

Weekly Iron-Folic Acid Supplements to Prevent Anemia among Cambodian Women in Three Settings: Process and Outcomes of Social Marketing and Community Mobilization

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Social marketing and community mobilization approaches were applied in a pilot program to introduce weekly iron-folic acid supplementation to prevent anemia in Cambodian women of reproductive age. The program was implemented in three very different environments: secondary school girls, women working in garment factories in the vicinity of Phnom Penh, and women in rural villages. Each population provided its own challenges and obstacles. However, all three groups of women showed substantial improvements in knowledge about the causes, consequences, and prevention of anemia, and the large majority reported interest in continuing to take the supplements.

Key words: anemia, weekly iron-folic acid supplementation, multisectoral collaboration, social marketing, community mobilization, Cambodia

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doi: 10.1301/nr.2005.dec.S126-S133

INTRODUCTION

Anemia is a widespread public health problem in Cambodia. The Cambodian Demographic and Health Sur-

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vey of 2000 estimated that 58% percent of Cambodian women of reproductive age (WRA) were anemic. The Cambodian Ministry of Health provides daily iron-folic acid supplements for pregnant women to prevent low birth weight and reduce maternal mortality. However, only 38% of the women in Cambodia receive antenatal care, and compliance in taking iron-folic acid supplements is poor.¹

Anemia is now recognized as a serious and preventable public health problem worldwide, with consequences for the health and well-being of a community and its development, especially affecting women and children.²⁻⁴ Anemia may have multiple causes, some of which may occur concurrently. In addition to iron deficiency, other nutrients associated with anemia include deficiencies in vitamins A, C, B₁₂, folate, and zinc. However, the leading cause of anemia worldwide is iron deficiency.⁵ One approach to the prevention of nutritional anemia is weekly iron-folic acid supplementation.⁵⁻⁹

The rationale for using weekly iron doses is presented by Viteri and Berger elsewhere in this issue.¹⁰ Several studies support the underlying assumptions upon which the weekly approach is based, and have demonstrated efficacy under supervised conditions.¹¹⁻²¹ Effectiveness under unsupervised community conditions, however, needs to be validated.

In 2001–2002, with the financial and technical support of the World Health Organization (WHO) Western Pacific Regional Office (WPRO) and the Japanese government, the Cambodian Ministry of Health, in collaboration with other ministries and agencies, undertook a pilot weekly iron-folic acid supplementation program for WRA. This program was implemented without supervised control among women in selected secondary schools, garment factories, and rural villages.

The weekly iron-folic acid supplementation program utilized social marketing and community mobilization approaches to: 1) reach non-pregnant WRA who are not easily accessible through existing health system delivery channels; 2) educate women about the benefits of iron and folic acid, emphasizing the positive effects on health and beauty; 3) achieve a high coverage and compliance

to supplementation over a long time frame; and 4) enhance sustainability of ongoing supplementation.

This paper reports the effectiveness of the social marketing and participatory communications methodologies applied in the Cambodian weekly iron-folic acid supplementation project and their impact on knowledge, attitudes, and practices (KAP) that may prevent the development of anemia. The paper also examines differences and similarities between participating schools, factories, and communities in order to provide direction for long-term program implementation.

PROGRAM DESIGN, IMPLEMENTATION, MONITORING, AND EVALUATION

The National Nutrition Program of the Ministry of Health (the program team), with support of a WHO advisor, the Occupational Health Department (Ministry of Social Affairs), and staff of the inter-ministerial Seth Kuma program in Kompong Speu Province (supported by UNICEF), worked in close collaboration to implement the weekly iron-folic acid supplementation program and to conduct ongoing monitoring and informal evaluation. Two independent external consultants were contracted for the duration of the pilot program. One consultant designed and coordinated the collection of the baseline, midterm, and final evaluation surveys, analyzed the data, and reported on hemoglobin (Hb) levels and changes in KAP of women participating in the pilot program. The second consultant, an expert in social marketing strategies, served as the program's social marketing advisor.

Social Marketing Strategies to Promote Weekly Iron-Folic Acid Supplementation

Developing an attractive name and image for the supplement was an important first step to its promotion. During initial formative field research in the three target areas at schools, factories, and rural villages, WRA complained of fatigue and tiredness during their monthly menstrual period, which caused some to reduce activities; for example, schoolgirls were often absent from school. The observation was also made that Cambodian WRA relate beauty with good health and a positive self-image, and they also associated a good complexion with good health.

During the pre-testing exercises to identify a suitable name for the product, the Cambodian women surveyed selected "Kolap Krahorm" ("red rose") as the most attractive name because it portrayed a product that would enhance women's health and beauty. The program team, with technical help from the National Centre for Health Promotion, Ministry of Health, worked collaboratively to design an attractive tertiary package for the supplement and a program poster, sticker, and logo. A photogenic factory worker "glowing with good health" was selected to be the

model for the supplement package, posters, and stickers. This young woman was photographed with an attractive and popular female Cambodian singer, who held a pack of the supplement. A program logo was designed that showed a beautiful hand holding a red rose. This logo was displayed on all information, education, and communication (IEC) materials, including the supplement package. The picture of the two selected young women and the program logo was also used to produce large factory billboards, which were erected in prominent locations at each factory and unveiled during the factory program launches.

The program team composed three program songs and key messages, which were recorded on a cassette tape. This tape was played over the public broadcast system at regular intervals throughout the week in each factory and on players in the schools. A program T-shirt and bags containing the program logo and a key message were also printed and distributed to many of the women participating in the program.

Choice of Supplement and Packaging

The weekly iron-folic acid supplementation supplement came from United Laboratories (UNILAB) in Manila, Philippines. It contained 60 mg of elemental iron and 3.5 mg folic acid encapsulated in a small elliptical, film-coated pink tablet, which was easy to swallow. Cambodian women surveyed during the field research chose pink as the most attractive color for the supplement. The film coating masked the taste and reduced side effects. The supplement was packed in blisters of four tablets (a 1-month supply) to ensure stability and protection. Although blister packaging is more expensive than flexible foil packaging, it was preferred by WRA in Cambodia. The Ministry of Health packing station in Phnom Penh prepared the tertiary packages, both small (containing one blister pack of four tablets) and large (containing 50 small packs), which were produced by a private company in Phnom Penh.

SUBJECTS

Secondary Schoolgirls

The weekly iron-folic acid supplementation program specifically designed for schoolgirls of reproductive age was launched in five secondary schools in January 2002. Schools were decorated with banners carrying messages about the weekly iron-folic acid supplementation. Dignitaries gave supportive speeches, which were followed by games and the presentation of gifts and recognitions. As a result of local consultations, a decision was made to charge a nominal fee of 10 cents US for one package of supplements (four iron-folic acid tablets providing 1 month's supply).

Schoolgirls who showed leadership were selected to be peer educators in the weekly iron-folic acid supplementation program for the schools. Schoolteachers were

also selected to attend peer educator training in order to provide support for the student leaders. A weekly iron-folic acid supplementation committee consisting of teachers and students managed the funds raised from the sale of the iron-folic acid supplements.

Questionnaires were administered and Hb was measured at baseline and at a follow-up visit approximately 6 months later. Of the 423 schoolgirls participating in both baseline and follow-up evaluation visits, 232 (55%) provided stool samples at baseline and were given 500 mg mebendazole for deworming if they tested positive for worms.

Initially, 581 schoolgirls from five schools were recruited to participate in the program evaluation. Six of these students did not complete the baseline questionnaire. Out of the remaining 575, 152 did not complete the follow-up questionnaire 6 months later. Data from the remaining 423 students were included in the analysis.

Garment Factory Workers

There are 130 garment factories in the vicinity of Phnom Penh. Because of few employment opportunities for young women in the rural areas of Cambodia, thousands of women migrate to Phnom Penh to find work in these factories. Most women earn around \$50 to \$60 US a month, and approximately half of their wages are sent back to their families in the countryside.

The social marketing strategy for the garment factories included peer education training for 50 peer team leaders. Factory workers were divided into teams, each led by one of the trained team leaders. The team leaders were selected based on the respect held by their peers. Team leader training included peer counseling and organizing educational activities to promote the iron-folic

acid supplements and improved nutrition. Every month, the team leaders distributed to their teams packets of four tablets for 1 month's supply of iron-folic acid supplements. The team leaders provided the supplements to the garment factory workers without cost, because local regulations require factory owners to care for the health of their staff, and it is not permissible to sell drugs and supplements to WRA inside a factory.

To generate excitement for the weekly iron-folic acid supplementation, news releases were prepared and a heavily publicized opening celebration was held at one of the participating factories. Special lotteries were held for factory workers who successfully took the supplement for 3 consecutive months.

To evaluate the weekly iron-folic acid supplementation in the garment factories, 1181 of the workers completed a baseline questionnaire. Because of garment factory closures, conflicts with working schedules or lack of participation in the weekly iron-folic acid supplementation, 703 of these women did not complete the follow-up evaluation questionnaires 6 months and 1 year after the start of the weekly iron-folic acid supplementation program. The final data analysis included 478 garment factory workers.

Rural Village Women

Respected rural villagers were selected for the weekly iron-folic acid supplementation peer educator training. Two peer educators were chosen to be responsible for village development committee health activities, and in this capacity their weekly iron-folic acid supplementation work was combined with other health activities. The supplements were sold to rural village women at the nominal cost of 10

Table 1. Baseline Characteristics of the Secondary School Students, Garment Factory Workers, and Rural Village Women Given Weekly Iron-Folic Acid Supplements in a Study in Cambodia

Baseline Characteristic*	Secondary School Students (N = 423)	Garment Factory Workers (N = 478)	Rural Village Women (N = 639)
Median age (yrs)	16	21	32
Median height (cm)	149	153	150
Median body mass (kg)	40.2	48.3	44.2
Median body mass index (kg/m ²)	18.1	20.7	19.4
Median earnings (US \$ per month)	not applicable	60	not available
Attending school	100%	96.2%	73.4%
Median highest grade attained among school attendees	not applicable	6th	4th
Median initial hemoglobin level (g/L)	120	127	116
Married	0%	17.4%	not available
Diarrhea during past 2 weeks unless otherwise stated	19.1%	14.9% (last 24 h)	32.9%
Fever during past 2 weeks	36.4%	46.7%	59.5%

*Weights, heights, and hemoglobin concentrations were measured. The participants reported all other characteristics.

Table 2. Questions Related to Behavior Change in the Use of Iron-Folic Acid Supplements in Secondary School Students in Cambodia

Question*	Baseline	Follow-up
Do you need to take iron tablets?	66.7% (282/423) answered yes	95.3% (402/422) answered yes
Will you continue to take iron tablets?	not applicable	96.3% (222/228) answered yes
How many times did you take the tablets?	not applicable	100.0% (232/232) answered once a week

*The first question was addressed to all participants, including those taking iron-folic acid supplements and those not taking supplements. The next two questions were only addressed to those persons who reported taking the supplements at the time of follow-up. Other differences between denominators are due to missing data.

N/A = Not applicable.

cents US for 1 month's supply (four tablets). In some villages, these supplements were sold at regular monthly village meetings. In other villages, peer educators went door to door to educate and promote the supplement. The most impoverished families received the supplements without cost. Funds received from the sales of the supplements went to a village revolving fund.

WRA living in 13 randomly selected villages (all located in Kong Pisei and Samraong Tong districts, Kampong Spue Province) participated in the weekly iron-folic acid supplementation program. From the 1021 rural village women recruited for evaluation, 383 were not available to participate in the follow-up visit 6 months later or were removed from analyses because they were pregnant. Data from the remaining 638 rural village women were available for program evaluation.

RESULTS

Table 1 shows the baseline characteristics of the three study groups. Secondary school students, as expected, were youngest and had the lowest body mass index

(BMI). Only 75% of rural women attended school, in contrast to 96% and 100% of factory workers and schoolgirls, respectively. Rural women had the highest incidence of diarrhea and fever in the 2 weeks prior to the survey.

Tables 2 to 4 show the questions on behaviors related to reported use of weekly iron-folic acid supplements. In all three groups, the majority of women reported that they felt the need for iron supplementation and that they intended to continue purchasing and taking supplements. Almost all of the women who were taking the supplements were taking them on a weekly basis at the time of the 6-month follow-up. An estimate of compliance in taking the supplements for the three groups of women can be obtained by dividing the number of women who said they took tablets (the denominator for question 3 in Tables 2–4) by the number of women who took part in the follow-up survey (the denominator for question 1 in Tables 2–4). This calculation shows that compliance in taking the supplements, as stated by the women in the three settings, was about 55% for the schoolgirls, 57% for the factory workers, and 71% for the rural women.

Table 3. Questions Related to Behavior Change in the Use of Iron-Folic Acid Supplements in Rural Village Women in Cambodia

Question*	Baseline	Follow-up
Do you need to take iron tablets?	63.1% (403/639) answered yes	92.3% (589/638) answered yes
Will you continue to take iron tablets?	not applicable	98.7% (312/316) answered yes
How many times did you take the tablets?	not applicable	97.8% (445/455) answered once a week; 1.8% (8/455) answered less than once a week; 0.4% (2/455) answered twice a week

*The first question was addressed to all participants, including those taking iron-folic acid supplements and those not taking supplements. The next two questions were only addressed to those persons who reported taking the supplements at the time of follow-up. Other differences between denominators are due to missing data.

Table 4. Questions Related to Behavior Change in the Use of Iron-Folic Acid Supplements in Garment Factory Workers in Cambodia

Question*	Baseline	Follow-up
Do you need to take iron tablets?	57.2% (318/556) answered yes	96.8% (539/557) answered yes
Will you continue to take iron tablets?	not applicable	96.3% (441/458) answered yes
How many times did you take the tablets?	not applicable	100.0% (316/316) answered once a week

*The first question was addressed to all participants, including those taking iron-folic acid supplements and those not taking supplements. The next two questions were only addressed to those persons who reported taking the supplements at the time of follow-up. Other differences between denominators are due to missing data.

Figures 1 to 3 show the number of subjects in each of the three populations who correctly answered questions related to anemia. Of the 11 questions, few correct answers were given at baseline, but the number of questions correctly answered markedly increased at follow-up 6 months after initiation of the social marketing intervention.

Figure 4 shows the replies to a question requiring participants to identify iron-rich foods at baseline and at the 6-month follow-up. Knowledge in all three groups improved substantially after the educational campaign. Women from the rural communities, however, had the least knowledge of iron-rich foods. Figures 5 and 6 show the increased knowledge of consequences of anemia and its prevention among all three populations.

DISCUSSION

The weekly iron-folic acid supplementation pilot program increased awareness and support about anemia and the benefits of preventative iron-folic acid supplementation among policy makers, government, non-government organizations (NGOs), and WRA in urban and rural settings in Cambodia. The majority of Cambodian women in the program areas enthusiastically adopted the practice of taking preventive weekly iron-folic acid supplements. Through the use of social marketing strategies, an attractive image was created for the supplements and was widely recognized in the program areas. Women and adolescent schoolgirls in rural areas who participated in the program demonstrated that they were willing and able to purchase the supplement.

Mobilizing women in all program settings through existing community and workplace structures increased knowledge of the causes and consequences of anemia, as well as ways to prevent it. Multiple collaborating partners from the national level down to the community level demonstrated that they could successfully work together to develop and implement strategies to prevent and control anemia.

The factory setting proved a challenging environ-

ment for introducing weekly iron-folic acid supplementation. Large numbers of young WRA in each factory were either highly mobile or inaccessible during working hours. Nearly 60% of the original survey group was lost to follow-up. Access to factories was also a limitation for follow-up, monitoring, and evaluation. Despite these constraints, women working in factories enthusiastically adopted the use of weekly iron-folic acid supplementation. Even though the supplement was provided free in the factory setting, a large percentage of women interviewed during the follow-up expressed interest in purchasing the supplement in the future.

The weekly iron-folic acid supplementation program's success in schools showed that this is a highly supportive environment in which to improve knowledge and behavior practices to control and prevent anemia. The educational training and social marketing strategies implemented were effective in increasing knowledge, awareness, and practices to prevent anemia.

However, unlike other weekly iron-folic acid supplementation interventions in schools in which supplements were provided free and under supervised conditions, the

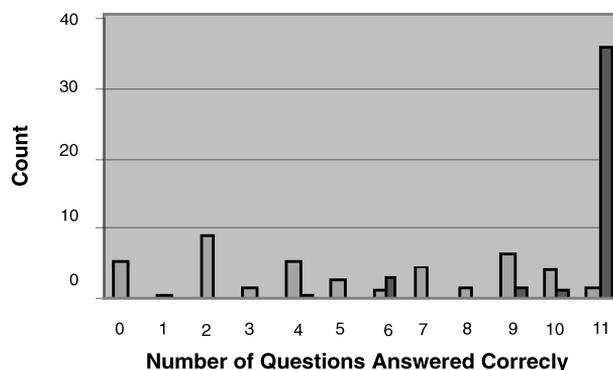


Figure 1. Schoolgirls (N = 423) in Cambodia who correctly answered a number of questions related to anemia. $P < 0.0001$ based on a *t*-test for the difference in counts of correct answers between baseline (□) and follow-up 6 months later (■).

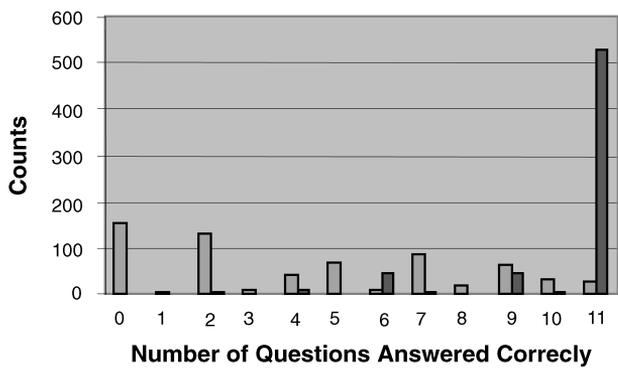


Figure 2. Community women (N = 638) in Cambodia who correctly answered a number of questions related to anemia. $P < 0.0001$ based on a *t*-test for the difference in counts of correct answers between baseline (□) and follow-up 6 months later (■).

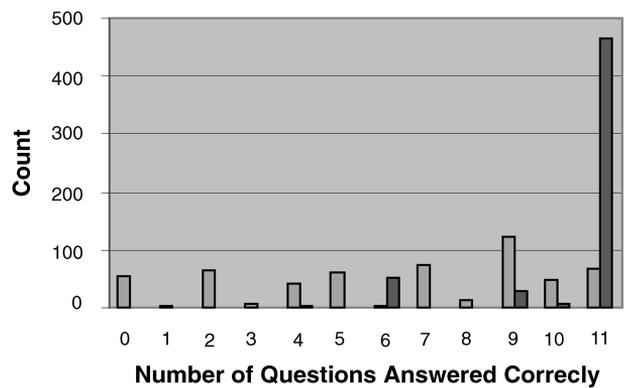


Figure 3. Garment factory workers (N = 592) in Cambodia who correctly answered a number of questions related to anemia. $P < 0.0001$ based on a *t*-test for the difference in counts of correct answers between baseline (□) and follow-up 6 months later (■).

supplements were sold to Cambodian female students. These schoolgirls, therefore, voluntarily chose to purchase and take the supplement since they had to pay for it.

The three populations of women, secondary schoolgirls, factory workers, and rural villagers, were very different. The secondary students were much younger and the women in the villages much older. The women in the garment factories were less educated than the schoolgirls. Rural village women suffered more health problems, at least from infectious agents that caused fevers and diarrhea. Rural village women also had the highest proportion with low baseline Hb. Villages and factories posed special logistical problems compared with the schools, with the villages having the least formal structure. The garment factories' priorities were primarily economic. Regardless, all three populations were very responsive to learning and understanding about anemia. Eleven questions testing knowledge related to anemia demonstrated substantial improvement at follow-up after

6 months of the weekly iron-folic acid supplementation. All three groups showed improvement in the identification of iron-rich foods and in their knowledge of the consequences and prevention of anemia.

Loss to follow-up was high for several reasons, such as factory closures and working schedules. Those lost may have been different from those remaining in the program.

The large majority of women who reported taking weekly iron-folic acid supplements at the 6-month follow-up indicated that they would continue to take the supplement. Though compliance to weekly supplementation over the entire program period is unknown, the women's interest in continuing supplementation and their feeling that they needed iron was a positive result.

CONCLUSIONS

The weekly iron-folic acid supplementation pilot program, utilizing social marketing strategies in the context

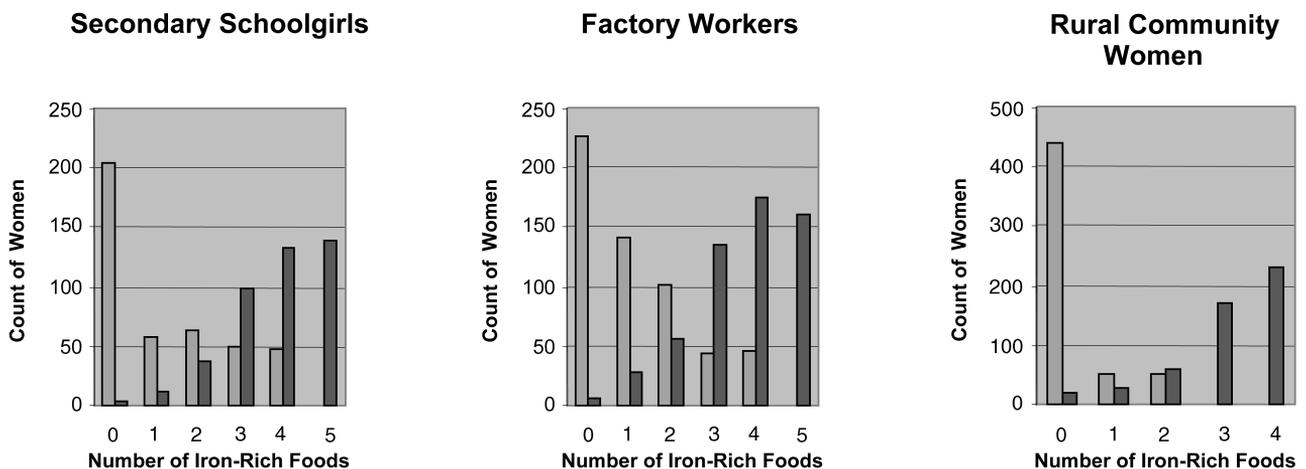
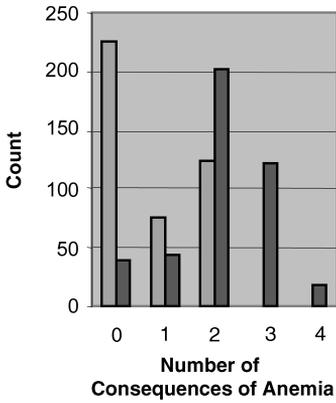
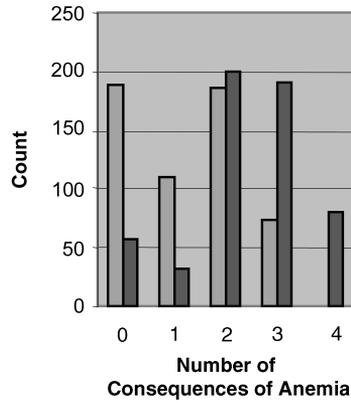


Figure 4. Cambodian women who correctly identified iron-rich foods. $P < 0.0001$ for all three populations based on a *t*-test for the differences in numbers of iron-rich foods correctly identified between baseline (□) and follow-up 6 months later (■).

Secondary Schoolgirls



Factory Workers



Rural Community Women

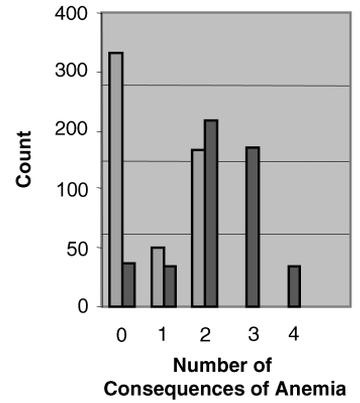


Figure 5. Women who listed correctly a number of consequences of anemia. $P < 0.0001$ for all three populations based on a *t*-test for the differences in numbers of consequences of anemia correctly identified between baseline (□) and follow-up 6 months later (■).

of a complex of multisector collaborators, demonstrated effectiveness in the dissemination of knowledge about anemia and nutrition. Although the three environments were very different and posed different challenges to success, the indicators for increased knowledge and behavior changes as a result of weekly iron-folic acid supplementation were positive. The program also inspired a reported interest in continuing supplementation in all three populations of women.

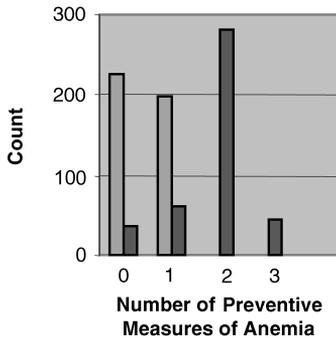
The weekly iron-folic acid supplementation pilot program, utilizing social marketing strategies, proved extremely worthwhile in providing future direction and generating further support relating to issues that impact on prevention and control of anemia. The weekly iron-folic acid supplementation program showed that a multisectoral collaborative approach to preventing iron-deficiency anemia in WRA in Cambodia is feasible and should be expanded through channels and partnerships that are more likely to succeed, such as schools. How-

ever, there were some constraints that need to be considered for future programming. One constraint was the difficulty in getting access to factories due to busy work schedules, which suggests that future support to factories might need to be provided outside the factory environment. Another constraint was that it took longer to implement the project at the rural community level. These women needed more time to absorb information and new knowledge, and village committees needed more support to provide health education and to conduct follow-up activities with women enrolled in the project.

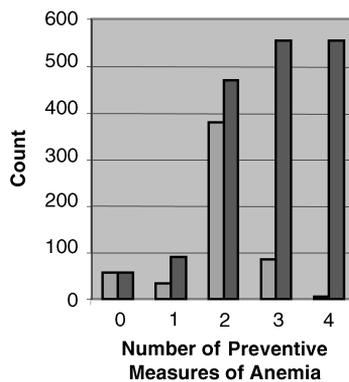
FUTURE PLANS

With positive results from the pilot program, the Cambodian Ministry of Health agreed in principle with the need to provide weekly iron-folic acid supplementation to WRA, and is developing the means to introduce the program on a larger scale. The National Nutrition

Secondary Schoolgirls



Factory Workers



Rural Community Women

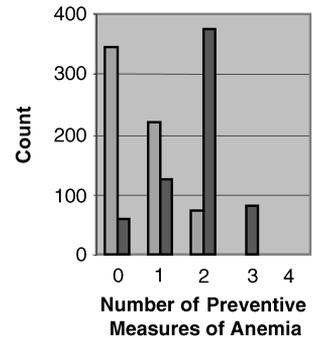


Figure 6. Women who listed correctly a number of preventive measures for anemia. $P < 0.0001$ for all three populations based on a *t*-test for the differences in numbers of preventive measures for anemia correctly identified between baseline (□) and follow-up 6 months later (■).

Program of the Ministry of Health has received some funding from UNICEF and WHO to further examine the delivery mechanism through the school system. In 2003–2004, the National Nutrition Program implemented the weekly iron-folic acid supplementation program in eight secondary schools in one operational district, with 1500 schoolgirls enrolled in the program. So far, the program has shown very encouraging results, including high coverage and compliance and improved knowledge about the causes, effects, and prevention of anemia. The program has excellent coordination among all partners involved in the program.

Even though only 30% of WRA attend secondary schools, the National Nutrition Program, with its limited human and financial resources, plans to first expand the weekly iron-folic acid supplementation program through the school system before further expansion to other settings, such as rural villages and factories. In 2005, with support from the Health Sector Support Project, the National Nutrition Program will expand the weekly iron-folic acid supplementation program in three provinces where other nutrition interventions are also implemented. The program will cover approximately 35,000 schoolgirls.

ACKNOWLEDGMENTS

We thank Mr. Eric Kenefick, who designed and conducted the original analyses of the data.

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