

Egypt's Adolescent Anemia Prevention Program

A Report on Program Development, Pilot Efforts, and Lessons Learned



Iron Health

Ministry of Health and Population
Health Insurance Organization

Acknowledgement

The Health Insurance Organization (HIO) program provides preventive and curative health services to approximately sixteen million school students under its Student Health Insurance Program (SHIP). The Ministry of Health and Population's Department of Maternal and Child Health is working with the SHIP to complement the activities of the Healthy Mother/Healthy Child Project to provide preventive health interventions to students in the area of nutrition, health education, and an anemia prevention program.

A recent survey revealed that many Egyptian adolescent boys and girls are anemic. This report describes a program that was designed to prevent anemia. It is based on qualitative research findings and pilot testing of protocols. Careful supervision and monitoring have resulted in a successful program that reaches, in the five target governorates, a million adolescents weekly with iron supplements. Healthful eating during adolescence is critical to the development of healthy adults and their ability to prevent anemia. This report also describes the complementary health education efforts that are being conducted in the schools.

A program of this scale could not have been accomplished without the support and hard work of staff at the central, governorate, district, and school levels. We greatly appreciate the support given by Undersecretaries of Health and Population and Education, and the Directors of Health Insurance Organizations, SHIP zone coordinators, district Ministry of Health and Population and Health Insurance Organization staff, medical staff assigned to the schools, and school principals in the governorates of Aswan, Luxor, Qena, Fayoum and Beni Suef.

The development of this program is the result of major efforts from the Student Health Insurance Program, the Ministry of Health and Population, the Healthy Mother/Healthy Child Project, and USAID's technical assistance contractor, John Snow, Inc. We hope this report will be useful for all agencies and individuals interested in improving the iron status of youth in school.

Dr. Hassen Abdel Fattah
Chairman
Health Insurance Organization

Dr. Esmat Mansour
PHC Under Secretary
HM/HC Executive Director
Ministry of Health and Population



Anemia and Adolescents

More than two billion people worldwide are anemic, due mostly to iron deficiency.¹ The prevalence of anemia is disproportionately high in developing countries due to dietary practices, high disease burden, frequent pregnancies, and poor access to health services. Although anemia primarily affects women, prevalence rates are also high among both male and female adolescents.

Anemia has a serious negative impact on growth and development during adolescence (11- 19 years of age). Both boys and girls have a decreased ability to concentrate, and learn, and decreased energy and physical strength. Physical growth slows down late in adolescence, at which point the iron status of boys improves. Adult men are therefore less at risk of anemia than women who lose blood (and as a result, iron) through menstruation. During adolescence, women's bodies develop and prepare for future childbearing. Anemia in adolescence puts a young woman and any future child at risk of premature birth, low birthweight, and perinatal and maternal mortality.

Adolescence is an opportune time for interventions to address anemia. Not only is there need (growth, preparation for pregnancy), but large numbers of both boys and girls can be reached easily if school attendance or participation in other group activities is high. Also, adolescents are open to new information and new practices since they are often striving for physical or academic excellence.

The Situation in Egypt

A survey conducted in 1997², found that 47% of adolescent girls and boys are anemic. The preliminary results from Egypt's Demographic and Health Survey conducted in 2000 showed that 30% of adolescents were anemic. This affects their growth, general health, and the health of their future children. Poor eating habits are the main reason for the high rates of anemia among adolescents in Egypt. The typical Egyptian diet has few iron-rich foods, or foods that enhance iron absorption, and often considerable amounts of foods that inhibit iron absorption such as tea and whole wheat bread.

Thirteen million people, 22% of the Egyptian population are currently adolescents.³ The government is



Preparatory children at school.

seriously concerned about the health of this large number of citizens and has made efforts to develop a comprehensive and sustainable health policy for youth. The Government's National Health Insurance Organization (HIO) has expanded its program to cover all school children. It provides preventive and curative health services to the students under the Student Health Insurance Program (SHIP). Headquartered in Cairo, the program has district and governorate administrators. Medical staff provide services at school clinics and HIO healthcare facilities.

School enrollment varies greatly in Egypt, by rural/urban settings, gender, and the socioeconomic level of the family. For the adolescent population as a whole, enrollment is highest (90%) in the age group of 8-11 years, declining after the first phase of education. At age 14, the beginning of the transition from compulsory education to noncompulsory secondary education (grades 9-11), the national enrollment rate is 73%, with variations by gender and locale.⁴

Program Context

Because of the high adolescent anemia rates, SHIP began a dynamic school-based program—The Adolescent Anemia Prevention Program. This is a collaborative effort through the United States Agency for International Development (USAID) bilateral agreement with the Ministry of Health and Population (MOHP), Healthy Mother/Healthy Child Project (HM/HC) and SHIP that seeks to reduce current anemia rates and to prevent anemia in preparatory and secondary schools students. All school, (including public, private, religious, government and technical schools) in five governorates in Upper Egypt (Aswan, Beni Suef, Fayoum, Luxor, and Qena) participate.

Support and technical assistance is provided to the MOHP and SHIP through USAID's subcontractor John Snow, Inc (JSI) and its subcontractor The Manoff Group. A two-pronged approach was adopted for this program: supplementation and diet improvement through nutrition education, both with routine monitoring. School activities address the immediate situation of iron deficiency anemia and lack of adequate iron stores through weekly in-school provision of iron supplements. The long-term situation of poor dietary habits is addressed through targeted communications activities to improve specific practices related to the intake of iron and its absorption.

The program has been implemented in phases. It began with formative research and an operational research study, expanding next to a one governorate trial and finally to implementation in five governorates. This phasing ensured that the methods for supplementation and nutrition education were tested, logistical problems solved, and cultural issues resolved to ensure success and sustainability.



Iron tablet distribution in a secondary school.

Program Development

Supplementation

Dietary change alone is not enough to increase an anemic person's hemoglobin level to normal. Supplements are necessary to restore a normal level of iron in red blood cells and to build up long-term iron stores for times (such as adolescent growth and pregnancy) when more iron is required. When hemoglobin levels are normal, healthy dietary practices can usually supply adequate iron.

Iron supplementation programs have many facets. The initial decisions facing the program were:

- which supplement to distribute;
- the frequency of distribution (once or twice a week);
- how to get the tablets to the schools;
- how to ensure their consumption (availability of cups and water);
- how to monitor the consumption of tablets.

In addition, an unforeseen issue arose in reference to thalassemia minor. Discussion with HM/HC staff, correspondence with international experts, and provision of information about the minimal exposure of only one tablet per week convinced concerned scientists and policymakers that a harmful situation would not exist.

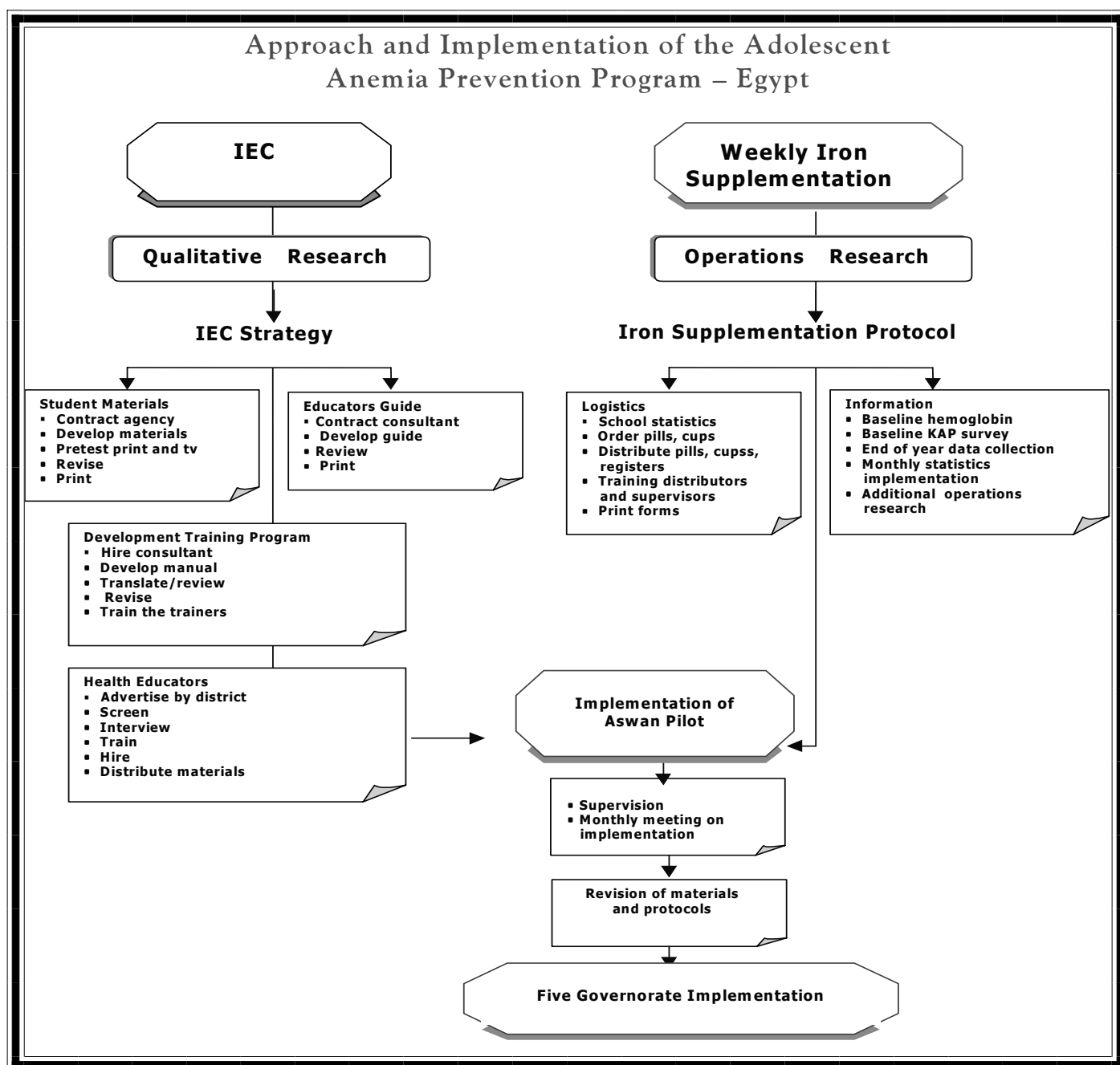
In the Spring of 1999, an operations research program began in the governorate of Fayoum, in eighty-four schools, reaching 70,000 students testing the following conditions:

1. **Supplements**—The supplements distributed at the schools were those that were on the National Essential Drug List. They contained 200mg ferrous fumarate and 300mcg folic acid as recommended⁵. Tablets were purchased by the government from an approved government pharmacy. The tablet was yellow.
2. **Frequency**—Weekly distribution was chosen after considering the controversy among professionals about the efficacy of weekly or twice weekly iron supplementation in schools, the difficulty of having SHIP staff available to distribute pills more than once a week, and the cost of doubling the number of tablets.
3. **Parasites**—Parasites, particularly hookworm, are often a contributing factor to iron deficiency anemia, but in Egyptian adolescents the levels of parasites that contribute to anemia were found to be extremely low. There is virtually no malaria, and a national program to screen and treat schistosomiasis in school children is fully operational. Therefore, no anti-helminth protocol was developed for this program.

4. **Logistics of distribution of tablets to schools –**
Tablets were distributed from the government pharmacy directly to the HIO governorate central warehouse and from there to the district warehouses. The district SHIP staff distributed a monthly supply of tablets and cups to the school clinics. In the beginning, transporting the tablets and cups to the schools was a problem for SHIP, but once vehicles were borrowed from the MOHP the problem was solved.

5. **Distribution of tablets in the classrooms –**
Depending on the size of the school, one or two SHIP health visitors or nurses were assigned to the school to distribute the tablets during a one or two day period each week.

Iron supplementation was scheduled to take place in the first days of every school week, when attendance is highest. If a student was absent on the day of supplement distribution, health workers recorded that absence and tried



to meet with the student during the next two days to give him/her a tablet. Beginning early in the week meant that even for absent students there would still be three to four days between tablet ingestion. The tablet distributors observed each student swallowing the tablet. Students who refused the tablet were marked on the register, and if they did not change their mind during the month, were counted in the school statistics as “refused.”

The lessons learned in Fayoum about supplementation were applied in the development and implementation of a governorate-wide pilot program in Aswan during the next school year. The following modifications were made:

1. Before beginning supplementation in the schools, meetings were scheduled with governorate and district health professionals and a television spot was aired to inform all members of the community about the iron supplementation program. This information helped to dispel any rumors or suspicions that the supplements were birth-control pills or would cause bad side effects.
2. Cup size was decreased to 75 ml to facilitate transport, storage, and disposal.
3. The class register was simplified to decrease the amount of documentation required by the tablet distributor.
4. Training for tablet distributors and supervisors was expanded to ensure that they learned essential skills.

5. In the future, the color of the tablet should be changed to red to relate to “strengthening the blood” and to dispell the rumor that the iron tablets are birth control pills (which are yellow).

Nutrition Communications

Maintenance of adequate iron levels often necessitates changing dietary practices, in this case, enhancing iron intake and absorption. For this, a major education effort on diet improvement was undertaken. Suggestions made during the Fayoum supplementation study were incorporated: raising public awareness through the mass media, raising awareness among the students before the tablets were distributed at the schools, distributing formal handouts and information about anemia, and encouraging more cooperation between teachers and health workers.

Research on current dietary practices was needed before the educational plan and materials could be developed. Qualitative research information was gathered on dietary habits and nutritional knowledge from the targeted students and their parents. This information was then used to develop an education strategy and materials for the school setting and for parents that focused on specific dietary improvements and motivations to help students and parents implement the changes. The research gathered information from adolescents of both genders in preparatory and secondary schools, and their mothers in both a rural and an urban location in the governorates of Aswan and Fayoum. Two methods were used during the formative research phase of

Ramadan study

There is one month during the school year when iron supplements cannot be taken in school – the month of Ramadan. Students are fasting during this month, unable to eat or drink during the day, so iron pills cannot be consumed. A Ramadan Iron Supplementation Operations Research study was conducted in Fayoum to see if iron tablets could be sent home with students during this month and a good rate of consumption achieved. It was hoped that there would be a high rate of compliance so that supplementation could be continued during that month, resulting in continued improvement of the students’ iron status. SHIP distributed the tablets, reminded students of the guidelines (taking the tablet at a prescribed time each week, taking it with water, taking it one-two hours after a meal), and kept records in the classrooms as before. The students were responsible for taking the tablet once they broke their fast at home.

Losing the tablet after being given it at school was not a problem and all but one of the sixty-four students declared that they consumed the tablets during the study. The study found the most popular reminders for taking the pill to be putting it where the student would see it and remember to consume it (on the table, television, or bed pillow). However, 20% of the students took the tablet at the wrong time. As a result of the high compliance found during this study, iron supplementation is continuing in the schools during the month of Ramadan with educational emphasis being place on when to take the pill.

this program: Focus Group Discussions (FGDs) and Trials of Improved Practices (TIPs)⁶.

Across the four selected locations, a total of twenty FGDs were conducted, four with mothers, and sixteen with students, divided between females and males. The students selected to participate included students from all grades and socio-economic levels. The selection of mothers took place in the community through door-to-door canvassing with selection based on having children in a preparatory or secondary school and having a level of education that was average for the community.

The FGDs sought to obtain information to help the program:

- understand the thoughts of adolescents and mothers about good nutrition, anemia, iron supplements, a healthy diet, and effective media channels for communicating nutrition/health information.
- find out what dietary changes are possible for adolescents to improve their iron status.
- find methods of motivating students and mothers to make dietary changes.

Additional information was gained using the TIPs technique with a sample of forty-four preparatory and forty-four secondary students of both genders in the four locations. This participatory research technique allows for the identification of dietary practices that need improvement and

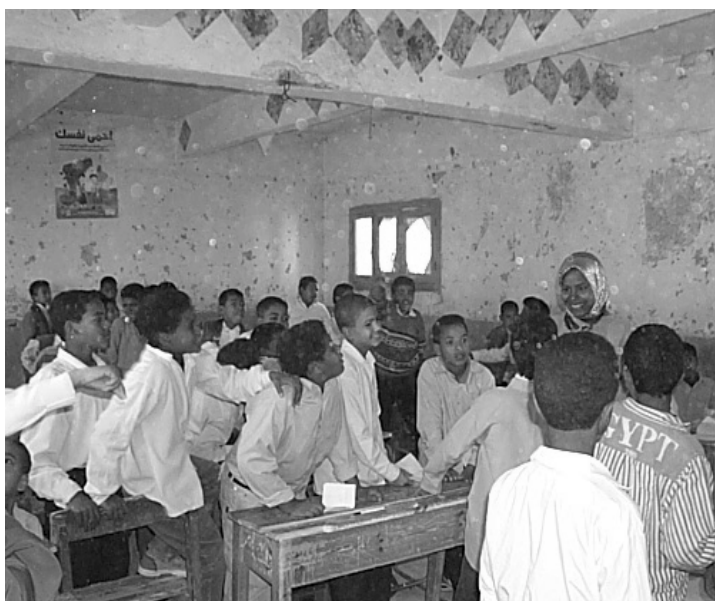
the trial of the new practices by students to understand the relative ease or difficulty in adopting them. Each student selected for TIPs was interviewed three times. The first encounter was an in-depth interview covering nutrition knowledge and dietary practices. This information was analyzed by the research team to identify dietary problem areas.

During the second interview, conducted within three days of the first interview, information was provided to the student on: anemia, food sources rich in iron, enhancers and inhibitors of iron absorption, and a food pyramid for achieving a balanced and healthy diet. Dietary practices that were identified as needing modification in the first interview were discussed, along with recommendations for improved practices, and motivations to implement them. Initial reactions to each recommendation were documented and the student agreed to try to implement two recommendations over the next week.

The third interview was held a week later to discuss the student's experiences when trying the recommended practices. A food frequency sheet and 24-hour recall were completed for the food intake during the trial week.

Specifically, the formative research showed that the general nutrition knowledge of students and mothers was not complete and not precise enough to enable them to make good decisions to protect themselves from anemia. They had limited knowledge of which foods were nutritious and of the functions of different foods in a "healthy diet" (e.g. fruits for vitamin C and enhancing iron absorption)⁷. The formative research suggested that the information and messages about iron would be most convincing if they were phrased in terms of impact on school performance, energy, physical growth, and mental development because of the importance of schooling to Egyptian students and their families.

Four specific dietary practices were identified for modification. In the typical manner of adolescents in many countries, adolescents in Egypt have particular likes and dislikes of certain foods and they tend to skip a meal (mainly breakfast) when they are tired, late for an activity, or have large amounts of school work. Their diets tend to be heavy on snacks instead of complete meals. Lunch is the main meal of the day. Fruits and vegetables are considered complementary, not a necessary part of the main meal and some fruits and vegetables are expensive. Therefore, fruits and vegetables are not eaten on a daily basis. Tea drinking during or immediately after a meal is a habit and cultural tradition.



Nutrition education being conducted in a preparatory classroom.

Precise changes in dietary practices that were considered feasible by the students and their mothers to improve iron intake and absorption were:

- Eat/serve breakfast everyday
- Eat/serve iron rich food at each meal and for snacks
- Eat/serve fruits and vegetables rich in vitamin C with each meal
- Delay tea drinking until at least one hour after a meal

The communications strategy developed to promote these changes in dietary practices had three key components and five major activities:

1. In-school activities
 - in-school campaigns
 - self-instructional student booklets
 - posters and non-formal education activities
 - weekly messages from the tablet distributors
2. At-home reinforcement
 - instructional reminder for mothers
3. Community awareness
 - informative television spot



Game from the preparatory student booklet.
The objective is to achieve iron health.

In-School Campaign

In order to build SHIP's capacity for health and nutrition education in schools, a cadre of health educators was hired and trained to implement the school-based nutrition education program. The selection of these workers was rigorous to ensure dedicated, motivated, and skilled personnel. The hiring process allowed the best candidates to be selected at each step: application screening, two rounds of individual interviews, and group training. Those finally selected were the best from the group of trainees.

The SHIP health educators are very different from medical doctors usually trained to conduct health education. The SHIP health educators are young university graduates, often inexperienced, and with no medical background. Many attended social-work school or had temporary jobs as teachers without formal education or training as such. Twenty health educators and one supervisor were hired by HIO for a governorate. Approximately sixteen schools were assigned to each health educator. These educators were trained to effectively relate to adolescents, conduct interactive sessions, answer questions about anemia from students, and negotiate changes in the students' dietary practices.

For schools with more than four classes per target grade, the nutrition and health educators conduct a campaign in the school for three weeks. Smaller schools have a campaign conducted during a reduced time period of 1 1/2—2 weeks. The campaign progresses through each of the four behaviors as specified in the Nutrition and Health Educator's guide. The educators select activities from forty-five choices. The educators conduct activities in classes of absent teachers,



Crossword puzzle from the booklet for secondary students.
Hints are based on iron and anemia facts.

during class time with an invitation from the class teacher, during supplementary classes such as art and music, and during recess. Posters are hung in each target classroom to correspond to the message that the activity addresses. All students in the target grade receive a self-instruction booklet at the start of the program. Preparatory students also receive a handout to give to their mothers.

Non-formal education activities to be carried out in the schools by nutrition and health educators are specified in *The Nutrition and Health Educator's Guide*. This guide provides complete information for implementing the school-based program, including: coordinating efforts with school administrators and staff, promoting the four behaviors, and how to implement the students' activities. All activities are developed to require no materials or teaching aides, for example, playing games that rely on information about nutrition and anemia to win, and creating a soap opera (about the tragedy of the star having anemia and how it affects his/her life).

Self-instructional booklets for students

Separate booklets were created for the preparatory and secondary students with the information provided at a grade-appropriate level. These colorful booklets contain interactive stories, word games, and puzzles based on information about anemia, and they encourage adopting the key behaviors to prevent it. The booklets stress the benefits of consuming more iron and eating healthier foods, provide examples of iron-rich snacks, contain activities to help students learn about anemia and a healthy diet, and help students determine how well they are doing in changing their dietary behavior. The booklets are distributed to students at the beginning of the in-school campaign.

Posters and non-formal education

Four posters (one set for preparatory and one set for secondary classes) were created to promote the key dietary practices. In addition, one poster promotes the iron supplementation program and pictures the students, teachers, and parents who appear in the television spot. The posters are popular because they are brightly colored and help to decorate the classrooms. Posters placed in the classroom change during the health education campaign to coincide with the message focus of the activities. Tablet distributors convey brief nutrition messages during the weekly distribution of tablets, reinforcing the four behaviors.



Pamphlet for mothers—promoting behaviors that prevent anemia.

Instructional reminder materials for mothers

Mothers need to be included in the educational program on nutrition because they are responsible for food purchasing and preparation in the home and thus the dietary choices of their children. Mothers of preparatory students were targeted because younger students were more willing to take materials home and were more influenced by mothers' attitudes than older adolescents. A pamphlet was created that informs mothers about the general causes of iron deficiency anemia, high iron foods, the importance of consuming these foods at each meal, foods that enhance or inhibit iron absorption, and how they can help their child avoid anemia. A simple checklist is included so the mother can monitor her practice of the recommendations.

Informative media spot for the community

Local government television channels broadcast an informative television spot to advise the community, parents, and students about the program. Airing of the spots starts a month before the program begins in the school and continues during the school year.

Routine Monitoring and Surveillance

A reporting system was developed to monitor tablet distribution and student participation. Tablet distributors record consumption by each student in registers. They are trained by supervisors on the techniques of distribution, logistics, and recording. Statistics on program implementation are collected at all class levels, compiled, and aggregated for the school by the school's tablet distributor. Statistics by school are compiled by district staff to generate district-level statistics. The governorate compiles district statistics using a computerized spreadsheet and reports governorate-level statistics to the central SHIP office on a monthly basis. Urban/rural and school-level descriptors are maintained to maximize the utility of the reports.

A sentinel surveillance system was created to monitor changes in the iron status and target dietary practices of the program students. The system allows for a periodic review of program progress and identification of any difficulties that may require correction. The surveillance system began with a survey before program implementation. This same survey is scheduled to be repeated at the end of each school year. The key measurements in the system's initial design were:

- hemoglobin, using a hemocue
- iron stores using ZPP (zinc proto-porphyrin) instrumentation
- anthropometry – height and weight
- knowledge, attitudes, and practices related to the four key behaviors
- number of tablet consumed



Health educators doing a group activity during training.

The reporting and data handling at the SHIP governorate-level office was enhanced by the purchase of a computer and training of two staff in three major software programs. Additional training in EPI Info data entry and simple analyses is planned.

Aswan Governorate Pilot

The progression from the operations research in Fayoum and the development of the education and monitoring components of the program to a full governorate pilot program began in Aswan governorate in September 1999. Governorate-wide implementation started in February 2000. This pilot program included not only iron supplementation but also nutrition and health education, which began in March 2000, and surveillance and monitoring efforts.

Numerous planning meetings were held with the Aswan SHIP, Ministry of Education (MOE), and MOHP staff at the governorate and district level. Because each district has different staffing patterns and available resources, these meetings ensured that the Anemia Prevention Program was adapted to their situation. The key to effective planning was the development of a database of all targeted schools by district and grade level, including the number of classes and students. This took considerable effort and required the collaboration of the MOE. In addition, a similar database was developed of all the staff available to implement the program by SHIP in urban areas and with the MOHP staff under contract to SHIP in rural areas.

Aswan had 349 schools eligible for this program. Almost 150,000 students in more than 4,000 classes were targeted to receive iron tablets. Tablet distributors were trained, as were the health educators recruited for Aswan. The health educators were given fourteen days of training by a small team of master trainers who had worked with consultants to develop the curriculum based on *The Nutrition and Health Educator's Guide*. A week prior to initiation of the program, the head master of each school announced the activities and their importance to student health, growth, and educational achievement.

During the 1999-2000 school year, iron supplementation was offered in Aswan from February – April with concurrent education during March and April. The baseline survey for the surveillance system was conducted in November, prior to implementation, with a sample of

approximately 700 students from ten schools. The same measurements were taken again in April.

In addition to collecting implementation statistics for each school and carrying out the surveillance plan, a monitoring study was designed for the pilot in fifty-four schools to provide monthly information on procedures, operational constraints, and adjustments needed in program protocols.

According to information from all sources, the Aswan pilot demonstrated that iron supplementation and education could be successfully implemented.

Supplementation

There was high coverage and compliance in the Aswan supplementation program. Almost all preparatory and secondary schools in Aswan (except a few remote rural ones) participated in the iron supplementation program. While most students willingly took the weekly iron tablet, many of the students who initially refused them became regular tablet-takers when they learned more about anemia through the nutrition education activities. By the end, less than one percent of the students refused to participate. The average number of tablets received by each participating student during February was 2.79 (some schools started late in the month) and increased to 3.8 per student by April.

Iron supplementation in the schools was well received by the community. The few concerns expressed were about tablets being taken without diagnosis of anemia by a doctor, and that tablets should not be the only means of prevention, rather the students should be provided with a proper diet as well.

In terms of logistics and distribution in Aswan, 55% of the supervisors and tablet distributors felt carrying out the iron tablet distribution was fairly easy, although they all agreed it could be improved with more staff. Forty percent felt distribution was difficult, mostly due to large school size, lack of an adequate number of staff for distribution, and difficulty in transporting water to the classes (distance to water source and lack of bottles for transport). A typical class size in Egypt is forty-five students with numbers of classes per school ranging from three to one hundred (the average being fifteen). Tablet distribution took between ten and fifteen minutes per class. Everyone felt tablet distribution could work smoothly if adequate staff were available. In cases where social workers, teachers, or other school staff assisted with

tablet distribution, the process went more smoothly.

Based on these findings, and information from other governorates that HIO staff numbers would be a constraint, project staff were concerned about the ability to adequately sustain the iron supplement distribution. This led to development of a trial in Beni Suef governorate in 2001 with teachers distributing iron tablets to students. Over 5,300 teachers in 322 schools have been trained to distribute tablets and keep records. The MOE has agreed to implement tablet distribution under the supervision of SHIP.



Training session for nutrition educators.

Nutrition Communications

During the two months of health education in the Aswan pilot, all target students (approximately 50,000) received booklets, 30,000 mothers received a reminder pamphlet, and 349 schools hung sets of five posters in each target classroom. Sixty schools also received a three-week in-depth campaign (in two periods), and over those six weeks more than 17,400 students participated in 1,325 sessions of health and nutrition education.

The activities have been well received by students and faculty. Using interactive methods of teaching nutrition information and relating nutrition to students' daily life and school skills has proven effective. The initial restriction on classroom access for these educational activities has changed. Health educators are now being requested to conduct activities in the classroom during class time and on occasions when a subject teacher is absent. Interest is high, with large numbers of students attending sessions, and teachers, administrators, and support staff attending the classes to watch the participatory techniques.

After the Aswan pilot, the Health Educator's Guide was revised to give educators strategies on how to deal with large groups. Sections on how to convince students to attend sessions were de-emphasized. More physical activities were added since students enjoyed them the most.

The educator training appears to have been effective. However, further adjustments to the curriculum were made. Scientific aspects were de-emphasized and more focus was placed on how to achieve behavioral change. More priority was placed on how to be an effective trainer of adolescents, the logistics of conducting the program, and the reporting requirements.

Program Impact

Due to the short duration of the supplementation period, the pilot surveillance program was designed to test methods rather than demonstrate project effectiveness. Surveillance analysis was based on data collected in ten sentinel schools. Two classes of students from each school were randomly selected. Data were collected pre-implementation and post-implementation. The total matched sample was 608 students. The preliminary results

show that weekly iron supplementation is an effective mechanism to reduce anemia among adolescents and that the data collection protocol is easy to implement by properly trained SHIP staff.

- **Anemia rates overall were reduced 20%, from 30% to 24%.** In boys, anemia was reduced from 36% to 32% and in girls from 24% to 17.5%. The overall reduction in anemia and the decrease in girls' rates were statistically significant.
- Most anemia was mild; however, girls had a higher rate of moderate anemia than boys. Moderate anemia was reduced more than 44% (2.5 % to 1.4%).
- There was a significant increase in positive attitudes towards behaviors that can improve iron levels.
- The percentage of students answering all five knowledge questions about iron correctly increased significantly from 23% to 41%.
- No significant overall changes were noted based on the practices questions asked. However, two practices among the group significantly improved. Practices that did not improve may have been difficult for the students to engage in due to uncontrollable influences, such as seasonal food availability.

Table 1. Definition of anemia and severity of anemia based on hemoglobin levels in adolescents

			Severity of anemia (hemoglobin g/dL)		
Sex	Age (in years)	Anemia	Mild	Moderate	Severe
Definition of severity					
Female*	≥ 12 years	<12 g/dL	10.0-11.99	7.0-9.99	<7.0
Male	12.0-13.99 years	<12 g/dL	10.0-11.99	7.0-9.99	<7.0
Male	≥ 14.0 years	<13 g/dL	10.0-12.99	7.0-9.99	<7.0

*For non-pregnant females

WHO Technical Report Series No. 405, 1968 (Nutritional Anemias: Report of a WHO Scientific Group); DeMaeyer et al. (1989) Preventing and Controlling Iron Deficiency Anaemia through Primary Health Care: A Guide for Health Administrators and Programme Managers, WHO, Geneva.

Table 2. Prevalence of anemia among 1st level, secondary students by sex and age; pre-supplementation and 3 month post-supplementation assessments; Aswan Governorate school-based iron supplementation program, Egypt, 1999-2000.

	Pre-Supplement	Post-Supplement	Percent Reduction
Overall %	29.8%	24.0%	20%**
# anemic/n	215/722	155/646	
Sex			
Male %	36.4%	31.6%	13%
# anemic/n	122/335	95/297	
Female %	24.0%	17.5%	27%**
# anemic/n	93/387	61/349	
Severity of Anemia			
Mild %	27.3%	22.6%	17%**
# anemic/n	197/722	146/646	
Moderate %	2.5%	1.4%	44%
# anemic/n	18/722	9/646	
Severe % (95% CI)	0.0%	0.0%	-
# anemic/n	0/722	0/646	

¹ Chi-square p-value comparing the prevalence of anemia in pre-supplementation survey with prevalence in post-supplementation survey; ² Chi-square p-value comparing prevalence within a survey (pre- or post-supplementation) between sex, age, or urban/rural status. See Table 1 for the definitions of severity of anemia.

**** Significant findings at least at the 0.05 level.**

Conclusions

Iron supplementation and health education focusing on anemia prevention in the schools can be effective in reducing the rates of anemia in adolescents who attend school. The logistics of a school-based program are feasible. One of the keys to success of the Anemia Prevention Program in Egypt has been the continual monitoring of the program's progress and adjustment when changes were needed. Also, without this ability to demonstrate implementation success, it would have been impossible to sustain political support and the motivation of program personnel.

The following elements were found to be important for successful implementation of the Egypt Adolescent Anemia Prevention Program:

1. Demonstrating program efficiency and effectiveness proved more important to obtaining political support than outcomes of stakeholder consensus meetings. The pilot effort was carried out in close collaboration with the local government agency, allowing them to become avid program advocates.
2. Involving governorate and district level staff in the initial stages of planning ensured the necessary buy-in and that implementation was adapted to local situations.
3. Developing a database of schools and staff was an essential planning and implementation tool and helped the governorate learn how to use data and solve problems more logically. Since accurate data were not easy to obtain, this became a larger effort than anticipated.
4. Building sustainability from the onset was accomplished by setting the expectation that SHIP would pay all reoccurring program costs based on available resources.
5. Identifying implementation constraints required large-scale operations research studies. Many of the problems were associated with the magnitude of implementation, not the methods proposed.
6. Instituting a training-of-trainers model was effective to teach tablet distributors the iron supplementation protocol and reporting requirements when these trainers were recruited based on the requirements of the job rather than on equity or seniority. The search for qualified trainers meant more inter-institutional collaboration with MOHP staff training SHIP personnel.
7. Establishing monthly meetings for problem solving about implementation constraints that involved several governorate agencies facilitated cooperation and strengthened supervision within the governorate SHIP organization. Using neutral contractor field staff (outside of government) to complement implementation supervision and provide timely reporting allowed the governorate-level SHIP to identify and address problems quickly.
8. Providing nutrition and health education improved acceptance of iron supplementation. In areas where resistance to supplementation might be high, education activities should precede supplementation.
9. Implementing non-formal education modules can work even in the formal school setting. The non-formal sessions provide contact with a large number of students and proved to also be a means to get information on dietary practices to parents.
10. Applying a consistent, standardized, and well documented hiring process for the selection of Nutrition and Health Educators avoided the pressure of requests in the selection of this cadre of worker for whom it is often assumed that no professional training is required.
11. Hiring Nutrition and Health Educators to work in their home districts eliminated transportation issues, additional cost to the government, and the potential limitations placed on the travel of female educators.

Endnotes:

- 1 Dreyfus, Michelle, Stoltzfus, Rebecca (1998) Guidelines for the Use of Iron Supplements to Prevent and Treat Iron Deficiency. ILSI/INACG, WHO, UNICEF, Washington D.C.
- 2 Ibrahim, Barbara et al (1999) Transitions to Adulthood: A National Survey of Egyptian Adolescents. The Population Council, Cairo.
- 3 Ibid.
- 4 Ibid.
- 5 Dreyfus, Michelle, Stoltzfus, Rebecca (1998) Guidelines for the Use of Iron Supplements to Prevent and Treat Iron Deficiency. ILSI/INACG, WHO, UNICEF, Washington D.C.
- 6 Dickin, Kate, Griffiths, Marcia, Piwoz, Ellen (1997) Designing by Dialogue: A Program Planners' Guide to Consultative Research for Improving Young Child Feeding, Manoff Group, SARA, USAID, HHRAA, Washington D.C.
- 7 Understanding Anemia and Eating Behaviors Among Youth in Egypt, (2000) Healthy Mother/Healthy Child, John Snow, Inc., Cairo, Egypt.

This document has been developed by the Student Health Insurance Program, Health Insurance Organizations, under the Healthy Mother/Healthy Child Project, in collaboration with the United States Agency for International Development and its technical assistance contractor, John Snow, Inc. This publication was made possible through support provided by the Office of Health and Population, United States Agency for International Development/Egypt, under the terms of Contract No. 263-C-00-98-00041-00 with John Snow, Inc. (JSI). The opinions expressed herein are those of the authors and do not necessarily reflect the views of the United States Agency for International Development or John Snow, Inc.



THE MANOFF GROUP