementation. PATH had to expend extra effort to allay their fears and explain that taking iron during pregnancy reduces anemia and maternal death during delivery. National programs in other countries should ensure that they choose terminology that will not lead potential consumers to misunderstand the effect of the tablet, which could undermine compliance. PATH chose not to use the term in its promotion of Aktifon, opting instead for pretested messages connoting health and energy.

Providing information to teachers, as well as to pupils and their parents, about why iron pills are being distributed and potential side effects proved to be very important in the GIRLS Project. While this information was provided at the start of the project, it was necessary to repeat it during the project to motivate students to continue to take the pills, echoing lessons learned in studies of pregnant women. With supervision, virtually all the students took more than 75 percent of the supplements, but compliance dropped to 60 percent without supervision. This suggests that compliance can be a real problem. Changing to a sugar-coated pill improved compliance considerably.

The age of the participants affected the focus groups. Participants had to be screened as younger pupils or those in cliques were vulnerable to peer group pressure by other students, which apparently could influence their responses. Teachers helped identify girls in cliques and kept them in separate focus groups. Separate focus groups were held for different age groups.

The window of supplementation during pregnancy is short compared with the opportunity to increase women's

iron stores during adolescence and before marriage. The chance to reach girls in schools provides expanded opportunities to deliver iron to women and the GIRLS project provides a good framework for future projects.

Continuous training and reinforcement of the supervising teachers, as well as technical assistance, are essential to making this approach sustainable and effective, at least initially. Although budget considerations make the current program impossible to sustain, there is high interest in trying to continue the approach, as the improvement of micronutrient status through schools is a viable strategy. Once the technical issues have been resolved, nutrition education and supplementation could be included as part of the education budget. The anticipated results, if they show a positive impact, would provide the data needed by the policymakers in the Ministry of Education to make this commitment.

Anticipated Impacts

The health and productivity of women is expected to improve once they accept the message that iron supplements will help improve their health and they begin taking the supplements. However, the sales of the product were down substantially the second month after the introduction of Aktifon, which coincided with Indonesia's economic crisis. Nevertheless, the close collaboration between public and private sectors that was exhibited in this model project are impressive, and demonstrate to the MOH how the private sector can help the country achieve its national health goals.

The factory project helps girls and women to have a better understanding of nutrition, especially of iron and its role in keeping women healthy during pregnancy. PATH workers noted that the factory women were eager to learn about nutrition and were pleased with the nutrition course they took, which demonstrated that iron supplements are the cheapest way to improve iron in the diet. This is part of the nutrition education component, but not yet part of the marketing approach.

Women with adequate iron levels are less likely to have low birth weight babies and premature deliveries, and are more likely to have safe births and be economically productive. Because iron deficiency anemia is often a chronic condition, supplementing young women with iron before they become pregnant is expected to ensure that they start pregnancy with better iron stores. The exciting aspect of the different methods of delivering iron throughout the life-cycle is the increased chance that a young woman will enter her first pregnancy with adequate iron, which will greatly benefit both the mother and her newborn.

In November 1996, an OMNI-sponsored team prepared a cost-effectiveness study plan designed to help the Ministry of Health and the Ministry of Manpower make decisions regarding the iron supplementation policy for female factory workers. In May 1998, the preliminary results were presented to the Minister of Health, who suggested a seminar on the results of the study for high-ranking officers from the Ministries of Health, Manpower, and Planning, among others. Modifications to the current iron supplementation program for female factory workers may be driven in part by the final recommendations of the cost-effectiveness study. The recommendations of the study are timely because, as a result of the economic crisis and newly-appointed cabinet posts, cost-effectiveness studies are in high demand to help guide policy decisions in the health sector.

IMPROVED MONITORING OF IDD INTERVENTIONS

IDD: Improved Monitoring and Quality Assurance

USAID has played a supporting but critical role in the process of universal salt iodization (USI). While UNICEF has focused on implementing the iodization of salt, OMNI's niche has been in the monitoring and quality control systems to guarantee the proper iodization of salt. In countries such as Eritrea and Russia, OMNI has worked in a closely coordinated, cost-sharing partnership with UNICEF.

OMNI, primarily through its partner, the Program Against Micronutrient Malnutrition (PAMM) at Emory University, has taken a major role in assisting countries and other agencies, such as UNICEF, the International Council for the Control of Iodine Deficiency Disorders (ICCIDD), and WHO, in ensuring that iodized salt consistently meets national standards. To have this assurance, OMNI recognized that a series of program elements must be in place and must be sustained to avoid lapses in adequate intake of iodine through consumption of fortified salt. A number of situations worldwide illustrated the need for the project to take a closer look at quality assurance in salt iodization programs. A 1996 evaluation of Bolivia's success in eliminating IDD through USI revealed that, even with a successful program, the iodine content of salt at the point of production varied widely. Experiences in Guatemala and the former Soviet Union have shown that lapses in quality assurance and in monitoring and enforcement (quality control) of USI can lead to re-emergence of the problem of iodine deficiency.

One particular emphasis has been to collaborate with ICCIDD, PAMM, MI, and UNICEF in providing new tools for monitoring and quality control for iodized salt. The project made a special effort to bring these methods to Africa, through technical assistance, regional regulatory workshops, and specific programs in Madagascar and Malawi. A major country program to organize the necessary "downstream" monitoring, tracking, and education campaigns is underway in Eritrea, with implications for improved iodized salt throughout the region. OMNI has assisted Russia as it works to meet its goal of iodizing 50 percent of the salt in the country by the end of 1998.

In the last quarter of 1996, OMNI provided support to an international technical review, organized by PAMM in Atlanta, of the procedures for quality control for iodizing salt. After extensive technical review, these guidelines were produced and distributed to salt production programs worldwide. The guidelines were translated into Spanish, French, and Russian and distributed in mid-1998. OMNI co-sponsored an African workshop in salt iodization that identified the need for a monitoring tool that could help country officials track and measure the extent of USI within a country. The first draft of the Iodized Salt Program Assessment Tool was completed by PAMM and ICCIDD and field tested in Malawi in 1997. It was then reviewed at a regional workshop in Malawi and subsequently will be field tested in Tanzania and Benin before being finalized.

USAID, through OMNI, has annually supported the writing and dissemination of the *IDD Newsletter*, the primary source of accurate information on salt iodization worldwide, produced by the ICCIDD. The newsletter, beginning with 1992 issues, is available on the ICCIDD web site. The Current IDD Status (CIDDS) Database, also supported by OMNI, is being adapted for Windows and MS-DOS.

One of the recommendations from the multi-agency Conference on Sustainable Elimination of IDD in Africa (Zimbabwe, 1996) was the need to strengthen salt iodization program monitoring, product quality assurance, and enforcement of regulatory requirements. USAID provided travel for key participants. OMNI, through PAMM, and with UNICEF, MI, and ICCIDD, also organized and conducted a workshop to this purpose in March 1998 in Blantyre, Malawi, bringing together government and salt industry specialists from eight countries in eastern and southern Africa with a view to establishing common purpose and common regulations. The workshop successfully brought together a wide variety of individuals involved in salt iodization at all levels. Seventeen African countries were represented, and all sectors were involved: private producers, bureau of standards staff, program managers, laboratory technicians, social marketing experts, and lawyers involved with legislation and regulation. The program monitoring group identified several constraints to effective monitoring, and made nationally-relevant recommendations to address these. Recommendations included: monitoring following production (i.e., beyond the factory, and during the distribution chain); laboratory standardization and use; biologic assessment and interpretation; and responsibilities and communication among those involved with monitoring.

In many localized pockets, and in some countries, small-scale producers supply much of the salt, which may vary considerably in terms of its quality, and hence its iodization, thereby denying portions of the population necessary iodine. OMNI produced a trainer's manual and a production manual for improving the quality of salt from small producers in Guatemala, which has been requested worldwide. OMNI has also worked with UNICEF to improve salt quality from small producers in Eritrea.

Iodine deficiency is highly prevalent in Eritrea, with an estimated 82 percent of school-age children suffering from IDD. Through a delivery order with USAID/Asmara's Eritrea Health and Population Project, OMNI worked to help ensure universal coverage of iodized salt in the country. Following the inauguration of iodization at the two major salt plants in December 1996 (with the help of USAID and UNICEF funds), OMNI's role has been to install governmental and consumer monitoring systems, provide information to consumers about the need to seek iodized salt, and ensure adequate quality control. The Eritrean Parliament passed legislation for USI in early 1998, requiring all salt producers to iodize salt, according to standards set by the Eritrean Standards Institute, including that which is exported. This benefits other countries in the region as well--primarily Ethiopia, Tanzania, and Uganda--which import a substantial portion of their salt from Eritrea. For example, Ethiopia imports approximately 85 percent of household salt from Eritrea. With iodized Eritrean salt marketed throughout Africa and the Middle East, Eritrea's impact on reducing iodine deficiency extends far beyond its own borders. Another aspect is important income generation for Eritrea through the export of properly controlled iodized salt.

The project also worked with Eritrea's small-scale producers to improve the quality of iodized salt destined for the lower end of the market, and in December 1997, supported a workshop on salt iodization for small- scale producers in the Northern Red Sea Zone.

With the collapse of the USSR, salt iodization in the former Soviet States fell apart. In most areas of the Russian Federation, iodine deficiency is a serious public health problem, resulting in extremely high rates of endemic goiter in the population--recent assessments have found goiter prevalences of 70 percent among school children in Moscow. The problem has become especially critical in the Chernobyl area, where iodine deficiency was prevalent before the nuclear disaster, and is considered a factor in the spread of aggressive thyroid cancer, particularly in

young children.

With the creation of the Gore-Chernomyrdin Commission, and the agreement by the Commission to address IDD and other micronutrient deficiencies as priority public health problems, OMNI has provided technical assistance to the Russian Federation since August 1997, establishing an OMNI field office in Moscow. From this office, an internationally recognized iodine deficiencies expert worked in close collaboration with the Russian Ministry of Health, the Association of Salt Producers (SolProm), and UNICEF to advance USI in Russia and the region. In the period of one year, awareness of the IDD problem in Russia has expanded substantially, with support and input from the highest levels of the Russian government. PAMM, working with the government, UNICEF, and ICCIDD, provided assistance on the adoption of harmonized national industry standards for salt iodization, a baseline survey of salt marketing and distribution mechanisms, and establishment of a quality control system. Also in conjunction with the Russian IDD strategy, Kiwanis International provided funding through UNICEF for salt iodization materials and equipment, including a one-year supply of iodate.

In November 1997, OMNI co-sponsored an advocacy workshop in Moscow for salt producers from Russia, Ukraine, and Belarus, which resulted in an agreement by the salt industry to produce high-quality iodized salt, available to all consumers at affordable prices. Representatives from the salt industry, the medical community, and the ministries of health of the three countries participated in the workshop--the first time that these groups had met to focus on critical issues of quality assurance and quality control of iodized salt. Since the collapse of the Soviet Union, IDD control has not been coordinated within NIS countries. This was a historic meeting of these groups and resulted in a unique partnership among Belarus, Russia, and Ukraine. A follow-up meeting was held in Moscow in June 1998, at which further training was conducted in quality assurance and quality control for salt producers, as well as training in biological monitoring of IDD for the medical community. As part of OMNI's assistance to Russia's neighbors in addressing IDD issues and promoting salt iodization, the project also co-sponsored a training course in Tbilisi, Georgia, with participants from Russia and eight other countries in the region. Organized by PAMM, the Tbilisi workshop helped strengthen regional capacity for controlling micronutrient malnutrition and emphasized quality assurance systems to sustain successful efforts, especially in salt iodization. It also provided an excellent opportunity for the Russian participants to share their experiences and lessons learned with regional counterparts.

In Madagascar, OMNI responded to a request from the Ministry of Health and the USAID Mission for technical assistance to evaluate and upgrade the government's national IDD program. Since 1993, the government of Madagascar has sponsored a program to fight IDD, funded by UNICEF, Kiwanis, and the World Bank. Activities include the distribution of iodized oil capsules; establishment of iodized salt production; IEC and promotion of iodized salt; training of technicians working in health, education, commerce, and industry; the passing of a decree on obligatory iodization of salt; and epidemiological surveillance at sentinel posts. OMNI supported the formal evaluation of the first five years of the IDD program to validate the current strategy and make proposals for improving it, as well as the subsequent national workshop in Madagascar, at which the evaluation results were presented. The results included the increased availability of iodized salt at the household level from 0 percent in 1995 to 80 percent in 1997, and the overall reduction in the prevalence of goiters from 45 percent in 1994 to 15 percent in 1997. OMNI also supported the development of a plan of action for IDD in Madagascar for 1998-2003.

As part of OMNI's fortification quality control work in the Philippines, the project worked on salt quality monitoring in several provinces, as well as with the central laboratories in salt iodization measurement. Coverage of iodized salt in the Philippines remains at a disappointing 15 percent, and OMNI worked with the National Micronutrient Task Force in identifying the reasons. An initial finding was that making an exclusive agreement with only one salt producer, however large, is probably a mistake. As the other companies had no incentive, they have not fortified, and when the selected, "favored" company did not fulfill its obligations, the amount of salt that was iodized remained low.

Worldwide, OMNI has distributed its own materials on iodized salt monitoring, as well as those developed by PAMM for the Micronutrient Initiative and UNICEF. Of the three micronutrients, the ICN goal for iodine is the one most likely to be met, although vitamin A should not be far behind.

Eritrea's IDD Program

Eritrea became the newest African nation in 1993, following a 30-year war with Ethiopia that devastated the infrastructure of the country. Since independence, the Government of Eritrea has been rehabilitating and expanding its health service delivery system, while at the same time focusing on critical primary health care priorities.

In 1994, a national micronutrient survey conducted by the Ministry of Health (MOH) and UNICEF showed that iodine deficiency disorders (IDD), vitamin A deficiency, and iron deficiency anemia were all significant public

health problems. The government moved swiftly to implement Universal Salt Iodization (USI) with the goal of eliminating IDD by the year 2000, and a multi-sectoral IDD Task Force was formed to coordinate the USI initiative. In 1995, Eritrea installed salt iodization capacity in the two major salt works in Assab and Massawa, and in 1996, provided salt iodization machines to the private salt producers around Assab. Since these interventions have been put in place, 90 percent of the salt produced in Eritrea is being iodized.

In response to the Government of Eritrea's request for micronutrient intervention support, USAID together with OMNI agreed upon three primary objectives: 1) provide technical assistance to the IDD Task Force for USI/IDD implementation activities, including strengthening quality assurance and control systems, improved salt production, distribution, and monitoring, and an examination of sustainability requirements; 2) build MOH capacity to use IEC for micronutrient deficiency and other primary health care interventions and programs; and, 3) assist in an assessment of vitamin A and iron folate supplement availability and existing delivery systems and ensure appropriate treatment and prevention protocols for micronutrients. In order to implement the above objectives, the OMNI/Eritrea office was established in January 1997, and was fully staffed with a Resident Coordinator, a Resident IEC Advisor, an Administration and Finance Officer, and support staff in July 1997.

Accomplishments

- **Established a good framework for a salt quality assurance system, including training of health workers in IDD monitoring, training, and mobilization programs for small-scale salt producers on iodized salt production; equipping and training the National Laboratory for analysis of IDD; and implementing an IDD verification survey two years after the introduction of salt iodization in the country.**

- **Established national guidelines for delivery of micronutrient supplements, including drafting the National Primary Health Care guidelines on nutrition, which include micronutrient interventions; conducting an initial assessment of vitamin A and iron service delivery systems; training health workers on vitamin A and iron treatment and prevention protocols; and advising the MOH on the integration of vitamin A distribution into their 1997 National Polio Immunization Day.**

- **In collaboration with the MOH, developed a national IEC program for the control of micronutrient deficiencies, which included targeted formative research on micronutrient deficiencies, and strategy development and implementation. The strategy is a multi-channeled integrated approach relying on mass and interpersonal communication media for the promotion of micronutrients, including iodized salt among salt traders, policymakers, health workers, schools, and communities.**

- **Built the capacity of the MOH to combat micronutrient deficiencies, through external training of various MOH personnel. One person was sent on a six-month nutrition course in the Netherlands. An interdisciplinary team was trained on building a national iodized salt quality assurance program in Malawi. A laboratory technician responsible for national iodized salt quality assurance spent a week in Tanzania learning basic analysis procedures. Two MOH officials participated in the IVACG meeting on vitamin A in Egypt in 1997.**

- **Built the IEC capacity of the MOH, by working closely with the IEC Unit to strengthen their ability to plan a national program, leverage funds for priority programs, train zonal staff in health communication, conduct targeted qualitative and quantitative research projects, and coordinate inputs among the various partners working in health promotion. OMNI strengthened the MOH's IEC human and material resources through support of external training for the IEC Unit Head and procurement of computer and other media equipment.**

  Lessons Learned

  1. High-level government commitment is essential for the success of Universal Salt Iodization programs, particularly in countries where the central government plays a substantial role in salt production, monitoring, marketing, and distribution. Such commitment in Eritrea was demonstrated in various ways, including:

  - **Prioritizing the elimination of IDD by the year 2000 by including it in its primary health care partnership with USAID;**

  - **Rapidly responding to the identified problem of IDD by securing salt iodization equipment to the two major government-run salt works;**

- **Repeatedly mobilizing governmental human and material resources to support the national initiative;**

- **Effectively coordinating inputs into the program among the different governmental and non-governmental bodies, particularly the Ministry of Health, Ministry of Trade and Industry, the Eritrean Standards Institute, the Ministry of Justice, the two major salt production facilities, and private salt producers; and**

- **Drafting legislation which mandates the production, trade, and sale of iodized salt.**

2. Private-sector salt producers need ongoing technical and material support to make the transition from non-iodized to high-quality iodized salt production. Private producers must first understand the importance of iodized salt and their critical role in its production. Salt producers are willing to adapt to the changing technology, but need to be supported with equipment, supplies, and technical skills over a period of time until they have succeeded in producing high-quality iodized salt in a profitable manner. Private producers should be involved in determining the mechanisms for such a transition, and the initial burden of this new, and more costly, process should be shared between the producer, the consumer, and the government.

3. A majority of front-line health providers are not aware of the public health problems associated with micronutrient deficiencies, even in regions with significant deficiencies, despite the existence of relevant national policy guidelines on micronutrient interventions. Skills-based training programs focusing specifically on micronutrients, together with the provision of targeted educational tools, can enhance provider understanding of the preventive and curative role of micronutrients and their importance to overall maternal and child health survival, and can improve provider practices related to diagnosis, treatment, and prevention of micronutrient deficiencies.

4. Promotion of iodized salt is necessary, even in countries whose major salt suppliers are currently iodizing and where legislation mandates it. Targeted communication interventions encourage policymakers, salt producers, and traders to maintain production of high-quality iodized salt over the long term. Creation of a consumer demand for iodized salt increases producers' and retailers' perceived need to market the health benefits of their product. Using existing private sector distribution channels to promote iodized salt is efficient and cost-effective.

5. To ensure sustainability of message dissemination, targeted behavioral change messages for micronutrients should be integrated into overall maternal and child health communication strategies. Eritrea is dedicated to the implementation of integrated primary health care programs, and at the same time, the MOH has limited human and material resources. Micronutrient communication strategies that can be integrated into existing programs will more likely be sustainable, acceptable to the MOH, and will reach wider audiences. In Eritrea, micronutrient messages have been integrated into more general nutrition messages, in the format of nutrition guidebooks and flip charts for use by health workers, and into general maternal and health messages, in the format of a national radio serial drama.

Greater Horn of Africa Initiative (GHAI)

Building on the successful iodine experience in Eritrea, OMNI joined forces with the Presidential Greater Horn of Africa Initiative (GHAI) in the last year of the project. The initiative addresses food security, economic development, and conflict mitigation in ten Greater Horn countries - Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Sudan, Tanzania, and Uganda. The priority countries for OMNI were Eritrea, Ethiopia, Kenya, Tanzania, and Uganda. OMNI's role has been to assist in the development of a strategy to improve the nutritional impact of food security interventions, such as access to quality foods and availability of foods, but more specifically, to aid in the improvement of child survival overall. At the beginning of this new focus on linking food security and nutrition to child survival (and maternal health) in the GHAI, three priority areas were identified, in partnership with African colleagues from the Greater Horn:

1. Improved maternal, infant, and child nutrition, with a focus on micronutrients and on improving quality of program design and implementation;

2. Improved use of information to articulate nutrition priorities and formulate policy with attention to crucial cross relationships; and

3. Improved nutritional impact of food aid in emergency and refugee situations leading to improved maternal and child survival.

Given the dire need for interventions in the Greater Horn of Africa (GHA) region, one of the poorest and most nutritionally deprived areas in the world, OMNI, along with other cooperating agencies, began an information gathering process to help identify the problems and to better aid planning of interventions. In-depth country profiles of the nutrition and micronutrient nutrition situation were developed for three of the priority intervention countries, Eritrea, Ethiopia, and Uganda, in addition to a regional profile covering all the countries in the Horn. These profiles benefited the planning efforts for interventions where over two dozen possible interventions have been identified for funding over the next three years.

Rates of stunting, wasting, and underweight for children under five years of age in the region exceed those of most other developing countries. In seven of the Greater Horn countries where information is available, over one-third of children under five are stunted. In Burundi, Eritrea, Ethiopia, and Tanzania, the prevalence exceeds one-half. Wasting prevalence is extremely high (greater than 9 percent) in such countries as Eritrea and Ethiopia. High rates of maternal anemia, low body mass index rates, and low birthweight babies in the region indicate serious maternal nutrition problems as well. Approximate estimates of populations affected by micronutrient deficiencies in the Greater Horn are: vitamin A deficiency-25 percent; iodine deficiency disorders-33 percent; and iron deficiency anemia-50 percent of pregnant and lactating women and young children in the first two years of life. These data, although limited and typically not nationally representative, indicate that all three micronutrient deficiencies are of public health significance. The micronutrient situation varies from country to country and from location to location within countries, but the primary determinants of these problems are inadequate dietary intake and disease. Across the region, population growth is outpacing agricultural productivity, leading to food insecurity and malnutrition.

Interventions to combat vitamin A are typically multisectoral, with widespread or targeted distribution of high-dose vitamin A capsules (VAC) being the most common intervention, in addition to increased local production and consumption of vitamin-A rich foods and food fortification. Distribution of vitamin A capsules in conjunction with National Immunization Days (NIDs) is an effective immediate way to reach a large proportion of the target population requiring vitamin A. In the ten Greater Horn countries, all but Burundi, Rwanda, Tanzania, and Uganda, distribute VACs during NIDs. Eritrea held its first campaign in 1997, and Kenya will launch its initial campaign in 1998. USAID will assess ways it can facilitate other Horn countries in distributing VAC through NIDs and identify strategies to improve the coverage and sustainability of this type of intervention.

Moderate to severe levels of iodine deficiency disorders (IDD) were found in all but three of the Greater Horn countries. Kenya, Somalia, and Uganda are classified as countries with "mild" prevalence of IDD. Where data exist, approximately 31 million people are directly affected by IDD and another estimated 57.2 million are at risk for the deficiency in the region. Universal salt iodization (USI) has been the most promising response to combat IDD. The technology for fortifying all salt in the Greater Horn region is relatively inexpensive and can be readily implemented. Most GHA countries now have iodized salt at an affordable cost, even for rural households. Quality assurance and control remains an area to be strengthened, although where salt is being exported, as from Eritrea, this has acted as a positive incentive. However, the range in household consumption varies widely from country to country, and data on the adequacy of the level of iodization are generally sparse. Iodizing salt is one of the first major steps in the process. Improvements in quality of processing, delivery, and education programs are now needed across the GHA region. Development of adequate country-level legislation and regional trade policies (i.e., trade policies between Eritrea and Ethiopia), and the means to ensure compliance of these are further steps needed. OMNI has played a key role in Eritrea in this regard, and began to bring its lessons learned to the region by supporting the first in a series of planned workshops on quality assurance and quality control. The workshop, held in Malawi in 1998, was a major step in developing country capacity to address these important issues.

Less precise information is known about the magnitude of iron deficiency in the Greater Horn. Interventions have focused on provision of iron tablets to pregnant women, parasite control measures for hookworms and malaria, education, and food-based approaches, such as increased food consumption of micronutrient-rich foods and fortification of wheat and other foods. Large-scale measures to address iron deficiency have not been fully explored or undertaken in the region. Over the next few years, the

groundwork of information OMNI helped to lay will assist the GHAI in identifying the most promising interventions in which USAID has a comparative advantage.

In addition to the problems of chronic food insecurity and malnutrition, millions in the Greater Horn region face acute food insecurity caused by drought, warfare, and conflict. When the GHAI was introduced in 1994, there were an estimated 11 million individuals classified as refugees or displaced persons, and 22 million requiring external food assistance. Today, there are an estimated 7.5 million refugees in eight of the ten countries of the region. The challenges of addressing micronutrient needs in relief situations remains a daunting task for the GHAI, while the role of technical assistance is still undefined.

One major contribution OMNI made to the information needs in the Horn has been the assessment of the feasibility for food fortification in select countries. These assessments are providing the Agency with program and investment options with an emphasis on the commercial private sector (food industry), that would support strategic objectives (child survival, maternal health, economic growth) for GHAI, USAID's enhanced vitamin A effort (VITA), and USAID Mission initiatives. Visits were undertaken to Kenya, Tanzania, and Uganda, as well as to South Africa, to determine the capabilities of the food industry to fortify multiple food vehicles. With the successful model in Zambia of fortifying sugar with vitamin A, USAID looks toward countries in the Horn with similar expectations. The synthesis of this information resulted in a series of recommendations for USAID investment, where at least one such recommendation was developed into a proposal for action on the promotion of fortified complementary foods in Kenya.

The appraisals of food fortification potential hold many possible benefits, including but not limited to:

1) expanding coverage of micronutrients and benefiting health, including for women, for whom supplementation programs have either been of limited effectiveness (iron/folate) or limited to the immediate postpartum period (vitamin A), while shifting costs to the private sector and consumer; 2) using commercial marketing of fortified foods to create population-wide awareness of the health benefits of micronutrients, even in non-fortified foods; 3) strengthening government capacity to create a regulatory framework for monitoring and controlling the quality and safety of foods; and 4) strengthening the competitiveness of local food manufacturers and processors to produce and market value-added food products. Consistent with GHAI principles, strengthening African capacity and collaboration with African partners is at the center of this effort.

Future micronutrient interventions will depend on the gathering of more details of the precise nutritional situation in key Greater Horn countries, including micronutrient surveys to identify areas within a country to prioritize interventions such as supplements, nutrition education, and improved household food production. OMNI's lessons learned from the cost-effectiveness analysis work undertaken in four countries on the economic advantages of select interventions will also be applied to the GHAI. Because nutrition policies and programs are still on the fringe of development planning, where nutrition programs are often split between ministries or given a marginal role within one ministry, advocacy targeted toward government officials will be a major thrust of the next steps for micronutrient interventions in the GHAI.

Serious limitations of nutrition-related policies across the region are hindering the implementation of effective programs. These include inadequate information available on the critical linkages among such sectors as health, agriculture, education, and finance for attaining improved nutritional outcomes, and a notable absence of multisectoral policy and planning at all levels of administration--national, district, and community-- within countries in the GHA region. The lack of a robust health structure underscores the urgent need for capacity-building at many levels. Greater support to women must be granted in all food security areas to ensure positive nutrition outcomes, and concerted multisectoral measures to raise food security at the household, regional, and national levels will need to be a priority. OMNI, with other partners, has helped start a process, from its program experience in other regions of the world, that will help USAID work with countries to address the immense task of micronutrient deficiencies in the Greater Horn.

INTEGRATING MICRONUTRIENTS INTO CHILD SURVIVAL ACTIVITIES

MinPak

Improving micronutrient status is one of the most cost-effective health investments that countries can make. However, most national health programs have failed to fully integrate micronutrient interventions into routine health services. This may also be the result of nutrition activities traditionally kept separate from health interventions in most countries, and the perception that health services use up resources rather than

being an investment in the future. The development of a "Minimum Package" of nutrition interventions (MinPak) integrated within health services provides an opportunity for mainstreaming the delivery of micronutrients as an essential, integral part of primary health care. Where decentralization of health services is taking place, such an intervention becomes even more critical. MinPak is a BASICS project initiative, in collaboration with the OMNI and LINKAGES projects, that resulted from the need for an essential or core set of universal nutrition actions that child health teams could routinely implement. Child health programs in five countries in Africa were chosen as the initial MinPak sites: Benin, Eritrea, Madagascar, Senegal, and Zambia.

MinPak is a collection of actions taken by health managers to support six priority nutrition behaviors: exclusive breastfeeding for about 6 months; adequate complementary feeding from 6 to 24 months, with continued breastfeeding for at least 24 months; nutritional care of sick and severely malnourished children; adequate intake of vitamin A; adequate intake of iron; and regular use of iodized salt. Health managers are expected to integrate these interventions into six critical health contacts for routine services, both at health facilities and in communities, during: prenatal contacts, delivery and immediately postpartum, postnatal contacts, immunization contacts, sick child visits, and well child contacts. In addition, special actions, such as community mobilizations, IEC, micronutrient campaigns, and fortification, are utilized to help ensure adequate coverage and quality. The desired result is at least 75 percent coverage of the population with MinPak interventions.

The purpose of OMNI support for MinPak activities was to explore the potential for expanding coverage and improving the quality of micronutrient interventions in child survival programs. OMNI supported the development and introduction of MinPak during 1997-1998 in the following ways: 1) helped identify the six emphasis behaviors, defined the content of the six critical health contacts, and drafted a set of six generic modules for orienting health staff to the MinPak actions during routine health contacts; 2) participated in MinPak program assessments (Senegal and Zambia) and provided follow-up for implementing micronutrient interventions (Madagascar and Zambia), again in partnership with BASICS and LINKAGES; and 3) helped extract "lessons learned" from introducing the "minimum package" in three countries (Madagascar, Senegal, and Zambia).

Results from field applications of MinPak in the five health programs show that:

- **The "minimum package" approach simplified nutrition strategies for health managers, making priority nutrition interventions easier to implement;**
- **The package approach was found to be more efficient than previous approaches to nutrition interventions;**
- **Activities undertaken to introduce the MinPak approach helped to focus attention on nutrition and, within nutrition, focused actions on proven interventions; and**
- **UNICEF-assisted activities in the field (with WHO endorsement) were critical to the rapid adoption of MinPak in all countries, particularly, the salt iodization, vitamin A supplementation, Baby Friendly Hospitals initiative, Essential Drugs, and Bamako Initiative programs.**

Elements that were useful for introducing MinPak were:

- **A program review of "MinPak assessment" conducted as a first step, especially useful when conducted jointly with health managers and staff;**
- **Workshops and meetings at national and district levels with key partners such as MOH, UNICEF, district and regional-level health service chiefs, PVOs, and NGOs in health service delivery;**
- **Formal agreement signed, e.g., MOU with partners such as MOH and UNICEF, and explicit acceptance of MinPak by MOH;**
- **Revision/updating of protocols, records, and other tools, and their introduction to health staff through orientation meetings and workshops;**
- **Formative research on priority behaviors conducted as a basis for developing IEC and other behavior change components;**

- **Emphasis on community-level actions and attempts to use existing, local program experiences; and**

- **Generic guidelines that BASICS had previously drafted and collected, e.g., Nutrition Essentials pieces, training materials, job aids, and lists of IEC messages.**

- **At this early stage of MinPak implementation, little progress is evident in terms of increased coverage or improved quality of services at health facilities or, even less so, in communities. For the latter part of 1996 and in 1997, MinPak program components were evolving and technical and operational guidelines were in the process of being developed. Although this process is not yet complete, the rapid adoption of the approach at all health program levels, the acknowledgment at high levels of nutrition as a central focus of health improvement, and the identification of a broad range of potential community-level factors indicate that, in time, results in improved services and behaviors are likely. To achieve the goal of 75 percent with the six interventions, MinPak will extend beyond the public health system into communities.**

- **In the three countries with MinPak lessons learned assessments (Madagascar, Senegal, and Zambia), activities and policies had, in the past, been addressed for each of the six intervention topics, but within a short period after its introduction, MinPak advanced steps taken to ensure increased access to key interventions. For example, all countries took actions to improve the distribution of vitamin A supplements, and in Zambia, sugar fortification with vitamin A was accelerated.**

Vitamin A and NIDs

Where clinical deficiency is a public health problem, vitamin A capsule distribution is an expedient approach to improve vitamin A status and control xerophthalmia. Vitamin A supplementation also diminishes the severity of infections, such as diarrhea and complications associated with measles, as well as reducing childhood mortality. USAID is responsible for much of the scientific foundation establishing that vitamin A interventions are effective, affordable, and sustainable, and in particular, the confirmation that vitamin A saves children's lives. It has been calculated that ensuring adequate vitamin A status in the 15 USAID Joint Programming Countries by supplementation and other means would save the lives of approximately 4.5 million children over a five-year period.

Supplements can be administered quickly at a reasonable cost. Critical to vitamin A supplementation's success as a preventative program is sustained periodic distribution and high coverage rates of the target population. Schedules for periodic vitamin A distribution must also factor in seasonal variation of vitamin A-rich foods, prevalence of childhood illness, the appropriate dose (50,000 IU < 6 months, 100,000 IU 6-11 months, 200,000 IU 12 months and older), local resources, and logistics. Vitamin A supplements are also administered in health facilities for treatment purposes to children showing symptoms of xerophthalmia or infectious diseases associated with deficiency, as well as particularly persistent diarrhea, measles, or severe protein-energy malnutrition. Adding vitamin A to National Immunization Days (NIDs) became an established way to dispense supplements during the course of the project through an international multi-partner effort. NIDs are heavily promoted, set-aside days when health care officials establish vaccination stations throughout a country, in collaboration with local communities (e.g., the Philippines), to ensure that everyone has a chance to receive inoculations. The days were first created to eradicate polio and now are conducted to immunize against a host of other childhood diseases. To bring vitamin A supplements to target groups on these days, along with other medicines, is a cost-effective method of reaching the highest possible number of people and the most at-risk groups. The Expanded Program on Immunization (EPI), for example, reaches 80 percent of the world's at-risk children in the first 12 months of life, as well as their mothers, making it a natural vehicle for delivering vitamin A.

While the benefits of delivering vitamin A before a child reaches six months of age are still under investigation, it is agreed that delivery after six months of age is beneficial. The routine measles vaccination between 9 and 11 months is an especially expedient way to combine two strategies--immunization and vitamin A ingestion--that reduce the risk of disease. Also, providing pregnant women with vitamin A within eight weeks of delivery may help infants fight off illness and possible death, although this remains to be shown definitively. The EPI program appears to be a useful mechanism for reaching infants of the age groups in which there is an overlap between the immunization schedule and the need for vitamin A supplementation.

Vitamin A supplementation during NIDs is not a panacea, however. For many populations,

supplementation should be viewed as a stopgap measure that can provide relief during periods when countries are intensifying efforts to increase vitamin A intake through dietary diversification and fortification of commonly eaten foods. For some populations, supplementation with vitamin A may be the most cost-effective means to meet vitamin A requirements (and with multiple micronutrient supplementation, other vitamins and minerals as well).

The longest running campaign approach is in the Philippines, where vitamin A supplementation has occurred twice a year since 1993--once on National Immunization Day, with the immunization in April, and again with vitamin A only (no immunization) on National Micronutrient Day in October of each year. USAID, through OMNI, has been strongly supportive of the program since its inception. Prior to that, targeted distribution of vitamin A capsules to underweight children at weighing posts was the policy. However, through technical assistance to the Department of Health of the Philippines, OMNI partner Helen Keller International (HKI) contributed to the policy change in 1993 that led to universal distribution of vitamin A capsules on NIDs, and since then, HKI has continued to provide technical support to the DOH. In HKI project provinces, it was documented that 86 percent of preschool-age children received vitamin A capsules in 1994 (up from 7 percent in 1991), and over 80 percent received them in 1995, thus demonstrating a sustained high level of coverage. Nevertheless, the last follow-on day (*Araw ng Sangkap Pinoy*-ASAP) showed a reduction in coverage to 78 percent. USAID, through HKI and OMNI, is helping analyze this decrease to see if it is a one-time dip or represents "campaign fatigue." The economic analysis work that OMNI has been supporting in the Philippines is being used to guide future supplementation choices.

In Nepal, one day in April and another in October have been set aside each year to distribute vitamin A capsules to preschool-age children in high priority districts, as well as provide nutrition education. Coverage of children 6-60 months was reported at 89 percent in 1996. Female Community Health Volunteers are central to managing vitamin A capsule distribution in their villages--they reached 1.4 million children in the 1996 campaign. Field trials conducted in Nepal suggest mass vitamin A supplementation campaigns could result in a 30 percent decrease in childhood deaths. In addition, capsules are used in health facilities in all 75 districts throughout the country for treatment. The combination of a universal and targeted approach is proving to be effective in both preventing vitamin A deficiency and reducing child mortality. Working through HKI, OMNI has been an important player in this national initiative, which has resulted in an increase of the coverage from 0 to 42 districts over the five-year period.

In Zambia, OMNI worked closely with the National Food and Nutrition Commission in planning the first ever vitamin A capsule campaign with a NID in Africa in August 1997. Nearly 1.5 million children six months to five years of age, received a vitamin A supplement along with the oral polio vaccine.

These successful examples have been noted by other countries which have recently adopted the NIDs approach (with information disseminated by the OMNI project or with technical assistance), such as Eritrea and Nicaragua. Several other countries in Africa are investigating the possibility of doing so. UNICEF reports that there are now 34 countries worldwide reporting that they provide vitamin A with NIDs.

The important question that needs to be answered is how this successful intervention, which has demonstrated dramatic increases in coverage, can be sustained after the global polio initiative. USAID, together with WHO, UNICEF, and other donors, is currently examining this issue.

COST-EFFECTIVENESS ANALYSIS AS A MICRONUTRIENT POLICY TOOL

From 1996-1998, OMNI developed a set of capacity-building tools for countries to undertake cost-effectiveness analysis of micronutrient interventions. This effort also included the provision of intensive technical support to four country teams that implemented cost-effectiveness studies (Indonesia, Peru, the Philippines, and South Africa). The primary objective of this initiative was to improve country micronutrient strategies by conducting economic analyses related to intervention choices. Another objective was to develop and/or strengthen in-country expertise, thereby enabling countries to increasingly make economic analyses integral to the process of program planning.

Cost-effectiveness analysis is based on the principle that using resources for a given program or activity is taking those resources away from other potential activities. This type of analysis helps decisionmakers decide how investments should be made because it gives equal weight to both the impacts and the costs of alternatives. For example, to choose among micronutrient strategies (e.g., mass supplementation versus targeted supplementation combined with fortification), cost-effectiveness analysis helps decisionmakers select options that provide the greatest payoffs for their investments. During the 1990s, USAID pioneered

the application of economic analysis tools in the field of nutrition. Beginning in 1992, a series of cost-effectiveness case studies were undertaken in Latin America and the Caribbean as part of the USAID-funded Latin America Health and Sustainability Project (LAC HNS). Lessons learned from this experience formed the basis for the economic analysis activities supported by OMNI. OMNI's work emphasized generating a demand for and building local capacity to conduct this type of analysis, as well as using it for micronutrient advocacy.

Accomplishments

- **Capacity was developed or strengthened in at least four countries, and capacity-building tools were developed and made available. These included the two-week planning workshop on "Principles of Cost-Effectiveness Analysis"; the Vitamin A Cost-Effectiveness Analyst, interactive software for using cost-effectiveness analysis to design and promote vitamin A programs; a draft cost-effectiveness manual; and draft spreadsheets for estimating global costs of controlling vitamin A deficiency.**
- **Cost-effectiveness analysis methods were proven to work in diverse settings, and with a range of intervention options and decision levels.**
- **The cost-effectiveness analysis initiative improved governmental and nongovernmental organizations' understanding of cost-effectiveness principles and issues, especially with regard to vitamin A programs, and iron supplementation.**
- **Expected results include improved policies and strategies for controlling micronutrient deficiencies, more countries with comprehensive micronutrient programs, an increased number of cost-effectiveness analysts in key countries, and better methods for economic assessment of micronutrient policies and programs.**
- **All four countries have indicated that the completed analyses are being used in the development of strategies or next steps for implementation in their national micronutrient programs, and helping to decide the mix of intervention choices.**

Summary of Cost-Effectiveness Country Studies

South Africa

***Policy Concern*: A 1994 national nutrition survey revealed unexpectedly high levels of VAD--one in three children under five years of age had subclinical vitamin A deficiency, a serious public health problem. Policy questions included how best to initiate action, and how to determine the cost implications for industry as well as for provincial health departments.**

***Users of the Results*: Ministry of Health (at national and provincial levels), food industry, and the South African Vitamin A Consultative Group (SAVACG).**

***Intervention Options*: Sugar fortification and/or maize meal fortification, complemented with mass or targeted supplementation. Supplementation options included immunization-linked vitamin A distribution at facilities (and other preventive health services linked with vitamin A distribution), and/or vitamin A supplements through targeted outreach.**

***Major Activities*: Four people attended the November 1996 cost-effectiveness analysis principles workshop in Washington. The study team focused on fortification and the design of supplementation options. SAVACG and SALDRU databases were used for estimating consumption levels, and patterns in households at risk for VAD. March 1998 meetings with stakeholders including the MOH took place.**

***Status of Policy Results*: The Directorate of Nutrition is awaiting the results of the study for consideration when designing the vitamin A strategy.**

***Lessons Learned*: Timing and positioning an analytical effort of this type requires more than the presence of technical tools and expertise--it also requires access to decision-makers. Decentralization, evolving leadership, and various institutional problems caused delays in decisions about key program parameters. A study such as this, in a setting where almost no program analysis experience exists, can be a useful process**

for identifying potential sources of inefficiency in programs.

Peru

***Policy Concern*: A proposal that called for the double fortification of wheat flour with vitamin A plus iron led to the need for justification to industry why supplements could not be used instead.**

***Users of the Results*: Ministry of Health, the food industry, and the National Micronutrient Task Force.**

***Intervention Options*: Sugar and wheat flour fortification, complemented with mass or targeted supplementation. Supplementation options included mass versus targeted immunization-linked vitamin A.**

***Major activities*: Three people, including an industry representative, attended the training workshop in Washington in November 1996. Preliminary analysis has been completed on household consumption patterns and levels for wheat flour and sugar in households at risk of VAD. A costing methodology was developed and applied to all regions. Cost and effectiveness estimates were developed for fortification and supplementation.**

***Status of Policy Results*: The CE study will be submitted to the micronutrient task force, the body recommending vitamin A policy to the MOH.**

***Lessons Learned*: The uptake of study results is directly related to the ability of the study team to forge broad ownership of the analysis, and maintain relevance to the changing policy environment; for example, the change in leadership for the development of the national micronutrient strategy was a significant factor, as was the restructuring of the sugar industry. It is important to maintain realistic assumptions about the status of key industry parameters before developing final recommendations.**

Philippines

***Policy Concern*: The next national development planning cycle was underway at the time of the study, and further analytical input, of the type provided by this work, was urgently needed. National campaigns for vitamin A supplements were considered unsustainable, but there was no clear indication that the food industry was ready for the task of a fortification-based strategy.**

***Users of the Results*: National planning bodies, particularly the National Nutrition Council's planning division; UNICEF; Asian Development Bank; World Bank; and HKI (as the USAID conduit for vitamin A support) were major supporters of the national plan for vitamin A.**

***Intervention Options*: Wheat flour fortification and/or sugar fortification, complemented with mass or targeted supplementation that is immunization-linked and/or vertical.**

***Major Activities*: Three persons attended the November 1996 workshop. Focus was on wheat flour fortification (potentially sugar, if the industry was restructured), and alternatives to national supplementation campaigns. New primary data sets were analyzed to estimate food consumption levels and patterns in households at risk of VAD.**

***Status of Policy Results*: The CE study was presented to and endorsed by the vitamin A experts group, which guides the country's national policy.**

***Lessons Learned*: The Philippines study offered the best examples of a team formed for this type of economic analysis, in terms of potential uptake of results. Decisionmaking based on analytical work needs to be institutionalized. Delays in primary data collection and obtaining existing data sets were due to institutional issues. Decentralization and the role of provinces was unclear, which hampered identification of realistic future program scenarios. The lack of cooperation on access to data jeopardized the potential for trends analysis, demonstrating the need for strong and coherent leadership by a designated government sector, perhaps planning. The lack of information on the spread of fortification and consumption of foods containing added vitamin A, the decision by the MOH--without consulting the nutrition service--to restrict supplementation coverage, and the proposed gradual phasing down of supplements eventually all made analysis more difficult, but it probably represents the "real world" situation.**

Indonesia

Policy Concern: **Whether to expand the current iron supplementation program for female factory workers.**

Users of the Results: **MOH, Ministry of Manpower, Ministry of Planning.**

Main Activities: **In November 1996, an OMNI/USAID-sponsored team prepared a cost-effectiveness study plan designed to help the Ministry of Health and the Ministry of Manpower make decisions regarding the iron supplementation policy for female factory workers. During 1997, data collection took place in several private companies in the provinces of East Java, Jogyakarta, Central Java (Kudus District), East Kalimantan, and Jambi.**

Status of Policy Results: **In late May 1998, the preliminary results were presented to the Minister of Health, who suggested a seminar for ranking officers from the relevant ministries. Modifications to the current iron supplementation program for female factory workers may be driven in part by the final recommendations of the cost-effectiveness study.**

Lessons Learned: **Timing of results is essential. The policy recommendations of the study were timely because, as a result of the financial difficulties, the economic crisis, and newly-appointed cabinet positions, cost-effectiveness studies are in high demand to help guide policy decisions in the health sector.**

NEXT STEPS AND ONGOING CONSTRAINTS

In many of the countries in which OMNI has been working, all three micronutrient deficiencies have been significant public health problems, and in many cases remain so, although there has been tremendous progress in reducing vitamin A and iodine deficiency levels. At the national level, most countries outside of sub-Saharan Africa do not have a food security problem, but problems of household dietary deficit and individual malnutrition are still common among low income populations, while social inequalities in nutrition and health care persist. These all contribute to unacceptable levels of micronutrient malnutrition.

This section presents the main issues and recommendations that arose from the OMNI project's experience. It is hoped that subsequent USAID projects will follow up on these recommendations. Both research and implementation issues are addressed.

VITAMIN A DEFICIENCY (VAD)

UNICEF estimates that there has been a 40 percent decline in vitamin A deficiency prevalence over the last 10 years. Vitamin A capsule coverage has increased in Asia, on average, from around 33 percent only four years ago (1994) to over 80 percent. The rate of decline of vitamin A deficiency "is about 70 percent of the global rate required to eliminate clinical vitamin A deficiency by the year 2000" (as calculated by UNICEF). If the current rates were maintained, clinical VAD would be eliminated in South Asia by 2007. Other countries in Asia and Latin America may well reach the year 2000 goal. Africa is concurrently assessing the magnitude of the problem while starting programs, but probably will not reach the end of decade goals.

A mix of interventions will provide greater coverage and sustainability, including public sector supplementation programs as well as non-subsidized private sector interventions, such as fortification of food and home gardening in some settings. In an appreciable number of countries, supplementation with vitamin A will be a necessity for some years to come. Thus, the mix will and should change over time and depend on local conditions.

Next Steps

- **Transitioning from reliance on universal supplementation to a mixture of fortification, other food-based approaches, and targeted supplementation;**
- **Identifying and using other EPI mechanisms for vitamin A after polio eradication is completed;**
- **Supporting provision of high-dose vitamin A to mothers within eight weeks of delivery;**
- **Addressing women's nutritional and health status, leading to a life-cycle approach;**

- **Studying the form and dosage regimen of supplements (retinol or beta-carotene, smaller intakes weekly, daily as a component of multi-micronutrient supplement, or 200,000 IU every four to six months);**
- **Analyzing HIV transmission reduction; and**
- **Assessing whether there is a role for vitamin A in malaria case management and mitigation.**

IRON DEFICIENCY ANEMIA (IDA)

Although it is the most prevalent of the three deficiencies, and its millennial goal is the most modest, IDA control has been the least successful. The Standing Committee on Nutrition of the United Nations has drawn attention recently "to the lack of progress in tackling iron deficiency anaemia which affects the health and development of tens of millions of children and women in spite of the availability of practical low-cost interventions." Constraints are multiple, starting with the fact that it is a harder problem to tackle programmatically. Logistics are complicated; compliance with supplements is often low; bioavailability in the diet--especially in the diets of the poor--is low, and further reduced in many largely vegetarian diets; and the status is worsened by coexisting conditions of parasite infection and malaria. Because of these obstacles, IDA prevention and control has been less successful.

Next Steps

- **Greater emphasis on IDA as the other two micronutrient programs show progress;**
- **Life-cycle approach targeting adolescents;**
- **Use of other delivery mechanisms (schools, factories);**
- **Weekly vs. daily dosing;**
- **Logistics (procurement, distribution, delivery systems);**
- **Modification of iron supplements to improve acceptability (taste, odor, side effects, packaging, and brand names);**
- **Fortification (including both iron and vitamin A); and**
- **Emphasis on cost-effectiveness with regard to the health and productivity-increasing effects of interventions.**

IODINE DEFICIENCY DISORDERS (IDD)

On average, 60 percent of all salt is now being fortified, meaning that 1.5 billion people are now consuming iodized salt for the first time worldwide. Although 19 countries continue to have significant iodine deficiency, iodized salt availability has gone from 10 percent to more than 50 percent in Southeast Asia and to more than 60 percent in Africa (on average). This has had a significant effect on the goiter rate in those regions. Over 12 million infants each year are being protected from mental retardation and loss of their intellectual potential. The number of cretins being born has been halved in the last decade from approximately 120,000 to 60,000 annually.

OMNI and its partners have identified the constraints to complete success. These include lack of adequate coordination and communication among sectors; a continuing need for advocacy, communications, and training at all levels; insufficient quality assurance and monitoring; and a remaining need to stimulate public demand. There is also a need for increased advocacy; modernization of the salt industry; legislation, regulations, and enforcement; improved communications, information, and management; strengthened laboratory management; and international collaboration and private sector involvement. In some countries, price differential and poor accessibility remain constraints, as does an inattention to costs and sustainability. While USAID, through OMNI, PAMM, and ICCIDD, has been involved at the global level with manuals on quality assurance and monitoring and evaluation of programs, this now needs to receive increased attention at the national level.

Next Steps

- **Strengthening of quality assurance/quality control;**
- **Accelerating existing programs;**
- **Eliminating pockets of IDD in unreached populations; and**
- **Ensuring sustainability of current programs.**

OTHER MAJOR TRENDS

One of the major achievements of the OMNI project has been to support the strengthening and testing of approaches that have now become routine. At the same time, the project has identified other major trends that will continue to need to be addressed.

Fortification and the Private Sector

Without doubt, there will be increased fortification of staples--wheat flour, rice, oils--and the attainment of universal salt iodization (USI). The private sector's involvement in fortifying processed foods, such as noodles, will increase. Nevertheless, a strong governmental role will remain an essential ingredient for success. A regional approach to fortification in terms of exports and imports, harmonization of standards and common legislative approaches, especially in an environment of economic globalization, is likely to be a further development. There will also be more private sector involvement in the sale of supplements. Particularly with donor encouragement, there will be some emphasis on using the private sector as the delivery mechanism for supplements, as in the recent experience in Indonesia. A recent survey in the Philippines found that while around 90 percent said they would be willing to buy supplements, most would not spend more than 20 pesos (about U.S. 5 cents) on iodized oil or vitamin A supplements, citing a lack of money and the belief that it was the government's responsibility.

Multi-micronutrient Approaches

The poor diets that women in developing countries often consume lead to deficiencies of iron, vitamin A, zinc, folic acid, B_6, B_{12} and other vitamins and minerals. Such deficiencies have serious consequences for women's health, pregnancy outcomes, and their children's health and nutritional status. Current efforts are testing the benefits to women of combining iron/folic acid and zinc, vitamin A and zinc, as well as several multiple vitamins and minerals into a single tablet. An earlier study of pregnant Indonesian women showed that 100 percent of the anemic women were cured by a combination therapy of vitamin A with iron, in contrast to vitamin A alone (40 percent) and iron alone (60 percent).

A postpartum vitamin A supplementation approach requires further field trials because of the current limited coverage, and the relatively narrow timeframe (up to eight weeks postpartum) that may need to be extended by regular intake of lower doses. In addition, since developing country diets are limited in many other essential vitamins/minerals, and micronutrient interactions need to be factored in, effectiveness may be limited even if supplement use among the target population is successfully increased. Nevertheless, multiple supplementation (starting before pregnancy), and fortification with a range of micronutrients, is a foreseeable trend. OMNI has already supported work on the fortification of wheat flour with both vitamin A and iron. Another likely trend is an emphasis on a life-cycle approach, starting before a woman becomes pregnant to build maternal stores for pregnancy and lactation.

Sustainability

Four factors have been identified as essential for sustainability: efficacy, appropriateness, demonstrated feasibility, and political commitment. In a report from the U.S. Institute of Medicine of the National Academy of Sciences, sponsored by USAID through OMNI Research, the authors point out that sustainability has two components: process (the continuity of a successful intervention) and outcomes (continuation of a significant, positive impact on the intended beneficiaries).

To address issues of cost and sustainability, there is increased interest in using a more targeted approach to supplementation through health care facilities, and other channels likely to reach groups at risk, including using the private sector, and NIDs. The recently successful NIDs have usually been in conjunction with the mass polio campaigns. While high levels of coverage have been achieved and maintained, the polio initiative is scheduled to finish over the next few years. The lessons that have been learned need to be carried over into other EPI and campaign activities. National measles immunization campaigns are a possible alternative since seroconversion does not appear to be affected. Another factor is the need for a follow-up day on which a second vitamin A capsule can be given, but this has been successfully handled, with good sustainability to date in Bangladesh (National Vitamin A Weeks), in Nepal (two days in April and October using the Female Community Health Volunteers, resulting in over 80 percent coverage sustained over three years), the *Araw ng Sangkap Pinoy* on World Food Day in the Philippines, with over 80 percent coverage, and also in Nicaragua. Potential constraints are seen as health worker fatigue with the campaign approach, lack of supplies on the specified day, and the need for continued promotion and greater consumer demand.

In Nicaragua, where vitamin A capsule coverage is in the 80-90 percent range, a recent USAID assessment found that the country's use of a combined campaign and health delivery approach has been working effectively. The Nicaragua review, organized by OMNI and performed through USAID's enhanced vitamin A effort (VITA), was the first of the VITA assessments, which are designed to review select countries' micronutrient policies, programs, and opportunities for continued assistance in the future. Given the high coverage rates in Nicaragua, the challenge will be to find complementary approaches to vitamin A adequacy, such as sugar and/or oil fortification, eventually combined with targeted supplementation, as well as dietary diversification.

Nutrition Education and Social Marketing

Nutrition education and increased knowledge of both consumers and policymakers are seen as an integral part in the sustainability of any program. However, the beneficial impact of nutrition education and social marketing on behavior change and micronutrient status has not been well documented in the past, except for limited efforts to increase consumption of food sources of beta-carotene. The OMNI project started work on obtaining more information on this subject, and it is anticipated that this will be continued. One of the lessons learned is that a combination of the complementary approaches of nutrition education, fortification, dietary diversification, and supplementation, is the most likely to ensure sustainability. A body of work establishing the impact of social marketing approaches in four Latin American countries (Bolivia, Ecuador, El Salvador, and Nicaragua) will allow further conclusions. Evaluating success and impact in this activity needs more attention, specifically in addressing micronutrient interventions.

CONCLUSION

The elimination of vitamin A deficiency and iodine deficiency disorders, and the substantial reduction of iron deficiency anemia have been endorsed as achievable goals by virtually all countries of the world. There has been wide acceptance over the last five years of the need to see micronutrient interventions as a national-level priority. The cost-effectiveness of most micronutrient interventions continues to need assessment and advocacy to policymakers. Overall, it has been estimated by the World Bank that for "less than 0.3 percent of their GDP, nutrient deficient countries could rid themselves of these entirely preventable diseases, which now cost them more than 5 percent of the GDP in lost lives, disability and productivity."

Increased cooperation among governments, communities, the food industry, agriculture, and academia will be needed. The exact mix and sequencing of interventions, and when to modify these, will become the important questions for each national program and for future USAID involvement. A major challenge at present is to make the elimination of micronutrient malnutrition more consumer-driven. Nevertheless, the amount of progress, both globally and nationally, through USAID-supported activities has been significant. How to monitor and measure the real impact of these continuing programs will become a more urgent question as the year 2000 approaches. Given the recent success of many programs, achieving the goals of the International Conference on Nutrition seems a possibility for vitamin A deficiency and iodine deficiency disorders, but iron deficiency anemia will continue to be a challenge.

APPENDICES

CHART OF ACTIVITIES BY INTERMEDIATE RESULTS

I.R. 2.1 Selected Nutrition Interventions to Improve Women's Health and Pregnancy Outcomes Identified, Developed, Evaluated, and Disseminated.	
ACTIVITY LEADING TO RESULT	**OUTCOMES**
Wheat Flour fortified with iron and vitamin B-complex in seven countries in Latin America.	Large-scale, sustainable provision of iron to women and young children who consume wheat products. A model for other regions.
Pilot trial in Indonesia--to improve packaging and develop an IEC campaign to market iron tablets through the private sector--was taken nationally.	Demonstration that a relatively small investment in collaboration with the private sector can complement public approaches.
IEC campaign and materials to increase consumption of iron tablets developed and begun in Bolivia, Ecuador, and Nicaragua.	Model developed. Follow-up monitoring to judge impact and applicability for other countries.
Nutrition education and innovative iron supplementation increased hemoglobin levels and tested compliance and impact for young women in Indonesian school trial.	Schools shown to be feasible as a point of intervention in a life-cycle approach to improving iron status in young women.
Educational and promotion materials developed for improving iron status among Indonesian women factory workers. Intervention endline samples currently being analyzed.	Analysis will determine whether this approach through factories--as an alternative complement to health system delivery of iron supplements--can be effective in reaching women prior to pregnancy.
Revised Iron Supplement Guidelines released by INACG in May 1998.	Clear, internationally-accepted guidelines support national policy decisions. First guidance since 1989; to be formally published late 1998.
High-level, political involvement of First Ladies Conference of South America pushed intervention decisions on iron interventions for women in five countries in December 1996.	Political will recognized as an important factor in awareness-raising, policy decision-making and program implementation.
Policies and protocols for iron supplementation to women finalized in three countries, with recommendation in a fourth evaluated and disseminated.	Without formal protocols, implementing functioning iron interventions is more difficult. Protocols are in place in 15 OMNI countries.
Field trial underway in Sri Lanka, assessing effectiveness of iron fortification of wheat flour.	Field trial completion in Dec. 1998, analysis due in mid-1999. This should show an impact under field conditions.
Results from pilot trials to increase iron supplement intake by women in India show constraints and facilitating factors in supply and demand of iron supplements at the village level.	Iron folate supplements have low coverage, and these studies, along with others by MotherCare, will improve coverage through U.S. and local PVO/NGO groups.
Community-based salt monitoring system developed using lot quality assurance sampling in the Philippines and for iron fortification in Sri Lanka.	Community-based monitoring methods and tools utilized.
Analysis of iron programmatic questions through international workshop with Institute of Child Health.	Identified next steps for operational and programmatic research.

I.R. 3.1 New and Improved Cost-Effective Interventions Developed and Disseminated.

ACTIVITY LEADING TO RESULT	OUTCOMES
Technical expert consultation reinforced importance of iron deficiency anemia on cognitive development in young children.	Technical recommendations help to formulate poli help to address iron deficiency in infants and youn
Report on sources, contents, and costs of iron supplements for young children.	Tool used by UNICEF and several governments to sources to supply iron needs of young children.
New iron fortification technologies and approaches tested: • Iron EDTA uses • review of iron chelate potential • review of iron fortification of rice	Information available on new vehicles for iron fort and more biologically accessible sources for iron.
Double fortification stability trials for high levels of both vitamin A and iron demonstrated that levels of vitamin A are not seriously affected.	Data available to support possibility of adding vita iron fortified wheat flour.
Guidelines for program managers and Manual for health workers in anemia detection distributed in English, Spanish and French developed with PATH.	Manuals available for use by program managers an laboratory workers involved in government and pr oversight.
Combining a vitamin A capsule delivery with the polio eradication campaign achieved 65-90% coverage in Zambia, Eritrea, Nepal, and the Philippines on national immunization days (NIDs).	Effectively demonstrated way to distribute one cap year at very little extra cost. The challenge is provi second capsule and inserting capsule distribution i ongoing system.
A finger-prick collection of blood for serum analysis, in connection with national polio eradication campaign, provided valid national data without a stand-alone survey.	Promising approach for reduced survey costs and l identified.
Reported proceedings of zinc consultation makes a strong case for addressing zinc deficiency in children.	Justification provided for zinc to be included in mu fortification or multivitamin delivery.
Study design completed to examine vitamin A and de-worming interventions on child growth in India.	Randomized, case-control study should help deter on vitamin A and anti-helminth interventions.
Feasibility of fortification of cooking oil with vitamin A in Nicaragua examined.	Fortification of oil with vitamin A should be exam in other countries, adapting this study model and b private sector experience with fats and oils.
Applied research in making vitamin A-rich diets more efficacious by greater understanding of bioavailability (Workshop on the Bioavailability and Bioconversion of Carotonoids), review of bioavailability with processing of foods; support to bioavailability workshop.	Increased understanding of food-based approaches adequate vitamin A status.
Applied research supported on vitamin A and infection and on vitamin A and HIV infection and effect on acute phase proteins.	Information needed to correctly interpret vitamin A using retinol levels.
Support of operational research on delivering iron to children innovatively and with appropriate multi-micronutrient formulations.	Increased availability of suitable iron supplements and children.
Community-based salt monitoring system developed using lot quality assurance sampling in the Philippines and for iron fortification in Sri Lanka.	Community-based monitoring methods and foods u
Analytical methods for the determination of vitamin A, iron, and iodine in fortified foods.	Useful food assays publication delayed due to copy problems.

I.R. 3.2 Improved Policies and Increased Global, National, and Local Resources for Appropriate Child Healt

Nutrition Interventions.

ACTIVITY LEADING TO RESULT	OUTCOMES
Five-year, national micronutrients plans and/or detailed annual plans were created with OMNI assistance in 13 countries.	National plans identified as a necessary step in forr and implementing government policies.
Supplement and treatment protocols for vitamin A and/or iron were reviewed and finalized in six countries.	Accepted protocols allowed for consistent impleme promotion, and training.
National vitamin A deficiency surveys were conducted or completed in Honduras, Morocco, Mozambique, Nigeria, and Zambia.	Statistically valid and scientifically accepted defici prevalence information is often needed to create ar vitamin A intervention policies. Surveys being plar Salvador, Eritrea, and Madagascar.
National iron deficiency anemia surveys were conducted in Ecuador, Honduras, Indonesia, Madagascar, Mozambique, Peru, and Zambia.	With accurate prevalence data, governments are m undertake immediate intervention programs. Moza and Madagascar decisions still in progress. Increas DHS.
Vitamin A Supplementation Guidelines revised by WHO/UNICEF/IVACG.	First revision of guidelines in 10 years used by nati governments for policy and protocols.
Iron supplement guidelines revised by INACG.	First guidance since 1989 addresses many outstand and helps national governments establish policies a protocols.
Five policy statements on key vitamin A issues produced and distributed by IVACG Task Forces. These include : • IVACG Policy Statement on Vitamin A, Diarrhea, and Measles • IVACG Policy Statement: Maternal Night Blindness: Extent and Associated Risk Factors • IVACG Policy Statement on Vitamin A Status and Childhood Mortality • IVACG Policy Statement on Clustering of Xerophthalmia and Vitamin A Deficiency Within Communities and Families • Vitamin A Supplements: A Guide to Their Use in Treatment and Prevention of Vitamin A Deficiency and Xerophthalmia	These updated guidelines help turn scientific resea national policies and national intervention program are an additional four other statements under revie
Vitamin A scientific research results and lessons from program interventions were shared at three international IVACG meetings, with over 1,200 total participants.	Forum for exchange of ideas has steadily increased participation, improved information sharing, and ra awareness of vitamin A importance. Next meeting Africa, spring 1999.
Improved technical input and leveraged USAID financial resources through multiple donor collaboration in the following meetings: • IUNS fortification workshop with MI -Ottawa • QA workshop with UNICEF, PAMM -Atlanta • Salt iodization workshop, UNICEF, PAMM, MI - Malawi • PVO MN workshop with PAHO - Wash.	Collaboration improved the final product and allow broader ownership of technical and policy issues.

• Child development and iron deficiency meeting with ICH - Oxford University • Iron/Multinutrient supplements for young children with UNICEF, Copenhagen 1996	
Improved technical input and leveraged USAID financial resources through multiple donor collaboration in the following documents and manuals: • Wheat Flour Fortification with MI, INCAP/PAHO • South America MN report with PAHO • Iron advocacy video with MI, ILSI, WB • Quality Assurance Manual with ILSI	Donor collaboration strengthened documents and r leveraged funds, and broadened ownership.
Joint workshops and conferences with other agencies to ensure sustainability of fortification: • with ILSI, Philippines, Manila 1996 • with WB, Washington 1997 • with PAMM/UNICEF/MI, Atlanta 1997 • with ILSI, Brazil 1998 • with PAHO, ILSI, IDB, Washington 1998 • with ILSI, MI on QA/QC, Washington 1997	Developed joint commitment with donor and other organizations and helped institutionalize fortificati micronutrient malnutrition intervention.
Cost-sharing program collaboration with UNICEF in 11 countries.	Allowed common advocacy approach, used compa technical advantages and permitted best utilization resources. Formal MOUs in Madagascar and Zamb effective.
Formal collaboration with other USAID-supported Collaborating Agencies including: • LINKAGES, BASICS in Madagascar • BASICS, SEATS in Eritrea • MotherCare in Bolivia, Honduras • IEF in Honduras • HKI in Philippines, Indonesia, Nepal • OMNI Research in Nicaragua • BASICS in Zambia • SUSTAIN and BASICS in CARMI • LINKAGES and AVSC in GHAI	Country-level and global collaboration result in int approaches, comparative technical advantages, ext resources, and comprehensive USAID health polic interventions.

• SANA in Africa • SCF, CRS in Mozambique • LINKAGES on multivitamins • MotherCare on iron policy • ILSI on private sector collaboration	
Micronutrient Country Fact sheets for 26 countries were used by USAID, PVOs, and donor groups to advocate for MN policies.	Summary Tool that provided basic, initial informat advocacy.
OMNI produced a matrix on MN status and program indicators for 25 USAID priority countries.	Used by USAID to prioritize intervention countries be used to track progress.
Development of Fortification Tools • Five Fortification Basics publications • Sugar Fortification Manual - three parts • Wheat Flour Fortification Manual - draft • Rice Fortification Options paper • Salt Iodization QA Manual • QA/QC Manual with ILSI • Private Sector Lessons Learned • Potential for Street Foods Fortification • Sugar Consumption questionnaire • Study on Fortified Foods in India	These tools are used for policy advocacy and techn by USAID, governments, and the private sector in fortification possibilities. Developed with other pa including the private sector.
Stage set for VITA-initiative, private sector thrust through a series of private sector collaborative meetings and discussions • IU FST Congress Budapest 1995 • Public/Private Sector Atlanta 1995 • Public/Private Sector Ottawa 1996 • Int'l Sugar Organization London 1996 • Regional Fortification - Manila 1996 • IFT Conference - Denver 1996 • IUNS Fortification - Montreal 1997	The VITA initiative is intensifying the effort to wo the domestic and international private sector to imp vitamin A coverage, largely through fortification b exploring other options as well.
Improved PVO capability and involvement in micronutrient interventions	Micronutrient interventions by U.S. PVOs and loca counterparts increased. Technical information and

• assisted with four regional PVO trainings • supported CORE MN conference -May 98 • 85 MN resource packets to field and headquarters • quick response to 2-3 requests weekly • All U.S. PVOs receiving MN information • Three TA support visits to PVOs in Africa • OMNI field collaboration in five countries	are necessary.
Common regional fortification standards and quality assurance (QA/QC) methods accepted by seven countries in Central America.	First regional agreement with implications for use a for other regional initiatives
Sugar fortification strengthened in Central America, with Zambia fortifying and Bolivia requiring government purchase of fortified sugar.	With successful examples and technology available A fortification of sugar will expand. New point-of- approach may help reduce costs. Ecuador, Kenya, I South Africa, and Uganda interested.
Iron fortification of wheat flour has moved from policy to practice in seven countries in Latin America. Training in fortification QC institutionalized through a regional millers training center.	Increased implementation of iron fortification will low-cost, sustainable iron intake improvement for children.
Micronutrient involvement has expanded dramatically in Africa in the last three years: • major programs started in Eritrea, Madagascar, Mozambique, and Zambia • National VA or IDA surveys done in Madagascar, Morocco, Mozambique, and Zambia • Economic analysis study in South Africa • Fortification feasibility studies in Kenya, South Africa, Tanzania, and Uganda • U.S. PVOs in eight countries trained • Several regional MN trainings for USAID • MinPak interventions designed for Madagascar, Senegal, and Zambia • Increased USAID Mission interest	With the VITA initiative, and growing recognition micronutrient deficiencies in Africa, there will con a greater need for expanded programs and technica throughout the entire continent of Africa. Current p provided approaches and served as potential techni resources in Africa.
Field-tested model for economic analysis for micronutrient policy choices available. Country studies completed in Indonesia, Peru, Philippines, and South Africa.	Model is being used by governments to make choi mix of micronutrient intervention strategies.
An interactive computer model is now available to test intervention mix comparisons for 108 countries.	Tool available to assist governments and others ex variety of intervention scenarios using known infor
Support to USAID's enhanced VITA effort	VITA Initiative planned to drive vitamin A and mi

• information and country backgrounds • presentation materials • conducted Nicaragua assessment • planned India assessment	programming for USAID and other groups in the y come.
Ten year, national micronutrient strategic plans have been drafted for Bangladesh, Indonesia, and the Philippines.	These countries have been among the world leader vitamin A. These plans begin provision for future i needs and already utilized in national planning.
I.R. 3.3 Enhanced Knowledge and Application of Key Child Health and Nutrition Behaviors and Practices.	
Province-wide, dietary behavior change programs in Indonesia increased consumption of targeted foods and was accepted as the model for future national expansion.	Model developed for scaling-up from large operati research to national plan.
Pilot program campaign and packaging for private sector iron tablet sales was taken nationally by Indonesian company.	A small investment in formative research, packagir campaign design to support the private sector show produce a sustained dividend.
Mass media and interpersonal campaign material examples are available from: • Iron tablet promotion in Bolivia, Ecuador • MN-rich foods in El Salvador, Nicaragua • Iodized salt in Eritrea • Vitamin A capsules in Zambia	Comparative materials can speed up the campaign process.
Baseline data on IEC campaign impact established for Bolivia, Ecuador, El Salvador, and Nicaragua with media impact results from El Salvador.	Campaign design and approvals took longer than e later evaluations will demonstrate impact.
Fortification-launch campaigns were done in Bolivia, Ecuador, Nicaragua, the Philippines, and Zambia.	Models for vitamin A and iron fortification develo could be the basis for similar approaches as fortific interventions start up.
Comprehensive salt iodization IEC campaign developed for Eritrea.	Model for salt iodization campaign could be used e and has regional implications.
A second-round vitamin A capsule campaign was implemented through the local health system in Zambia and evaluated in the Philippines.	Model for adding second VAC campaign to polio e campaign and using "devolved" local health units.
IEC training courses completed in Bolivia, Ecuador, and El Salvador.	Local level training demonstrated to be an integral IEC.
Support to Food and Nutrition Bulletin of United Nations University, IDD Newsletter, several national micronutrient information dissemination efforts.	Increased information available and enhanced awa globally.
Extensive global dissemination of OMNI and other micronutrient information.	Increased information and awareness globally.
Joint activities with other groups - MotherCare, HICI, Manoff, AED- and in-country to develop common IEC micronutrient materials.	Developed a corpus of available materials.
Iron video produced by INACG with MI, Manoff, CIDA, PAHO, SUSTAIN, UNICEF, and WB.	Advocacy tool in preparation to contribute to raise awareness of IDA.

I.R. 3.4 Improved Quality and Availability of Key Child Health and Nutrition Services.	
ACTIVITY LEADING TO RESULT	**OUTCOMES**
In Nepal, vitamin A capsule coverage went from near zero to 90% every six months in all 42 target health districts (from 72) in five years.	National model demonstrated scaling up and possibl implement sustained, high coverage in a relatively period of time.
Local Government Units in the Philippines include MN activities in local decisionmaking, based on training and prevalence feedback.	This HKI model demonstrated acceptability of one deal with devolution from central to local control a funding. Will now need scaling up.
Vitamin A capsule distribution in connection with a polio eradication campaign reached 65-90% of target children in Eritrea, Nepal, and Zambia.	Model established to provide at least one VAC per is second capsule distribution. Madagascar campai for October 1998.
Protocol training increased health worker knowledge for supplements for treatment and prevention in Bolivia, Ecuador, Nepal, Indonesia, the Philippines, and Zambia.	Preventive distribution increased, but treatment im difficult to measure. As new protocols are finalized is necessary.
Tools and information systems to monitor salt iodization programs include: • ISPAT salt iodization monitoring manual • Africa regional QA/QC training course • Salt iodization Quality Control Manual • IDD database tracks locally and globally	Tools developed through international partnerships improve effectiveness of national iodized salt prog improved tracking (ICCIDD, MI, PAMM, UNICEF Country programs for M&E developed at regional workshop in Malawi.
Laboratory facilities have been up-graded and personnel trained in Eritrea, Honduras, the Philippines, and Zambia as well as INCAP in Guatemala (in the Philippines cooperation between U.S. FDA, Phil. BFAD, PATH, and OMNI).	Improved facilities and better trained personnel all government control and monitoring of national pro leading to better service delivery.
Laboratory Manuals for anemia detection available in English, Spanish, and French.	Training manuals clearly delineated testing choices national program decisionmaking.
A tool to study MN supplement supply and logistical issues has been field tested in Honduras and India.	This draft tool developed and will help policymake the logistical systems of micronutrient supplement distribution.
Agreement among mentor states of Commonwealth of Independent States (including Russia). Regionalization further enhanced by meeting in Tbilisi, Georgia.	Demonstrated further model (besides CARMI) of r cooperation in fortification (in this case, iodized sa

OMNI PUBLICATIONS[(4)]

OMNI Brief 1: Bioavailability and Bioconversion of Carotenoids **(English). Summary of a workshop convened in Washington, DC under the joint organization and sponsorship of the Micronutrient Initiative and USAID/OMNI project to address the question: Can foods rich in provitamin A carotenoids provide adequate vitamin A for human needs? (1995)**

OMNI Brief 2: Street Foods in Developing Countries: The Potential for Micronutrient Fortification **(English). Summary of larger technical paper, *Street Foods in Developing Countries: The Potential for Micronutrient Fortification*, that reviews research on street foods and their potential in delivering key micronutrients to urban populations. (1998)**

Micronutrient Fortification and Enrichment of P.L. 480 Title II Commodities: Recommendations for Improvement **(English). Provides technical information about past and current enrichment and fortification practices, quality assurance of the fortified commodities, product and fortificant stability, and appropriate and safe levels of fortification. (1994)**

Iron Interventions for Child Survival **(English). Proceedings of a workshop in London, organized by USAID/OMNI and the London Institute for Child Health, addressing efforts to reduce and control iron deficiency anemia in infants and young children. (1995)**

Strategies for Promoting Vitamin A Production, Consumption, and Supplementation: Four Case Studies **(English; published in cooperation with the Academy for Educational Development). Presents experiences from four projects in Niger, Indonesia, and the Philippines which reflect the critical importance of behavior change in successfully reducing and eliminating vitamin A deficiency. (1996)**

Street Foods in Developing Countries: The Potential for Micronutrient Fortification **(English). Reviews research on street foods and their potential in delivering key micronutrients to urban populations. (1996)**

Improving Iron Status through Diet: The Application of Knowledge Concerning Dietary Iron Bioavailability in Human Populations **(English). A scientific review that examines significant factors affecting dietary iron bioavailability in humans. (1997)**

Carotenoids and Food Preparation: The Retention of Provitamin A Carotenoids in Prepared, Processed, and Stored Foods **(English). Covers properties, functions, and actions of carotenoids, the difficulties in measuring provitamin A levels, important food sources of provitamin A, as well as the effects of home processing and industrial processing on provitamin A content food.**

(1997)

Quality Assurance Workshop for Salt Iodization Programs, October 1996 **(English, Spanish, French, and Russian). Proceedings document from a workshop on establishing salt iodization programs and quality assurance systems to monitor program effectiveness. (1997)**

Fortification of Wheat Flour with Vitamin A: An Update **(English). This publication focuses on the fortification of wheat flour with vitamin A, and discusses the technology and issues related to stability of vitamin A, sensory characteristics, quality assurance and control, and cost of wheat flour fortified with vitamin A and other micronutrients. (1998)**

Micronutrient Deficiencies in Latin America and the Caribbean: Vitamins**. Published with PAHO, this publication, focused on vitamin deficiencies, provides health and nutrition planners and cooperating agencies with a regional view of the problem of micronutrient malnutrition, based on recent data on its extent and magnitude, as well as a brief review of its causes and implications, and of the actions currently implemented in the region to address it. (1998)**

Micronutrient Deficiencies in Latin America and the Caribbean: Iron Deficiency Anemia**. Published with PAHO, this publication, focused on iron deficiency anemia, provides health and nutrition planners and cooperating agencies with a regional view of the problem of micronutrient malnutrition, based on recent data on its extent and magnitude, as well as a brief review of its causes and implications, and of the actions currently implemented in the region to address it. (1998)**

Micronutrient Deficiencies in Latin America and the Caribbean: Iodine, Calcium, and Zinc**. Published with PAHO, this publication, focused on iodine, calcium, and zinc, provides health and nutrition planners and cooperating agencies with a regional view of the problem of micronutrient malnutrition, based on recent data on its extent and magnitude, as well as a brief review of its causes and implications, and of the actions currently implemented in the region to address it. (1998)**

Nigeria National Micronutrient Survey (English). Summary of the findings of the 1993 Nigeria Micronutrient Survey.

Manual for Sugar Fortification with Vitamin A, 2nd ed. (English and Spanish). Three volumes presenting technical guidelines to systematize and facilitate the establishment of and execution of a vitamin A sugar fortification program. (1996)

Linking Food Security and Nutrition Series (to be published in conjunction with AED in 1998).

Case Study: Eritrea

Case Study: Ethiopia

Case Study: Uganda

Regional Profile

Basic Indicator Summary Tables

Africa

Asia

Latin America

Micronutrient Facts Country Series

Bangladesh Bolivia Ecuador

Egypt Ethiopia El Salvador

Ghana Guatemala Haiti

Honduras India Indonesia

Kenya Madagascar Malawi

Morocco Nepal Niger

Nicaragua Peru Philippines

South Africa Sri Lanka Tanzania

Uganda Zambia

OMNI Technical Fact Sheets

Micronutrient Malnutrition (#1)

Vitamin A Supplementation (#2)

Monitoring Iodized Salt Programs (#3)

Engaging the Private Sector in Micronutrient Programs (#4)

OMNI Update (English; available in Spanish for January through June/July 1995 and after July 1996.

January 1995 (The OMNI Project--First Year Highlights)

February 1995 (Largest IVACG Gathering to Date Brings New Vitamin A Studies)

March 1995 (Nepal Vitamin A Program Gets Results)

April 1995 (Phase I of Iron Fortification Intervention

In Sri Lanka Is Completed With OMNI Assistance)

May 1995 (Salt Iodization Manual is Published)

June/July 1995 (Workshop Addresses Iron Interventions For Child Survival)

August 1995 (Consumer Research Key To Marketing Vitamin A-Fortified

Sugar In Bolivia)

September 1995 (IDD Month: Raising Awareness of Iodine Deficiency Disorders)

October/ (OMNI Research: Converting Theory Into Practice)

November 1995

January 1996 (A Challenge to the Public and Private Sectors: Ottawa Forum

Addresses Food Fortification)

March 1996 (Fortifying Sugar with Vitamin A: A Practical Solution)

April 1996 (Improving the Quality of Iodized Salt: Training in Guatemala)

July 1996 (Eliminating Vitamin A Deficiency: XVII Meeting Addresses

Obstacles and Solutions)

September 1996 (Decentralizing the National Micronutrient Program in

the Philippines: A New Challenge)

November 1996 (Quality Assurance--A Key to Fortification Efforts)

January 1997 (Strengthening Local Capacity for Cost-Effectiveness Analyses)

March 1997 (Moving Towards Consensus and Action on Anemia in Young Children)

May 1997 (New Initiative Takes a Regional Approach to Battling

Micronutrient Deficiencies)

July 1997 (Focusing on Women in Micronutrient Programs)

September 1997 (Towards Eliminating Vitamin A Deficiency in Four Countries)

November 1997 (Highlights from the XVIII IVACG Meeting)

January 1998 (OMNI Programs in Africa)

March 1998 (Assessing the Problem: National Micronutrient Surveys)

USAID/OMNI/Roche Fortification Basics Series: Various aspects of fortification covered in the fact sheets include technology, quality control, cost, and relevant legislation, along with a broad overview of the worldwide use and impact of food fortification. (1997-1998)

Sugar (English and Spanish)

Wheat Flour (English and Spanish)

Principles of Assay Procedures (English)

Oils and Margarine (English)

Choosing a Vehicle (English)

USAID's Vitamin A Program: Ending Vitamin A Deficiency Worldwide 1965-1998

(English). USAID has played a pioneering role since the 1960s in support of programs and policy interventions to reduce vitamin A deficiency. Document highlights USAID vitamin A programs worldwide. (1998)

Vitamin A Briefing Page: Vitamin A Deficiency: USAID Initiative Seeks to Avert One Million Deaths, End Leading Cause of Childhood Blindness (English). Describes and promotes vitamin A interventions as a cost-effective way of saving children's lives to a non-technical audience. (1997)

VITA: USAID's Enhanced Vitamin A Effort: Saving Lives Around the World (English). A one-page brief on the VITA initiative, USAID's enhanced effort to reduce vitamin A deficiency worldwide. (1998)

Anemia Detection Methods in Low-Resource Settings: A Manual for Health Workers (English). Published in conjunction with the Program for Appropriate Technology in Health (PATH). This publication describes common anemia detection tests for health workers in settings with limited resources such as rural clinics and hospitals. The manual provides instructions for performing the tests, suggestions for improving test performance, descriptions of test characteristics, advantages and disadvantages of each test, and the equipment and supplies needed for each test. (1997)

Anemia Detection in Health Services: Guidelines for Program Managers, 2nd edition (Available in English, French, and Spanish). Published by the Program for Appropriate Technology in Health (PATH), this book presents existing, commonly available anemia detection methods in a standard format to help managers make appropriate decisions regarding technology selection. (1996)

IVACG Publications

IVACG Policy Statement on Clustering of Xerophthalmia and Vitamin A Deficiency Within Communities and Families. (1996)

IVACG Policy Statement on Vitamin A, Diarrhea, and Measles. (1996)

IVACG Policy Statement: Maternal Night Blindness: Extent and Associated Risk Factors. (1997)

IVACG Policy Statement on Vitamin A Status and Childhood Mortality. (1997)

Vitamin A Supplements: A Guide to Their Use in the Treatment and Prevention of Vitamin A Deficiency and Xerophthalmia. (1997)

Strategic Placement of IVACG in the Evolving Micronutrient Field. (1996)

Vitamin A and Iron Interactions. (1998)

Safe Doses of Vitamin A During Pregnancy and Lactation. (1998)

Conversion of Measurements of Vitamin A. (1998)

Vertical Transmission of HIV and Vitamin A Status. (Projected 1998)

Research Needs Regarding Bioavailability of Vitamin A Sources. (Projected 1998)

Sustainable Control of Vitamin A Deficiency: Defining Progress Through Assessment, Surveillance,

Evaluation (English). Report of the XVIII International Vitamin A Consultative Group (IVACG) Meeting, Egypt. (1998)

Virtual Elimination of Vitamin A Deficiency: Obstacles and Solutions for the Year 2000 (English). Report of the XVII International Vitamin A Consultative Group (IVACG) Meeting, Guatemala. (1996)

Two Decades of Progress: Linking Knowledge to Action (English). Report of the XVI IVACG Meeting, Thailand. (1994)

A Brief Guide to Current Methods of Assessing Vitamin A Status. (1993)

INACG Publications

Iron EDTA for Food Fortification. (1997)

Iron/Multi-Micronutrient Supplements for Young Children. (1997)

Child Development and Iron Deficiency. (1997)

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MICRONUTRIENT STATUS IN SELECTED USAID AND OMNI COUNTRIES

1. [0] Helen Keller International, Emory University Program Against Micronutrient Malnutrition, The Manoff Group, Johns Hopkins University, International Life Sciences Institute, Program for Appropriate Technology in Health, University of Arkansas, and the University of California, Davis.

2. [0] Helen Keller International, Emory University Program Against Micronutrient Malnutrition, The Manoff Group, Johns Hopkins University, International Life Sciences Institute, Program for Appropriate Technology in Health, University of Arkansas, and the University of California, Davis.

3. [0] OMNI, which had no activities in Africa just three years ago, has been active in numerous countries including Eritrea, Madagascar, South Africa, and Zambia.

4. This list includes global OMNI publications only. OMNI publications that were produced in-country are mentioned in the text or in the chart of activities.

O M N I Project
MICRONUTRIENT STATUS
MATRIX

VITAMIN A

Best Available Information as of: 1997

	NEED	COVERAGE					PROGRESS			TARGETS		IMPACT
	% Children Deficient (+) <0.70 umol/l	Supplementation % children 6- 60 m. at risk			Fortification % Consumption		Clinical VAD			% Children Deficient (+) <0.70 umol/l		Potential Deaths Averted per Year
Joint Programming Countries	Baseline	<1990	1998	2005	<1990	2005	<1990	1998	2005	1998	2005	1995
India	37	20	38	70	5	30	Y	Y	N	30	25	466,700
Nigeria	28	5	30	35	0	10	Y	Y	Y	28	25	115,800
Indonesia	49	15	62	95	5	80	Y	N	N	40	25	88,800
Bangladesh	60	35	88	90	0	10	Y	Y	N	60	65	67,500
Ethiopia	NA	5	20	80	3	10	Y	Y	N	NA	NA	62,900
Tanzania	30	5	50	80	0	10	Y	N	N	30	25	24,100
Uganda	60	5	50	70	0	30	Y	Y	N	60	50	20,500
Philippines	35	5	88	95	5	90	N	N	N	25	20	13,800
Nepal	55	5	65	90	0	10	Y	N	N	40	30	13,700
Ghana	55	30	50	70	0	20	Y	Y	N	50	30	12,900
Kenya	59	NA	30	60	5	30	Y	N	N	55	40	10,100
Peru	20	NA	70	95	0	90	Y	N	N	18	15	3,900
Egypt	12	0	40	60	0	90	Y	N	N	10	5	3,400
South Africa	33	NA	40	80	10	90	N	N	N	35	35	3,100
Morocco	41	0	50	70	0	10	Y	N	N	NA	NA	1,500
Other Countries												
Zambia	43	5	80	70	1	10	Y	Y	N	10	10	9,900
Bolivia	11	5	20	95	0	90	Y	N	N	10	5	2,900
Guatemala	16	10	50	95	86	90	N	N	N	15	10	2,400
Eritrea	62	0	40	70	0	20	Y	Y	N	55	30	2,400
Nicaragua	31	5	70	95	0	90	Y	N	N	25	15	1,100
Honduras	18	5	50	95	50	90	N	N	N	10	5	1,000
El Salvador	36	20	50	95	55	90	N	N	N	30	20	900
Ecuador	18	0	60	95	0	90	N	N	N	15	10	550
Sri Lanka	NA	20	50	95	10	30	N	N	N	NA	NA	500

(+) WHO cut off for significant Vitamin A deficiency is > 10%
NA Not available

O M N I Project
MICRONUTRIENT STATUS
MATRIX

VITAMIN A PROGRAM FOCUS

Best Available Information as of: 1997

	Explicit Strategy		Supplement Protocol (Prevention)		Treatment Protocol		Food-Based Approaches Behav.Mod./Diet.Divers.		Fortification		Private Sector		Monitoring Surveys < 5yrs	
Joint Programming Countries	<1990	1998	<1990	1998	<1990	1998	<1990	1998	<1990	1998	<1990	1998	<1993	1998
India	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	Y
Nigeria	Y	Y	N	Y	N	Y	N	N	N	N	N	Y	Y	N
Indonesia	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	Y
Bangladesh	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y
Ethiopia	Y	Y	Y	Y	N	Y	N	Y	N	N	N	N	N	N
Tanzania	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	Y
Uganda	Y	Y	Y	Y	Y	Y	N	Y	N	Y	N	Y	Y	Y
Philippines	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
Nepal	Y	Y	Y	Y	Y	Y	N	Y	N	N	N	N	Y	Y
Ghana	Y	Y	N	Y	N	Y	N	Y	N	N	N	N	Y	Y
Kenya	N	Y	N	Y	N	Y	Y	Y	N	Y	N	Y	N	Y
Peru	Y	Y	N	Y	Y	Y	N	Y	N	Y	N	Y	N	Y
Egypt	N	Y	N	Y	Y	Y	N	Y	N	Y	N	Y	Y	Y
South Africa	Y	Y	Y	Y	Y	Y	N	Y	N	Y	N	Y	Y	Y
Morocco	N	Y	N	Y	N	Y	N	Y	N	N	N	N	Y	Y

Other Countries														
Zambia	Y	Y	N	Y	Y	Y	Y	Y	N	Y	N	N	N	Y
Bolivia	Y	Y	Y	Y	Y	Y	N	Y	N	Y	N	Y	Y	Y
Guatemala	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Eritrea	N	Y	N	N	N	Y	N	Y	N	N	N	N	Y	Y
Nicaragua	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N	Y	Y
Honduras	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y
El Salvador	Y	Y	Y	Y	Y	Y	N	Y	N	Y	N	Y	Y	Y
Ecuador	Y	Y	Y	Y	Y	Y	N	Y	N	Y	N	Y	N	Y
Sri Lanka	N	Y	N	N	Y	Y	Y	Y	N	Y	N	Y	N	Y

O M N I Project
MICRONUTRIENT STATUS
MATRIX

I R O N

Best Available Information as of: 1997

	NEED								COVERAGE						PROGRAM FOCUS			
	Anemic Women of Reprod. Age (1995)	Women of Reprod. Age (1995)	Anemia % of Pregnant Women		Anemia % of Women		Anemia % of Children < 5 years		% Consumption Fortification		% of Pre-natal Supplementation		% Children Receiving Supplements		Explict Strategy (Y/N)		Supplement Protocols In Use (Y/N)	
Joint Programming	15 - 49 yrs (m)	15 - 49 yrs (m)	< 11 g/dl - Baseline	< 11 g/dl - 2005	< 12 g/dl - Baseline	< 12 g/dl - 2005	< 11 g/dl - Baseline	< 11 g/dl - 2005	Baseline	2005	Baseline	2005	Baseline	2005	Baseline	1998	Baseline	1998
India	158.6	226.6	80	50	70	50	56	45	0	10	51	60	NA	0	Y	Y	Y	Y
Bangladesh	20.4	29.1	99	70	70	50	70	60	0	0	NA	60	NA	NA	Y	Y	NA	Y
Nigeria	6.3	25.3	37	30	25	20	29	25	NA	0	NA	NA	NA	NA	NA	Y	NA	Y
Philippines	6.3	17	43	34	37	30	40	35	30	60	NA	80	NA	20	Y	Y	Y	Y
South Africa	3.4	10.3	33	30	33	30	NA	NA	NA	0	NA	0	NA	0	NA	Y	NA	Y
Egypt	2.6	15.2	22	18	17	15	25	20	0	70	NA	20	NA	0	Y	Y	NA	Y
Kenya	2.2	6.3	NA	40	35	30	74	50	0	10	NA	30	NA	10	N	Y	N	Y
Morocco	2.2	7	45	40	31	30	35	30	0	60	60	70	NA	0	Y	Y	Y	Y
Peru	0.6	6.1	48	35	10	10	65	50	0	90	NA	25	NA	25	NA	Y	NA	Y
Indonesia	NA	52.7	64	50	NA	NA	56	30	0	10	52	30	NA	NA	Y	Y	Y	Y
Ethiopia	NA	11.9	NA	40	NA	30	47	40	0	10	NA	20	NA	15	N	Y	N	Y
Tanzania	NA	6.8	80	60	NA	50	45	40	0	5	NA	10	NA	0	Y	Y	Y	Y
Nepal	NA	5	68	70	NA	60	79	70	0	0	NA	20	NA	0	N	Y	Y	Y
Uganda	NA	4.7	NA	NA	NA	NA	NA	NA	0	0	NA	NA	NA	NA	Y	Y	Y	Y
Ghana	NA	4	69	55	NA	NA	NA	NA	0	0	NA	NA	NA	NA	N	Y	N	Y
Other Countries																		
Sri Lanka	2.3	5	39	40	45	35	45	40	0	85	90	90	0	0	Y	Y	Y	Y
Ecuador	1.7	2.9	60	48	60	50	22	15	0	80	NA	40	NA	30	Y	Y	Y	Y
Guatemala	0.8	2.4	26	20	35	20	21	15	50	70	NA	30	NA	15	Y	Y	Y	Y
Nicaragua	0.4	1.1	64	35	34	25	28	20	0	10	NA	40	NA	25	Y	Y	Y	Y
Honduras	0.2	1.3	40	30	16	15	16	10	0	10	NA	NA	NA	NA	Y	Y	Y	Y
El Salvador	0.2	1.4	14	14	12	15	23	15	0	50	NA	5	NA	0	Y	Y	N	Y
Zambia	NA	2.2	34	50	NA	35	60	40	0	0	NA	30	0	15	Y	Y	Y	Y
Bolivia	NA	1.8	51	25	NA	NA	36	25	0	80	14	30	NA	10	Y	Y	Y	Y
Eritrea	NA	0.8	34	50	NA	40	92	60	0	10	NA	NA	NA	NA	N	Y	N	Y

NA Not available

O M N I Project
MICRONUTRIENT STATUS
MATRIX

IODINE

Best Available Information as of: 1997

	Need		Coverage				Program Focus		
			Salt Iodization				Adequate Monitoring		
Joint Programming Countries	Population At Risk (000's)	Total Goiter Rate School Age Children	% of Population Covered - Baseline	% of Population Covered - 1998	% of Population Covered - 2005	% of Salt Adequately Iodized	Ongoing - 1996 (Y/N)	Ongoing - 1998 (Y/N)	Ongoing - 2005 (Y/N)
India	270,000	42	70	80	90	60	Y	Y	Y
Indonesia	95,000	27	50	70	90	10	Y	Y	Y
Bangladesh	60,000	47	62	90	100	NA	NA	Y	Y
Nigeria	25,000	20	97	100	100	NA	Y	Y	Y
Ethiopia	25,000	22	75	90	100	80	NA	Y	Y
Nepal	16,000	37	68	90	90	80	N	Y	Y
Philippines	15,300	7	40	65	80	16	N	Y	Y
Peru	14,000	36	90	95	100	NA	Y	Y	Y
Tanzania	10,000	37	65	60	80	12	NA	Y	Y
Kenya	10,000	8	100	100	100	2	Y	Y	Y
Morocco	6,500	22	0	30	70	NA	N	Y	Y
Egypt	5,000	6	0	60	95	NA	N	Y	Y
South Africa	4,975	2	40	50	90	30	NA	Y	Y
Ghana	4,785	17	0	45	70	NA	NA	Y	Y
Uganda	3,700	60	69	80	95	90	N	Y	Y
Other Countries									
Sri Lanka	5,000	14	4	25	50	40	Y	Y	Y
Ecuador	5,000	36	97	100	100	90	Y	Y	Y
Zambia	4,600	32	94	95	100	45	Y	Y	Y
Bolivia	4,000	21	98	98	100	90	Y	Y	Y
Guatemala	4,000	20	80	90	90	11	NA	Y	Y
El Salvador	2,500	25	75	90	95	0	N	Y	Y
Honduras	1,000	9	48	80	90	83	Y	Y	Y
Eritrea	787	22	75	90	100	5	NA	Y	Y
Nicaragua	500	4	95	100	100	95	Y	Y	Y

NA Not available