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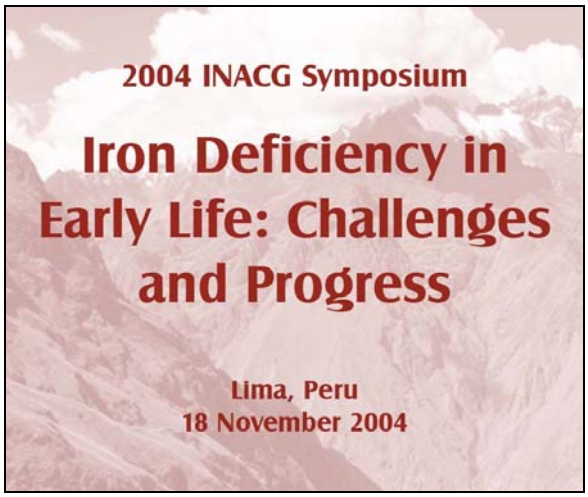

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Perception of availability of vitamin A-rich foods by mothers: an indirect indicator for evaluating food diversification programs

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Vitamin A deficiency is a public health problem in Burkina Faso. Food diversification programs represent one of the possible strategies to control vitamin A deficiency. It is often difficult to evaluate these types of programs in the field. UNICEF and HKI conducted and evaluated a School and Community Gardening Program where perception of the availability of the gardening products by mothers was used as one of the indicators of success.

We have here his reliability referring to the practice of the gardening by the households and to the prevalence of night blindness in the mothers during their last pregnancy.

During the survey, 810 mothers of children under five years of age were interviewed. The proportion of mothers who judge the availability of vitamin A rich food favorably is significantly higher in the villages where more than 30% of the households practice gardening (61.8%) than in the villages where less than 30% of households have a garden (49.7%, $P< 0.01$). In the same way, night blindness prevalence during the last pregnancy is less important for mothers who say that the availability of vitamin A rich food is good or very good (14%) compared to those who estimate availability as poor or nonexistent (21%, $P < 0.01$).

These results seem to indicate that the perception of the availability of vitamin A-rich foods by mothers is a simple indicator that is complementary to the prevalence of night blindness in pregnant women to evaluate programs promoting the production and consumption of vitamin A rich foods in the Sahel.

Dietary vitamin a intake and factors influencing it among Micronesian children and caretakers

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Background: Understanding dietary vitamin A (VA) intake and factors influencing it is critical for dietary improvement programs to alleviate vitamin A deficiency (VAD). The 7-day Helen Keller International (HKI) food frequency questionnaire (FFQ) is widely used but assesses only child intake.

Aims: To develop a tool to measure dietary intake in Kosrae, Micronesia; assess intake of dietary VA/related nutrients among children and caretakers; and investigate relationships between dietary intake and influencing factors.

Methods: A study using two dietary assessment methods was carried out by trained interviewers among a random sample of Kosrae children/caretakers where a VAD problem had been identified. Ethnography was used to develop a modified FFQ tool; this was used to collect data on 267 children/267 caretakers. Selected foods were analyzed for VA/carotenoid content. A quantitative 24-hour recall for three non-consecutive days was administered among a sub-sample (65 children, 65 female caretakers). Banana/pandanus cultivars (yellow- versus white-fleshed) and maturity were specified. Data were analyzed using the Pacific database (adding foods and recipes) and SPSS.

Results: Yellow-fleshed banana, taro, and pandanus cultivars were carotenoid-rich. Total VA intake was low. Protein intake was high. Fish liver was eaten more frequently among caretakers; Taiwang was the most commonly consumed carotenoid-rich banana, but caretakers revealed a belief that it causes worms. There were no statistically significant associations between VA intakes and gender, caretaker education, or socioeconomic status.

Conclusions: A broad-based intervention is needed to improve VA intake. Ethnography was critical for survey tool development, detecting caretaker-child differences, and perceptions on Taiwang. Specifying cultivars and maturity improved assessment. Aspects of this methodology may be relevant where similar foods, as yellow-fleshed banana, are eaten.

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Moving with red palm oil towards dietary diversification strategy for controlling vitamin A deficiency in Burkina Faso

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Background: Controlled trials have demonstrated RPO efficacy, and dietary diversification projects were effective in different settings. In Burkina, a 2 year pilot project was effective to introduce RPO in villages, increase children VA intake from 164± 30 to 514± 144 µg RAE/d and reduce low serum retinol from 84.5 to 66.9%. Thus, we are suggesting a plan for a progressive move towards a dietary diversification strategy.

Objective: To select the best sources of VA for children and on that basis develop a combined strategy including RPO and others foods, supplementation and food fortification.

Methods: We carried out focus groups, market surveys, garden and agricultural surveys, to establish a list and a calendar of VA food sources available in the area. Usual portion size, VA content and carotene bio-efficacy of these foods were used to define a VA score, and then to select the best VA food sources for inclusion in a yearly schedule for VAD control. The national action plan for nutrition was taken into account.

Results: Out of 26 food sources of VA, the top 8 with respect to their A score were: liver, RPO, whole milk, eggs, mango fruit, néré fruit (Parkia biglobosa), orange sweet potatoes and green-leaf sauces. Then, a progressive 3-step strategy was suggested. Step 1: Promotion and consumption of the 8 selected foods according to seasonal availability, and VA supplementation once a year; step 2: VA capsules of step 1 are replaced by fortified foods; and step 3: a global dietary diversification with a strong and reliable food system. RPO is the key food in this plan and as such, needs support for its production, distribution and promotion. Conclusion: Achieving the recommendations to combine VA supplementation with dietary approaches against VAD is a challenge but appears to be essential for the long term control of VAD.

Potential contribution of mangoes to VA intake in rural Burkina Faso

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Background: Previous studies showed a mean daily vitamin A intake of 164±15 µg RAE for young children, mainly provided by dark green leafy vegetables (DGLV) for 43% in rural Burkina. Mangoes are largely produced in Burkina and its β-carotene has better bioavailability than that of DGLV. Unfortunately, they are not yet properly used for VA in Burkina. Objective: I) to measure changes in β -carotene content of 2 varieties of mangoes (Amélie and Brooks) after drying and after 6 months storage of dried mangoes, ii) to analyze the possible contribution of mangoes to VA intake in young children.

Methods: Two samples of 200 g ripened and half ripened fresh mangoes were collected from a drying unit, just before drying in a gas oven. Two other samples of 200 g each were also collected from the same lots, immediately after drying. One of them was immediately stored at -32 C until HPLC analysis, the second was kept during 6 months at room conditions before analysis. Carotenoid content was expressed as µg β -carotene per crude material. Usual portion size of ripened fresh mango for children and mothers' opinion on how to increase consumption of mangoes were obtained through focus group.

Results: β -carotene content of Amélie and Brooks's varieties were respectively 12.6 ± 0.9 and 12.9 ± 2.2 µg/g for ripened fresh, 6.9±0.7 and 9.3±1.1 µg/g for half-ripened fresh. Content of half ripened dried was 16.8±2.1 and 15.8±3.8 µg/g but decreased to respectively 11.2±2.1 and 9.5±5.1 µg/g after storage. Usual portion size of ripened

fresh mango for children was 123±2.4g, providing a daily intake of around 1600 µg β-carotene (133 µg RAE). Mothers declared children appreciate mango fruits, and suggested to powder dried mangoes to fortify complementary food. They suggested social mobilization for mangoes tree plantation, on the basis of 'One household, one mango tree'. Conclusion: Mangoes fruit are well appreciated by children. Along with red palm oil and other VA rich local foods, mangoes might better contribute to children VA intake in Burkina.

Carotenoid content of ten varieties of orange-fleshed sweet potatoes promoted in Burkina Faso

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Vitamin A deficiency (VAD) is a major public health problem in developing countries, especially in Burkina Faso where 40% of the population is under poverty line. In the framework of a UNICEF-HKI gardening project promoting the consumption of foods containing provitamin A carotenoids in Burkina Faso, ten varieties of orange-fleshed sweet potatoes have been evaluated for their carotenoïd content.

A fully validated reversed phase (RP 18) HPLC method was used for assessing carotenoid content of the orange-fleshed sweet potatoes. Zeaxanthine (ZEA), lycopene (LYCO), α-carotene (ACAR) and β-carotene (BCAR) were analyzed. Echinenone (ECHI) was used as an internal standard during the extraction procedure.

The analysis of orange-fleshed sweet potato varieties show that the Jewel, Narumintang, Caromex Niger and taining had the highest β-carotene content with respectively 1,911µg/100 g, 2,348µg/100 g, 2,046µg/100 g and 774µg/100g. In all these varieties, β-carotene represented more than 80% of all provitamin A carotenoids. The Jewel, and Narumintang were the most concentrated and homogenous in their carotenoid content. Other sweet potato varieties (Kolokohogo BF, Lantaogo 2 and Ming Shu Niger) appeared to contain only carbohydrates and little if any carotenoids.

The high β-carotene content of the Jewel variety combined with its good cultural output make it the best variety to promote for production and consumption in Burkina Faso.

Introduction of orange-fleshed sweet potatoes in Gourma Province, Burkina Faso

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Vitamin A deficiency and food insecurity are permanent issues in Gourma Province. To address this, HKI implemented a UNICEF-funded school and community gardening pilot project from 2000 to 2004. This project included a component where three varieties of orange-fleshed sweet potatoes (Jewel, Caromex and Taining) were selected through an experimental processthrough an experimental process and promoted in 16 project villages.

Two years following implementation, producers and consumers were surveyed to identify farming, conservation and consumption practices during periods of high availability in intervention villages. The survey covered three villages where orange-fleshed sweet potatoes were introduced among farmers producing white-fleshed sweet potatoes, using the school as an entry point (Zone 1). Zone 2 consisted of three villages where promotion was carried out only in schools. In total, 172 men and 230 women were randomly selected and surveyed.

The proportion of men growing orange-fleshed sweet potatoes alone or in association in 2003 was 78.8% and 78.3% in Zone 1 and Zone 2 respectively. The proportion growing orange-fleshed sweet potatoes only was 4.5 times higher in Zone 2 than in Zone 1. Over 50% of the people surveyed stated that maximum conservation time after harvesting was under three months. Ninety percent of people surveyed, mostly women, consumed boiled sweet potatoes between meals at least one day a week. Irrespective of gender and zone surveyed, orange-fleshed sweet potatoes were preferred to the white ones because of their taste, their vitamin A content, and the fact that they are easy to grow.

This experience highlights the potential of orange-fleshed sweet potatoes as a vitamin A source in Sahel regions affected by food insecurity, and findings can be scaled up throughout the Sahel.

Homestead food production contributes to improving household food and nutrition security

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Background: Rural Bangladeshi households have a low micronutrient intake, due to a poor quality and diversity of the diet. In order to improve vitamin A intake from the diet, food-based programs addressing nutrition should also include an animal food

component. The Helen Keller International homestead food production (HFP) program conducted a one-year pilot study to introduce animal husbandry into an ongoing home gardening program among households in two rural districts of Bangladesh. Objective: To assess whether HFP programs can change consumption patterns of animal foods.

Methods: Longitudinal data from 400 target and 300 control households were collected at each baseline (BL; Apr-May 2002) and endline (EL; Mar-Apr 2003). Precoded questionnaires were used to obtain information on animal production and consumption.

Results: The HFP program was able to significantly improve animal food consumption among target households. Egg consumption among children aged 6-59 months of target households in the previous week significantly increased ($p<0.001$) from BL to EL (1 vs. 2 eggs) and compared to controls at EL (0.5 eggs). The percentage of target households consuming animal foods (liver, egg) from the own production significantly increased from BL to EL and compared to controls (at least $p<0.05$). Fish consumption on at least two of the last 3 days by children aged 6-59 months significantly increased ($p<0.001$) from BL to EL and compared to controls at EL. The median income earned from selling HFP produce significantly increased ($p<0.001$) among the target group from BL to EL and compared to the controls. The money was mainly spent on foods such as poultry ($p<0.005$) and fish ($p<0.05$). Discussion: Households participating in the HFP program were able to diversify their diet by increasing consumption of micronutrient-rich animal foods and generating income to be spent on additional foods, thus contributing to improved household food and nutrition security. Such programs should be expanded, especially in countries where micronutrient deficiencies are still a significant problem.

Serum retinol, infection and intestinal parasites in vitamin A supplemented children in Niger

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Introduction: Vitamin A (VA) supplementation twice a year should be effective in controlling VA deficiency in children. However, it is possible that a good proportion of children are again deficient only a few months after taking the supplement in areas with high rates of infection and intestinal parasites.

Objective: To identify health-related factors associated with child VA status 3 months after taking the VA supplement. Methods: 102 children aged 24-36 months were randomly selected in a district of Niamey, the capital city, and in four villages in a radius of 100 km from the capital. Serum retinol was used to assess VA status. Intestinal parasites were identified using two complementary stool tests. Recent child morbidity and sanitation were documented by observation and questionnaire.

Results: The rate of low serum retinol (<0.70µmol/l) 3 months following supplementation was barely lower than before taking the supplement (34.4% vs

39.8%). Intestinal parasites, primarily protozoa (G. intestinalis, E. histolytica), were present in nearly 60% of the children. Health-related variables significantly associated with a better VA status in the follow-up survey included the absence of intestinal helminth (H. nana, Oxyurus), the presence of latrines in the home and access to running water. Children with symptoms of infection in the previous fortnight tended to have lower serum retinol concentrations than children who had not been ill.

Conclusion: Additional measures of sanitation and control of infection/infestation are required for increased effectiveness of VA supplementation.

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The role of grandmothers 'muso koroba' in strengthening post partum vitamin A supplementation in Mali: a qualitative analysis

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Background: Mali ranks 172th out of 175 countries in the Human Development Index (UNDP 2003). The high under-one mortality rate (113/1000) indicates that over 11% of children born will die before their first birthday; of these, half will die within their first month of life (M/DHS, 2001). Vitamin A Deficiency is a public health problem. Objectives: To strengthen the role of grandmothers (GMs) as key household health advisors by increasing their knowledge of priority nutrition practices particularly during pregnancy, the post partum (pp) period and with newborns.

Methods: A qualitative community study showed that GMs are the primary resource persons for all issues related to women during pregnancy and the pp period. Prior to this study, GMs had never been invited to participate in community-level health or nutrition education activities. From July 2002, a strategy to involve GMs in nutrition communication activities, using stories and songs, was implemented in 48 villages in Koulikoro region. One of the priority messages was for GMs to encourage pregnant women to attend pre/postnatal visits.

Findings: An evaluation in August 2003 showed that VAC coverage for pp women within 40 days of delivery increased from 7.5% to 80% in areas with functional health centres (HC) and from 4.5 to 20% in areas without HC. In the region, only 37% of women deliver in health facilities. The evaluation also showed that communication between mothers and GMs improved.

Conclusion: VAC coverage appears to have increased considerably. This may be partly attributed to the innovative GM strategy: the influential GMs are encouraging young women to attend prenatal sessions, and take their VAC at the health centres (even when delivering their babies at home). GMs promote acceptance of new community norms which greatly facilitates adoption of improved practices by young women and their husbands.

Risk factors for night blindness among non-pregnant women in Indonesia

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Objective: To identify risk factors for night blindness among non-pregnant women in rural and urban poor populations of Indonesia.

Design: A casecontrol study. Setting and Subjects: Data used for analysis were collected by the HKI/GOI Nutritional and Health Surveillance System (NSS) between Dec 2001 – May 2003 in rural East Java and South Sulawesi and urban poor areas of Surabaya and Makassar. The prevalence of night blindness among non-pregnant women in those four sites ranged from 0.93-4.03%. In total, 1217 cases and 3306 randomly selected controls (ratio of 1:3 per site) were included for analysis.

Methods: Univariate and multivariate logistic regression models were used to estimate odds ratios (ORs) of factors associated with night blindness.

Results: Multiple logistic regression analysis revealed that night blindness in the last pregnancy (OR 48.2, 95% CI 29.4-78.9), diarrhea in the previous week (OR 1.7, 95% CI 1.0-3.0), parity>3 (OR 1.6, 95% CI 1.3-1.9), open latrine (OR 1.2, 95% CI 1.0-1.5), illiteracy (OR 1.4, 95% CI 0.9-2.1), not breastfeeding (OR 1.3, 95% CI 1.1-1.6), and lower educational level of mothers were associated with night blindness among non-pregnant women.

Conclusions: Prevalence of night blindness among non-pregnant women in rural East Java and South Sulawesi and urban poor of Surabaya and Makassar was high and during pregnancy it was above the threshold of a public health problem (>5%). Night blindness during the previous pregnancy was strongly related to current night blindness. Programs to break this cycle of VAD, which affects both mothers as well as their infants, are urgently needed. Other risk factors include diarrhea, high parity and low socioeconomic status.

Risk factors for xerophthalmia among mothers and their children and for mother-child pairs with xerophthalmia in Cambodia

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Objective: To characterize the risk of xerophthalmia among non-pregnant women and children and risk factors for households in which both mother and child had xerophthalmia.

Methods: In case-control analyses of > 15,000 households in the National Micronutrient Survey of Cambodia, univariate and multivariate logistic regression was used to estimate odds ratios (O.R.) for non-pregnant mothers, children, and mother-child pairs with xerophthalmia, using night blindness as the indicator.

Results: Of 10,942 children, age ≥ 18 to < 60 months, and 9,587 non-pregnant women, the adjusted prevalence of xerophthalmia was 0.67% and 1.90%, respectively. In multivariate analyses, a child was at higher risk of xerophthalmia when the mother had xerophthalmia (O.R.4.36, 95% Confidence Interval [C.I.] 2.25-8.46) and a mother was at higher risk of xerophthalmia when a child had xerophthalmia (O.R. 9.21, [3.56-23.82]). Households were at higher risk to have both mother and child with xerophthalmia if there was a history of diarrhea in the mother (O.R. 6.48 [1.49-28.23]) or child aged 0 to ≤ 60 months (O.R. 10.16 [1.55-66.62]) in the last two weeks.

Conclusions: Xerophthalmia clusters among mothers and children in Cambodia and is associated with diarrheal disease. Interventions to address vitamin A deficiency should take a life-cycle approach, focus on vitamin A intake as well as diarrheal disease, and be aimed at the household level.

Different communication strategies can increase women's awareness about vitamin A rich foods in Indonesia

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Background: Improving the daily dietary intake of vitamin A (VA) rich foods is an important strategy for combating VA deficiency among mothers and children. Health communication programs can influence behaviors related to maternal and child survival, such as improving the dietary intake of VA rich foods. Problems faced in Indonesia in the dissemination of health messages include the vast geographical area (>17,000 islands spread out between the Indian & Pacific oceans) with more than 400 languages in different cultural settings and wide variations in socio-economic status (SES).

Aims: To explore the different sources of information about VA rich foods that women receive in Indonesia, which could help future program planners design strategies to strengthen other nutrition and health seeking or disease prevention behaviors.

Methods: Data collected by the GOI/HKI Nutrition and Health Surveillance System from Oct 2002–Sept 2003 on ~30,000 households in the rural areas of 8 provinces across Indonesia were analyzed to compare where and how women had received messages about VA rich foods in the past.

Results: ~40-80% of women had heard about VA rich foods. Among those women, less than 30% heard messages from mass media channels that included broadcast and print materials. School is another place where mothers had heard about VA rich foods. In East Java, more than 50% of the women had received such information at school, which suggests that school health programs can be an effective way to educate future generations of parents about current health issues. However, in areas where mothers had lower levels of education, low SES, and lived in a poor environmental setting, their sources of information were more likely to be through interpersonal communication with health workers, cadres, doctors or friends. In a district located in one of the poorest areas in the eastern part of Indonesia, over 90% of the 78% of mothers who had heard about VA rich foods had heard about them through this type of communication.

Conclusion: Program planners of large-scale maternal and child survival communication programs in Indonesia need to understand the different situation in each area and use appropriate strategies to utilize the existing communication channels and local social systems in order to be effective.

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Vitamin A capsule coverage among Bangladeshi children 6-11 months of age: the need for improvement

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Background: The 1997 Bangladesh national vitamin A deficiency (VAD) survey showed that VAD is common among Bangladeshi children aged 6-11 months (27% with serum retinol <0.70µmol/L). Young children have VAD because the diet of their mothers generally lacks sufficient vitamin A and there is very low postpartum vitamin A capsule (VAC) coverage, both affecting vitamin A levels in the breast milk. In addition, complementary foods, being predominantly cereal-based, are often low in vitamin A. Under the current policy, children at nine months of age should receive 100,000 IU of vitamin A with measles immunization.

Objective: Assess VAC coverage among children aged 6-11 months.

Methods: Data were collected on 11,304 children aged 12-23 months in rural Bangladesh in 2002 by the Nutritional Surveillance Project of Helen Keller International and the Institute of Public Health Nutrition. Through precoded questionnaires, mothers were asked if the child was immunized for measles vaccination at the age of 6-11 months, and whether he/she received a VAC along with the measles vaccine. The information was validated with the immunization card if available.

Results: In rural Bangladesh, 70.6% [95% C.I. 69.7, 71.6] of children received a VAC between 6-11 months of age, 12.2% [10.3, 14.1] received the measles vaccine but no VAC, and 17.2% [15.5, 18.8] received neither. Among children in functionally landless households the coverage of VAC was 69%, while it was 75% in households owning more land ($p<0.005$). Coverage also varied among sub-districts (9-96%).

Conclusion: VAC coverage among 6-11 mo old infants is considerably lower than among 12-59 mo old children (>90%). Improvements and/or changes of the existing mechanism for reaching 6-11 mo old children need to be considered in order to increase coverage among this vulnerable age group.

Postpartum vitamin A capsule coverage in Bangladesh

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Background: Maternal vitamin A deficiency (VAD) is a major health problem in Bangladesh. Requirements during pregnancy and lactation are high but many women cannot afford vitamin A rich foods, especially animal food products. VAD in mothers can lead to ill health and death during pregnancy and the postpartum period; it also affects infant's vitamin A stores. The Government of Bangladesh advocates that women should receive a high potency vitamin A capsule (VAC) containing 200,000 IU within six weeks of delivery.

Aim: To assess the postpartum vitamin A capsule coverage in rural Bangladesh.

Methods: Data were collected by the Nutritional Surveillance Project of Helen Keller International and the Institute of Public Health Nutrition in 2002 from 32,070 mothers who had a full term pregnancy during the previous three years. The mothers were asked whether they suffered from night blindness during pregnancy and also whether they received VAC within six weeks of delivery.

Results: Data showed that the prevalence of night blindness among mothers in their most recent pregnancy in the previous three years was 1.6% [95% CI 1.5, 1.8]. In two out of the 24 surveyed subdistricts, the prevalence was above the 5%-threshold of a public health problem (8.2% and 7.4%). Only 3.6% [95% CI 3.4, 3.8] of women in rural Bangladesh received a high potency VAC during their postpartum period. Highest coverage was observed in two sub-districts where the Bangladesh Integrated Nutrition Project was operational: 28.4% and 15.5%.

Conclusion: Coverage of postpartum vitamin A supplementation in Bangladesh is extremely low and demands immediate attention because VAD is a major health problem in Bangladeshi mothers and has serious consequences for the health and survival of women and their infants. Opportunities for an effective delivery system should be explored.

Sustaining vitamin A supplementation: testing a community directed, integrated approach in Cameroon

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Problem: The prevalence of vitamin A deficiency in Cameroon is 39% (2001) yet Cameroon does not have a sustainable delivery mechanism to provide two annual doses of vitamin A to children 6-59 months. A combination of strategies will be necessary.

Objective/conceptual framework: To test the feasibility and scale up the delivery of vitamin A (VA) by trained community distributors of ivermectin (CDDs) to children and women within 2 months post partum (pp) via the community-directed treatment (ComDT) strategy. Since ComDT is funded for the next 5 years and will need to be implemented for 15-20 years to control onchocerciasis, it is a potentially sustainable delivery mechanism for VA as well.

Program Design: Over 2150 community-selected CDDs will receive an integrated training on VA and onchocerciasis and provided the means to deliver VA capsules as they deliver ivermectin. Support materials will be used to sensitize communities. 300 nurses have been trained to monitor program activities and supervise CDDs.

Evaluation Methods: A pilot study was conducted in 2003 in 1 health district (HD) of Center Province by the MOH and HKI to test the feasibility of integrating VA into ComDT. Results were positive with 100% of children 6-11 months, 84% of children 12-59 months, and 26% of women pp receiving a VA supplement. Problems were noted and corrections made to the program design, messages and support materials. The adjusted design is now being scaled up throughout 15 HDs of Center Province. Monitoring checklists are being used to further assess the process and mid-term and final evaluations will be conducted to assess coverage rates for both VA and ivermectin.

Program implications: Based on evaluation results, a ‘How to’ Guide will be elaborated and shared with partners implementing ComDT throughout Cameroon and in other countries. ComDT is implemented in all 10 provinces and potentially can provide VA to 2/3 of all HDs in Cameroon at least once/year and possibly twice/year.

Low vitamin A capsule coverage rates among post-partum women in Central Java, Indonesia. What are the limiting factors?

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Background: Vitamin A (VA) supplementation of postpartum women has important health benefits for mothers and their breastfeeding infants. The additional VA improves breast milk quality, boosts resistance to severe disease, and may increase child survival. Unfortunately, VA coverage among postpartum women in Indonesia is extremely low.

Aims: To assess VA capsule coverage rates among postpartum women in Central Java, Indonesia and to investigate the limiting factors that influence it.

Design: Cross-sectional data on nutrition, health, socio-economic status, and patterns of health care utilization from the GOI/HKI Nutrition and Health Surveillance System in Central Java from Jun-Aug 2003 were analyzed. VA capsule (1 x 200,000 IU) coverage among postpartum women (n=6980) was assessed along with the timing of when the mothers received VA, where they delivered their baby, who attended their birth, and whether the mother was active as a health cadre(volunteer health workers).

Results: The coverage rate in Central Java was 19.3%. More than 50% of these mothers got VA within 2 days after delivery. Mothers who were active as health cadres, 4% of the sample, had higher coverage (38%) compared to mothers who were not (19%). Mothers who delivered their baby in Puskesmas (sub-district public health centers)/village maternity clinics had higher coverage (30%) compared to those who delivered in maternity hospitals (25%), a midwife's house (23%), or at home (16%). Mothers whose delivery was attended by a midwife or doctor had higher coverage (23% coverage for those groups) compared to those attended by another helper or who gave birth by herself (18%) or who was attended by a traditional birth attendant (13%).

Conclusion: Vitamin A coverage rates among postpartum women in Central Java was low. Additional efforts with different approaches are needed to improve coverage of the postpartum VA supplementation program, which has important health benefits for postpartum mothers and their infants.

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Community-based vitamin A supplementation even in emergency situations

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Introduction: Since September 2002, Côte d'Ivoire has been in conflict, with northern and western regions under rebel control. As a result, the health and nutrition status of the population, particularly in the rebel-held areas has exacerbated. Vitamin A deficiency affects over 30% of the population, and the only strategy to address this, until recently, has been supplementation during annual National Immunization Days.

Methodology: Since early 2003, community-based vitamin A supplementation was implemented in the districts under rebel control, as well as those under government control. After training, volunteers/distributors are provided with a box of vitamin A capsules and a pair of scissors and go door-to-door to supplement children.

Results: Twenty six out of 64 total health districts are covered under this strategy. The approach has been implemented by 4 NGOs and 7 community-based organizations, mobilizing 38 coordinators, 237 supervisors, 1813 distributors and 1329 social mobilizers. In total 926, 636 children between 6 and 59 months, representing 71.4% of the total, received one vitamin A capsule in 2003. Using this community-based strategy, the cost of supplementation per child has been evaluated as 0.085$ in the government-held areas, and 0.11 dollars in the rebel-held areas. However, during the JNVs, it is 0.188 dollars.

Lessons Learned: i) mobilizing communities to take charge of their health problems is necessary for the success of any public health program. ii) it is beneficial to foster collaboration between the health sector and other related sectors. iii) cost effectiveness of various strategies must be evaluated and taken into consideration.

Conclusions: It is necessary to give a second dose of vitamin A outside NIDs, and implement sustainable strategies to replace NIDs as they are phased out. Even in emergency situations, we can effectively and sustainably supplement children with vitamin A. In addition, this approach can serve as an entry point for other nutrition and health activities.

Sustaining high VAC coverage beyond NIDs in the Philippines

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Background: In 1993, the Philippines was one of the first countries to distribute VAC nationwide through National Immunization Days (NID), in April, and National Micronutrient Day (NMD) or Araw ng Sangkap Pinoy (ASAP) in October. The Philippines achieved impressively high VAC coverage levels of 88-93% in 1993-96.

However, coverage dropped to 78% in 1997-98, below the national target of 90%. In 1999, NIDs were no longer national in scope so the DOH launched a new strategy to distribute VAC, dubbed Preschoolers Health Week or Garantisadong Pambata (GP). This weeklong event is conducted twice a year and offers a comprehensive package of health services for children aged 0-59 months, including VAC distribution, routine immunization, weighing, deworming, distribution of toothbrushes, information on safe toys, and promotion of healthy habits and increased consumption of foods rich in vitamin A, iron and iodine. Strategies used to gain support for the GP from local chief executives and stakeholders were social mobilization and capability building. For the past 4 years, Helen Keller International in coordination with DOH and the LGUs conducted VAC coverage surveys with financial assistance from USAID in 9 out of 16 regions.

Aim: To assess VAC coverage through Preschoolers Health Week and to identify factors that maintain high coverage in 9 out of 16 regions.

Methods: The surveys were conducted in all provinces and selected cities in 7 regions of the country in 2000 then in 9 regions of the country in 2001, 2002 and 2003. Barangays or clusters in these provinces/cities were selected based on probability proportional to size sampling.

Results: The over-all VAC coverage in the HKI/USAID assisted regions in 2000 and 2001 was 85% and it increased to 89% in 2002 (coverage results for 2003 will be available in November 2004). Thus, for the past 3 years, the VAC coverage was sustained at high levels even after the cessation of the national NID's. This level of success was attained through awareness campaign conducted by health workers, broadcast, print and interpersonal communication, the vitamin A capsules that were already available, and the setting up of GP centers.

Conclusions: Preschoolers Health Week sustains high VAC coverage and is an effective delivery mechanism beyond NIDs.

The national vitamin A plus campaign: a success story for vitamin A programme in Bangladesh

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In Bangladesh, the prevalence of night blindness in children has been sustained below the 1% threshold that signals a public health problem. This remarkable achievement is largely due to the high coverage (as high as 87%) of vitamin A capsules (VACs) among children aged 12-59 months twice a year, since the distribution of VACs was linked with the National Immunization Days (NIDs) since 1995. The NIDs became an annual event in 2003 and will be discontinued after 2005, which has made it necessary to identify alternative strategies to sustain the high coverage of VAC.

The Government of Bangladesh recognized that distributing multiple nutrition and health interventions would be more cost-effective and therefore took the initiative to implement a package of health and nutrition services for children through a 'National

Vitamin A Plus Campaign' which was held on Oct. 2003. The three interventions selected for this campaign were: a). Vitamin A (200,000 IU) supplementation to children 12- 59 months, b) Albendazole (400 mg) administration to children aged 24-59 months, c) Salt-testing for iodine in all government and non-government primary and secondary schools. The benefits of the Campaign, which are expected to have contributed towards lowering child morbidity and mortality are: (1) Sustained high VAC coverage of 12-59 months, thereby preventing vitamin A deficiency and its consequences. (2) Achieved high coverage of albendazole administration among children aged 24-59 months which reduced burden of soil-transmitted helminths. (3) Increased awareness among school children on the harmful consequences of iodine deficiency disorders and the importance of consuming iodised salt. Data from the National Surveillance Project of Helen Keller International indicate that the Vitamin A Plus Campaign 2003 achieved a coverage of 89%.

Future Campaigns will always include VAC distribution, but will add different additional interventions, such as measles vaccination. It is expected that the Campaigns will be held annually in 2004 and 2005, and biannually from 2006.

Distribution of vitamin A capsules coupled with measles vaccination campaign: the Guinea experience

A Touré, MC Messier, Z Touaoro. Helen Keller International (HKI) Guinea

Background: Guinea has high infant and maternal mortality rates. It is estimated that 25% of children 6-59 months are vitamin A deficient. Since the year 2000, the Ministry of Health (MOH) has been distributing vitamin A capsules (VAC) twice a year: the first round using a health center (HC) based strategy and the second round (4-6 months later) using National Immunization Days (NIDs). The official coverage rates have averaged more than 90%. When NIDs ended in 2002, it was imperative to find a strategy to maintain high coverage in a cost-effective manner. In November 2003, Guinea undertook a national measles vaccination campaign (NMVC) for children aged 9 months to 15 years. Coupling these two activities presented an opportunity to maintain high coverage while maximizing the use of resources.

Objectives: To ensure at least 80% VAC coverage for 6-59 month old children by coupling VAC distribution with the NMVC.

Methodology: All agencies involved, including HKI, MOH, UNICEF and WHO, made a concerted effort to reach all target populations, as well as to harmonize training and monitoring tools and approaches. Intense advocacy was targeted at high-level decision-makers. VAC distributors were added onto teams of vaccinators. Mass media was used for sensitization, and a seven-day national campaign (except in the capital) using fixed and mobile teams was conducted.

Results: National VAC coverage rates reached 102.2%. A majority of regions (7/8) and Health Centers (89%) reported coverage above 80%. Cost of distribution was approximately US$0.021/child.

Conclusion: This campaign reported the highest coverage rate ever since VAC distribution started. Compared to HC-based distribution, coupling resulted in a lower cost per child supplemented ($0.025 vs. $0.021), estimates similar to those attained in Ghana. With better coordination, particularly during the planning phase, it is thought that these costs can be lowered further. Rates above 100% should be validated by an independent survey as the total targeted population may have been underestimated.

High vitamin A supplementation coverage in Niger: the challenges of maintaining success six years later

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Background: As one of the poorest countries in the world, with very high levels of child mortality (274/1000), malnutrition (32% chronic) and vitamin A deficiency (2.1% night blindness prevalence), Niger has taken a lead in vitamin A supplementation, and has been able to maintain a coverage of more than 75% of children 6-59 months, twice a year since 1999. Maintaining the success of past years is however a major challenge.

Objectives: Subsequent to the integration of vitamin A distribution into National Immunization Days (NIDs) in 1997 and 1998, the objective was, as of 1999, to ensure that at least 80% of children aged 6-59 months receive a twice-yearly dose of vitamin A and that at least 75% of post partum women receive a high vitamin A dose within 40 days of delivery.

Methods: Vitamin A was integrated into NIDs in 1997 and 1998 ; in 1999 National Micronutrient Days were organized for the distribution of a second vitamin A dose, six months after NIDs; in 2002 National Micronutrient Days were organized to cover the 27 polio-free districts, with no NIDs.

Results: Since mass supplementation started in Niger, each round covers more than 80% of children aged 6-59 months, as well as other target groups including post-partum women for vitamin A (more than 50%) and pregnant women for iron+folic acid (more than 50%).

Conclusion: The Niger experience shows that even the poorest countries can successfully provide vitamin A supplementation and reach high levels of coverage, even with the phasing-out of NIDs; however, maintaining the success of past years still remains a major challenge. Countries like Niger should maintain bi-annual supplementation for many years. Lessons learned from this experience and the strategies to maintain long-term success will be presented.

Community volunteers: an excellent channel for postpartum vitamin A supplementation in Dinguiraye, Guinea

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Background: Guinea has high infant and maternal mortality rates. An estimated 25% of children have vitamin A deficiency (VAD). Dinguiraye is one of the poorest and most remote areas of Guinea and nutrition and health indicators in this area are abysmal.

Aim: Decrease VAD in postpartum women and their 0-6 months old infants by supplementing women with two vitamin A capsules (VAC) within six weeks after delivery.

Methodology: HKI trained 170 members of Africare's Community Distributors Network (composed of health and field workers, traditional birth attendants and volunteers) to distribute VAC free-of-charge to women following the IVACG recommendations. Monitoring tools were designed for people with low literacy levels, and distributors reported their monthly distribution levels to the health center where they had received their supplies of VAC. Distributors were provided with promotion tools.

Results: VAC coverage levels among targeted women increased from the baseline of 5% to 40.8% within two years of the intervention. Of those covered, 64.7% received VAC within one week after delivery. Mother's knowledge of the importance of vitamin A increased from 29.5% to 63.3%, and 50.2% of women could cite a vitamin A-rich food compared to 17.3% before the intervention. Unexpected results from the program include the increased official reporting of births by families in order to access free VAC, illustrating the fact that a great demand for the capsules was created.

Conclusion: Community Distributors were found to be important resources and channels for improving awareness of vitamin A deficiency and ensuring high VAC coverage for postpartum women. Challenges will be to ensure regular supplies of VAC, timely and accurate reporting, cost recovery, and the sustainability of interventions once PVOs have ceased activities in the area.

Evaluation of iron/folate and vitamin A supplementation programs in Guinea

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Background: In Guinea, 79% of children 6-59 months and 63% of pregnant women are anemic. The Vitamin A Deficiency (VAD) rate for children 6-59 months is

estimated to be 25%. National micronutrient supplementation programs include twice yearly Vitamin A Capsules (VAC) distribution for children 6-59 months and Iron/Folate distribution throughout pregnancy. However, these programs have never been evaluated.

Aims: The aims of this project were to 1) Determine VAC coverage rates for children for the most recent disbribution; 2) Determine pregnant women's adherence to iron/folate and chloroquine treatment; and 3) Evaluate the knowledge, attitudes and practices (KAP) of heath workers concerning micronutrient deficiencies.

Methodology: A cross-sectional survey with a nationally representative sample (1913 caretakers of children and 1885 pregnant women) was implemented. Questionnaires were administered to 126 health workers.

Results: It was found that 67% of children had received one VAC during the most recent distribution. The majority (80.4%) of pregnant women received iron/folate tablets during their last prenatal visit; of those, 85% reported taking one tablet per day for 30 days. Of those who abandoned treatment, 53% cited nausea as the main cause. 90.8% of women received chloroquine. Concerning KAP, the majority of health agents could not cite more than one sign of VAD (72%), nor more than one consequence of VAD (88%). In addition, the majority of health agents could not cite more than one sign of iron-deficient anemia (91%), nor more than one iron-rich food (77%).

Conclusion: There is a substantial disparity between the official coverage rate reported by the Ministry of Health (93%) and the effective VAC coverage rate observed by this study (67%); this disparity could in part be due to underestimation of population increase in Guinea. The iron/folate and chloroquine supplementation program seemed efficient in reaching a large proportion of pregnant women. Yet, considering the high prevalence of anemia, the recommended three prenatal consultations may not be sufficient to treat/prevent anemia. Health workers' lack of knowledge in nutrition may also be a factor. Thus, nutrition should be reinforced in pre-service and inservice curricula to support efforts to reduce micronutrient deficiencies.

Large scale-up of VAC distribution pilot project in Cambodia through coordinated efforts among partner agencies and effective use of available resources

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Background: In 2001, Helen Keller International (HKI) in collaboration with the Ministry of Health (MoH) successfully implemented a pilot project to improve VAC coverage in Cambodia. Results revealed a significant increase in VAC coverage among children 6-59 months old as well as in mothers' knowledge related to

VA/VAC. Routine immunization outreach twice yearly through health centers was found to be a good channel for VAC distribution. Village-health-volunteers played an important role in raising awareness and community mobilization. However, large-scale expansion faces various difficulties, particularly transportation and regular support for outreach activities.

Objective: To overcome the constraints and to achieve the expansion of the VAC distribution program to 16 or more Operational Districts (ODs) between 2002 - 2005 (target population: 196,303 children 6 – 59 months).

Method: To overcome the constraints related to routine outreach, HKI partnered with agencies already supporting outreach and aided them with integrating VAC distribution. Efforts were coordinated to assist the MoH in expanding the program to another 16 ODs. Roles and responsibilities were defined with HKI located at national level and partner agencies at provincial/OD level and a detailed workplan was prepared. A common scale-up strategy was used that included a training cascade, monitoring and supervision. Distribution was conducted by government HC staff with support from partner agencies and HKI.

Results: In the six new ODs introduced, VAC coverage rates increased markedly among children 6-59 months from 22-85% to 83-91% and among postpartum women from 2-32% to 26-65%. Mothers' knowledge related to VA/VAC also improved. To date the National VAC Program has been implemented in 13 ODs.

Conclusions: Findings reflect the success of the VAC distribution program strategy in general and the collaboration of partner agencies. The cooperation of various partner agencies with defined roles and responsibilities appeared to be a good approach to effectively use resources and to rapidly expand the National VAC Program.

Evaluation of a pilot program for post-partum vitamin A supplementation in Maputo City, Mozambique

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Background: In May 2002 the Mozambican Ministry of Health started a pilot program for post-partum vitamin A supplementation (VAS) in Maputo City. Staff of all maternity wards in Maputo city were trained on technical and logistical aspects of the program. Guidelines were established and a reporting system was designed. In January 2004 this experience was evaluated.

Objectives: To collect best practices for revision and expansion of the post-partum VAS program to other maternities in the country.

Methods: Observation and interview sessions were conducted with health staff and clients to collect information on knowledge and perceived benefits of VAS, practices and recording of VAS, training and supervision.

Results: Health staff had adequate knowledge on VAS and benefits of VA. Mothers knew they received VAS and that it is good for their health, without being able to detail why exactly. VAS was correctly administered in all maternities. Coverage data show that 80% of the estimated number of women who gave birth in 2003 received VAS. Missed opportunities include mothers who were transferred directly after birth, some mothers who gave birth during the weekend and mothers who did not give birth at the maternity ward and did not go to post-partum consultation. In the bigger maternity wards, coverage data were also affected by failures in recording. Initial training of health staff was found to be adequate, but mechanisms to train newly appointed staff were not always in place. Frequent supervision has contributed to high coverage data.

Conclusions: Post-partum VAS should be expanded to the rest of the country. Proper training and regular supervision of staff is essential, and should emphasize on possible missed opportunities and recording. Administering VAS at exit of the maternity is preferred as it provides better opportunities to explain benefits and insist on need for VAS of the newborn after 6 months.

National vitamin A promotion campaigns increase vitamin A capsule coverage rates among 6-59 month old children in Indonesia

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Background: From August 2001 – February 2003 a series of national vitamin A (VA) promotion campaigns were conducted prior to every national VA distribution month (February and August) for preschool age children in Indonesia. Television and radio ads were broadcast and printed promotional materials (banners, posters, flyers, etc.) were distributed to all government health centers across the country for display in their areas.

Aims: To evaluate the impact of the mass media promotion campaigns on VA capsule coverage rates among 6-59 month old children using GOI/HKI Nutrition and Health Surveillance System (NSS) data.

Design: NSS survey data collected from ~24,000 households in 8 rural provinces and ~6,000 households in 4 urban poor areas after the February 2003 VA distribution month were analyzed to compare mother's exposure to VA campaign messages with VA capsule receipt among their children. During the survey, mothers were asked to recall if they remembered seeing a TV spot about VA or seeing the VA mascot's picture on any other media materials. Mothers were also asked to recall if their children received a VA caspule in the past 6 months.

Results: In the rural areas, 81% of the 6-59 month old children received a VA capsule and 76% had mothers who were exposed to the VA promotion campaign. Among children whose mothers were not exposed to the promotion campaign, only 65% received a VA capsule. In comparison, 86% of the children whose mothers were

exposed to the campaign received a VA capsule. Similar results were observed in the urban poor areas (data not shown). 14% of the children whose mothers were exposed to the campaign still did not receive a VA capsule. When asked why not, the mothers most commonly said it was because they had not visited a health center or a health post.

Conclusion: Mother's exposure to VA campaign messages was positively associated with VA capsule receipt in their 6-59 month old children. Health promotion campaigns that use a combination of mass media channels can positively influence families' participation in health and nutrition programs in both rural and urban poor areas of Indonesia. Supported by: USAID Cooperative Agreement No: 497-A-00-99-00033-00.

Success stories from West Africa: nutrition networking through the ECOWAS Nutrition Forum

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The 15 member nations of the Economic Community of West African States (ECOWAS) have a combined population of over 250 million with a weighted under-5 mortality rate (U5MR) of 180. Recent analyses indicate that 41.9% of children in the region are at risk of vitamin A deficiency (VAD) and that adequately controlling VAD will reduce U5MR by 24.7%, averting over 245,000 child deaths a year (VM Aguayo et al). Formal nutrition networking started among Francophone countries in 1996, and expanded to all ECOWAS countries in 1999. Pre-existing regional health structures were merged into the West African Health Organization (WAHO), the official health agency of ECOWAS, in 2000 and the networking, now known as the ECOWAS Nutrition Forum, co-ordinated by WAHO since 2001. Annual meetings of the Forum bring together nutrition actors of the region for review of activities, technical update, exchange of best practices and setting objectives for the coming year. Exchange continues among Forum members between meetings through e-mail, web site and specific workshops. Annual meetings have taken on increasing national-level visibility providing invaluable advocacy: the 2002 Forum was opened by the Vice President of The Gambia and the 2003 Forum was opened by the Prime Minister of Guinea.

Regional advocacy, goal setting, exchange of best practices, technical updating/capacity building and public accountability has led to a number of concrete advancements in vitamin A programs including: (1) acceleration of mass VA supplementation, (2) adoption of the objective of sustained twice-yearly VA supplementation levels of at least 80% for children under 5 by all member states, (3) acceleration of food fortification initiatives including 2 Private Sector-Public Sector Dialogues on Food Fortification, (4) acceleration of advocacy through PROFILES analyses and presentations on VAD at 2 WAHO Assembly of Health Ministers. As the Forum is supported by a number of partners (USAID through BASICS II, SARA

and MOST projects; UNICEF, WHO, Helen Keller International, World Bank, the Micronutrient Initiative, FAO) it has also facilitated donor coordination in the region. This model of networking has been critical to advancing VA programs in one of the neediest regions of the world. The combination of a technical network with a regional political structure permits direct impact on policies.

Vitamin A capsule distribution in Mali through National Nutrition Weeks: reaching and maintaining high VA supplementation coverage

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Background: In Mali, VA deficiency (VAD) is a public health problem: 6.7% of rural women of reproductive age have been night blind during their most recent pregnancy (M/DHS-2001). VA supplementation is part of the Ministry of Health's (MOH) package to reduce VAD. VA capsules (VAC) are delivered through National Nutrition Weeks (SIAN) to children 6-59 months and post partum women.

Objectives: To ensure twice-yearly VA supplementation of 6-59 months children with at least 80% coverage.

Methods: Distribute VAC through SIAN using a mix of delivery strategies: fixed centres, outreach, campaign, routine.

Findings: Mali had good results organizing Regional Micronutrient Days (RMD) progressively from one (in 2000) to 5 regions in 2001 (78 to 100% VAC coverage range). With NIDs phasing out and conscious of the importance of VA supplementation, the MOH adapted the RMD strategy and organized a first SIAN in June 2003, SIAN II (January 2004) and SIAN III (June 2004). A mix of distribution strategies has been used appropriate to the local situation. Coverage results are high (>90%). A national rapid coverage survey has been organized after SIAN II: data on coverage, information source, implication of partners at the peripheral level have been collected and will be available at the IVACG meeting. Coverage data will be linked to delivery method and will reveal strengths and weaknesses.

Conclusion: In Mali, the transfer process from NID-supported supplementation, to NIDS with Regional Micronutrient Days, to National Nutrition Weeks has been smooth and is an example of a PVO initiative scaled up with MOH and donors support. Lessons learned from past editions will continue to be shared with implementation partners and will lead to 100% coverage nationwide in the near future. The MOH intends to institutionalize SIAN: they are included in the National Strategic Food and Nutrition Plan (2004-2008).

The status of vitamin A supplementation for young children and postpartum women

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Background: Vitamin A supplementation (VAS) has been the major Vitamin A Deficiency (VAD) intervention in Tanzania since 1987. Diverse approaches have been implemented in order to address low coverage of VAS to young children and postpartum women (PPW). The country has recorded coverage of above 90 % in VAS of children aged 6-59 months during national commemoration of the Day of African Child (DAC) and World AIDS Day (WAD) since 2001. But over 6 years VAS coverage PPW has remained below 62% and little is known about the associated constraints.

Objective: To assess the status of VAS systems and draw lessons for improvement, sustain coverage of VAS to the children to above 90% and raise VAS coverage of PPW from 60% to at least 80% by the end of 2004 in pilot areas.

Methods: Assessment of VAS systems involved interviews to health/nutrition managers at facility to national levels, health workers (HW), community-owned resource persons (CORPs), community leaders and mothers of children aged less than 5 years. Approaches for accelerating VAS included fostering partnership and community participation, developing and implementing a communication strategy and training of HW and CORPs on management of VAS.

Results: There are favorable policy environments and standardized monitoring systems. Constraints included inadequate adherence to policy guidelines by HWs, low rate of facility deliveries, slow pace of incorporating VAS in comprehensive council health plans, irregularity in training HWs and CORPs, shortage of HWs and inadequacies in data management and reporting. Experience in mobilizing communities and HWs to accelerate VAS for PPW in pilot areas will be presented during the IVACG meeting.

Conclusion: Gaps in policy, implementation and monitoring systems should be immediately addressed to improve performance of VAS program. The experiences learned in accelerating VAS of PPW in pilot areas should be extended to other councils of Tanzania.

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HKI INACG Abstracts

Effectiveness of a redesigned iron supplementation delivery system for pregnant women

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Background: More than 50% of pregnant women in the Philippines suffer from iron deficiency anemia despite the implementation of a large-scale iron supplementation program. The effectiveness of an iron supplementation program depends to a large extent on the delivery system and compliance of the target recipients.

Objective: This study aimed to determine the effectiveness of a redesigned iron supplementation delivery system (ISDS) in reducing the prevalence of anemia in pregnant women.

Methods: This effectiveness trial was conducted among 298 pregnant women in 9 villages in Negros Occidental, Philippines (experimental area) and 284 pregnant women in 9 villages in Negros Oriental, Philippines (control area). Interviews with pregnant women and health workers were conducted and blood samples for hemoglobin level determination (using a HemoCue kit) were collected from the pregnant women at baseline and post-intervention. The pregnant women in the control area were given UNICEF iron tablets (with 60 mg elemental iron and 0.40 mg folic acid) for 6 months using the existing ISDS while those in the experimental area were given the same tablets for 6 months using the new ISDS. The new ISDS was designed based on the results of a preliminary survey on the existing ISDS that was conducted among selected pregnant women and health workers from both areas. The features of the redesigned ISDS included (1) involvement of the indigenous health workers in the identification of pregnant women, distribution of iron supplements and monitoring of compliance; (2) spot mapping and clustering to identify pregnant women early; (3) use of monitoring notebooks to record compliance; and, (4) use of various information, education and communications materials for promoting iron supplementation in the community and for counseling pregnant women.

Results: After the intervention, the mean hemoglobin level of the pregnant women in both areas increased but the increase was significant only for the experimental group (from 10.8 g/dl to 11.45 g/dl). A significant reduction in the prevalence of anemia (from 50.6% at baseline to 35.5% at post-intervention) was also observed in the experimental group.

Conclusion: The redesigned ISDS was effective in the reduction of anemia among pregnant women. Funder: National Center for Disease Prevention and Control–Department of Health, Philippines.

Barriers to maternal anemia control in rural Mali

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Background: In Mali, 73% of pregnant women are anemic (DHS, 2001).

Objectives: To identify the major barriers to the effective control of maternal anemia in rural Mali.

Methods: A population-based study and a health facilitybased study in Bla and Fana (rural southern Mali).

Findings: 81% of pregnant women were anemic. 54% of women were not able to explain what anemia was, 56% were not able to mention a symptom of anemia, 47% were not able to mention any action women can take to control anemia, and 34% had never heard about anemia. Only 38% of women in the 2nd and 65% of those in the 3rd trimester of pregnancy had had a prenatal consultation. Among them: a) 89% had been prescribed iron and folic acid (IFA) supplements and 62% (30% of total sample) had taken an IFA supplement in the past 24 hours; b) 93% had been prescribed chloroquine tablets and 68% (32% of total sample) had taken three chloroquine tablets in the past seven days; and c) only 3% have been prescribed drugs for intestinal parasite control. Only 27% of the prenatal care providers had received training on maternal anemia control. Supplements and drugs for anemia control were available in almost all facilities. However, one third of them had experienced 1-2 month supply shortages in the previous six months; 78% of the women interviewed after prenatal consultation reported that their health provider had not talked to them about anemia and/or malaria.

Conclusion: In rural Mali, prescription rates for anemia control are high, women's adherence acceptable, drug supply problematic, women's/provider's knowledge about anemia poor, and providers' counseling to women sub-optimal or non-existent. The services that pregnant women "covered" by the national health system receive for the control of anemia can be significantly improved.

Resorting to radio clubs to enhance nutritional status in two health districts in Niger

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Background: With low health coverage (about 47%) and high levels of nutritional deficencies, (about 60% of anemia among women of childbearing age), nutritional problems are utmost priority in Niger. In response, HKI implemented a communication program, using several channels, including radio clubs, to improve behavior ans enhance the nutritional status of households.

Objectives: To enhance nutrition knowledge and change behavior among women of childbearing age.

Methods: Established in 1960s by the government of Niger, radio clubs are designed to promotesocial mobilization for development actions, through the sensitization of rural populations. HKI uses radio clubs in 6 intervention villages with population of 10,480, within the social mobilization component of the 'food security initiatives'. Activities include a baseline stady on anemia, the broadcast of educational messages and the establishment of community structures, including radio clubs and village animatoin committees (VAC).The radio clubs animators and the VAC are then trained in nutritional education and communication techniques. The members of the radio clubs organize listning sessions, followed by discussions one to three times per week.

Results: Results of the evaluation show high participation: 80% of interviewed women attended the listning discussion sessions of the radio clubs. 73% of mothers respond that they clearly understood the messages and the practical interest they can drow from them. 78% of mothers report that they start practicing the advices given. Commonly discussed themes are vitamine A and iron (97.7%), diarrhea case management and preparation of ORS (95.4%), consumption of micronutrient-rich food (95%) and breastfeeding (93%).

Conclusion: Radio clubs apear to be an important source of information for populations and the experience is being expanded to other villages. This experience has raised much excitement about possible use of similar clubs in existing community radio stations within other projects.

Community-based distribution of iron + folic acid in Niger: success and challenges

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Background: Niger is a Sahelian country, with a high prevalence of anemia among pregnant women (about 60%). In rural areas, only 39.6% of pregnant women have access to health services (1998 DHS) and 11% of those using health services have received iron+folic acid. Helen Keller International, in collaboration with the National Nutrition Division and with the support of Micronutrient Initiative, has tested an alternative supplementation mechanism to increase the percentage of pregnant women benefiting from iron+folic acid supplementation.

Objective: To measure the feasibility, effectiveness and sustainability of an iron+folic acid community-based distribution to pregnant women.

Method: The community-based distribution project started with a pilot phase in two health districts. The positive results served as a basis for the extension of activities to seven other districts. During this second phase, nine districts, or 345 villages were covered. The approach involved: community sensitization, baseline study on the knowledge of women on anemia and iron+folic acid, selection and training of traditional birth attendants, distribution of tablets and monitoring.

Results: The success of this pilot phase is dependent upon the following: baseline study approach; sensitization of communities to secure their involvement; quality training of traditional birth attendants in charge of the distribution of iron+folic acid; close monitoring by health workers and regular supply of iron tablets. The same approach was used during the extension phase, with the same results. However, the implementation period was shorter in some areas because of funding constraints and did not allow for the establishment of a sustainable distribution mechanism. Such a mechanism will be designed and implemented in those areas still benefiting from funding.

Conclusion: Results are very encouraging, despite unforeseen funding withdrawal that may jeopardize field- level activity implementation. A comparative update of funded and non-funded locations will be provided.

Weekly iron supplementation among primary school children in Burkina Faso: improving coverage

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Background: In Burkina Faso, several causes of anemia exist: insufficient food intake, intestinal and urinary parasites and malaria among others, causing reduced academic performance, and low economic productivity. To address this, an integrated school health program is underway in Kourwéogo and Gnagna Provinces, in which supplementation activities are conducted by teachers trained to this effect.

Methods: Based on pre-established protocols, teachers give the following to the children: iron + folic acid, vitamin A, iodized oil capsules and anthelminthic drugs. Teachers fill out a weeklymonitoring sheet. One innovative aspect of this approach is that parents are used to ensure that iron is distributed over 16 consecutive weeks, even during school holidays.

Results: The coverage rates achieved prove that supplementation activities can be conducted by teachers. In 2001, 2002 and 2003 respectively, 94%, 86.5% and 97.9% of school children received iron supplementation for at least 15 weeks. This approach was refined in Kourwéogo province (that is easily accessible and has a schooling rate similar to the national average) and then replicated in the remote province of Gnagna that has poor academic performance and a high school dropout rate. The same phases of implementation and data collection tools were used for the replication. In 2003, 87.1% of school children received at least 15 tablets of iron supplements.

Conclusion: Primary school teachers are able to conduct a supplementation and helminth control program, provided they are given a minimum of training and follow-up/supervision. Through this strategy a large number of children can be covered, and good compliance achieved.

Community-based iron + folic acid supplementation and nutrition education for pregnant women: findings from Manica Province, Mozambique

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Background: Anemia is a severe problem in Mozambique; over 50% of pregnant women are anemic. Current MoH protocol recommends that all women take iron + folic acid (IFA) supplements in their last two trimesters of pregnancy and first trimester post partum. Most women do not take IFA supplements in sufficient quantities.

Objectives: To improve access by pregnant women to IFA supplements, improve women's knowledge about iron deficiency/anemia, and evaluate the feasibility of achieving these goals through community elected health workers (ACSs).

Methods: 12 intervention neighborhoods and 13 control neighborhoods were included. A baseline survey was conducted before the initiation of the program with women of a 0-11 month old infant and their husbands about anemia and iron-related knowledge, basic socio-economic indicators, as well as diet quality. A similar follow-up survey was performed one year later with the addition of questions related to program quality.

Results: Contact with an ACS was associated with an increased duration of IFA supplementation (3.3 vs 2.4 months) despite fewer prenatal consults (4.3 vs 4.8). 75% of women with ACS contact reported that they preferred to receive IFA supplements from an ACS rather than at the health post. Coverage at follow-up was lower than expected (27% overall) and no detectable impact was seen on anemia and iron related knowledge.

Conclusion: Regular supervision of the ACSs and the health posts was more challenging than expected. Improved supervision and communication between the health posts, program coordinators, and ACSs, can increase program coverage while quality is improved and sustained, so as to make community-based IFA supplementation and iron/anemia education for pregnant women an effective option for decreasing anemia prevalence among pregnant women in Manica province.

Effectiveness of school-based iron and folic acid supplementation for adolescent girls: findings from Manica Province, West-Central Mozambique

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Background: In Manica province, 47% of adolescent girls are or have been pregnant and 45% of adolescent girls attending school are anemic.

Objectives: To assess the effectiveness of two school-based weekly iron and folic acid (IFA) supplementation regimes in adolescent girls.

Methods: Two comparison groups: six schools in group 5 (5-month supplementation) and six schools in group 8 (8-month supplementation). The weekly supplement contained 60 mg of iron and 400 microgram of folic acid. All girls received a single dose of mebendazol (500mg) at T0 and T6. Supplementation implemented/supervised by school teachers.

Findings: At T0, mean hemoglobin concentration and anemia prevalence in groups 8 and 5 were comparable (125.3 ± 12.6 g/l vs. 123.8 ± 12.8 g/l). Between T0-T3, girls in group 8 received IFA supplements weekly whereas those in group 5 did not. At T3, mean hemoglobin concentration in group 8 was significantly higher (126.3 ± 14.3 g/l vs. 121.5 g/dl ± 11.9 g/l) and prevalence of anemia lower (28% vs. 35%). At T8, after an additional 5-month supplementation period in both groups, mean hemoglobin concentration and anemia prevalence in groups 8 and 5 were not significantly different (126.5 ± 12.6 g/l vs. 124.9 ± 12.3 g/l; 23% vs. 27%).

Conclusion: In Manica province, school-based weekly IFA supplementation is a feasible and effective intervention to prevent seasonal drops in hemoglobin concentration and increases in anemia prevalence. Short supplementation periods can have an important impact in girls' hematological status. The size of girls' hematological response was significantly lower that that observed in studies with similar population groups, initial anemia prevalence, supplement composition, and/or supplementation regime. The contribution of malaria and/or other micronutrient deficiencies to adolescent anemia in Manica needs to be documented and adequate measures for its control integrated into school-based programs for anemia control in adolescent girls.

Foods naturally rich in iron increase hemoglobin concentration among anemic Indonesian adolescents

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Objective: To investigate the effectiveness of consuming acceptable and affordable locally available meals rich in iron, especially heme-iron, from natural foods, in improving the iron status of adolescent girls in Indonesia.

Design: A 6-month intervention where 384 adolescent girls in 5 schools were assigned to one of two groups; 249 girls in 3 schools received iron-rich meals and another 135 in 2 schools received iron-poor meals once per day for 6 days per week. The average amount of iron for rich-iron and iron-poor meals was 9.0 and 5.3mg, respectively. Vitamin C provided from the iron-rich and iron-poor meals was 4.1 and 4.6mg, respectively.

Setting and Subjects: The study was carried out in five Islamic boarding Schools on Madura Island, East Java, Indonesia. Subjects were adolescent girls aged 12-15 years old who attended and lived in these schools. Weight, height, MUAC, Hb, serum concentration of retinol and carotenoids, information on socio-economic status, and vitamin A intake were collected before and after the intervention.

Results: Baseline characteristics of the two groups were not different. Among those who were anemic at baseline, 48.0% of those in the iron-rich group became non-anemic, while 22.2% in the iron-poor group became non-anemic ($p<0.05$). Serum retinol and β-carotene was significantly increased within subject after 6 months of intervention both in the iron-rich and iron-poor groups and the changes were larger in the ironrich group ($p<0.05$).

Conclusions: Food naturally rich in iron can contribute to reducing the prevalence of anemia among adolescent girls.

Management of anemia in pregnant women: health agents' practices and opinions

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Because of its consequences on maternal and child health and survival, addressing anemia during pregnancy is a priority issue for health services in Burkina Faso. Despite regular anemia management during antenatal consultation, anemia is still a serious problem. Health agents consider anemia as a major risk factor ranking fourth after hypertension, presence of edema and low weight gain. Most practitioners examine conjunctiva coloration (95.8%) and all state that they systematically prescribe iron+folic acid and chloroquine. In practice, we have observed that 67.9% of practitioners prescribe iron+folic acid against 64.3% for chloroquine.

Women are not generally informed about potential adverse side effects and the need to take iron tablets regularly. After prescription, practitioners do not check whether the iron tablets have been taken or not. On very few occasions, dietary counseling is provided but it is limited, incomplete and impractical.

Conclusion: Systematic identification of severe anemia through examining conjunctiva and systematization of preventive prescription of iron and chloroquine are necessary and need to be strengthened and sustained. Major gaps to be addressed include the lack of follow-up on the regular consumption of iron+folic acid and chloroquine, and the lack of appropriate diet counseling using visual aids and the promotion of foods readily available and accessible to the pregnant woman. Recommendations: 1) Provide permanent support to nutrition activities in health facilities; 2) Ensure inservice training of health agents on nutrition in general with special attention to anemia management; 3) Design basic technical material, especially visual aids and IEC materials, available in health facilities; 4) Ensure the improvement of coverage, duration and follow-up on the taking of iron+folic acid and anti-malarials through enhanced involvement of the community.

Designing a program for large scale delivery of sprinkles

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Problem: Up to 70% of young children in urban poor areas of Indonesia are anemic. The negative consequences of anemia for child health and development warrant urgent intervention, but only very few larger scale anemia prevention programs have yet been implemented in developing countries.

Objectives: The overall aim is to design a program for large scale delivery of an in-home fortificant (sprinkles) to underfive children. Specific objectives include: to evaluate the effectiveness of sprinkles distribution on the nutritional status of underfives; and to identify appropriate distribution channels and promotion strategies for the sprinkles product.

Framework: In-home fortification may be a highly feasible intervention to address child anemia, especially in urban Indonesia. Mothers are accustomed to sachet use in preparing foods. Local corner shops and/or the community health posts are potential distribution points that are in close proximity to, and regularly used by mothers. Household expenditure data from this population suggest that the product would be affordable for mothers, and current production of sprinkles by private sector partners within Indonesia adds to potential sustainability.

Program: In three cities of Java and Sulawesi in 2004-2005, sprinkles will be distributed via local NGOs and community health posts in the context of their ongoing health and nutrition programs.

Methods: Formative research in 2003 employed focus group discussions and in-depth interviews with key informants to develop a local product name (Vitalita, meaning vitamins for underfives), package design, and key message for promoting Vitalita as

part of good child care, health care and nutrition. A social marketing campaign is being developed based on these findings. A monitoring and evaluation activity will be conducted in intervention communities to track the use of the product and the impacts on nutritional status of young children, including anemia. Lessons from developing the name and packaging and implementing the distribution/purchasing program are expected by late 2004.

Implications: In home fortification ('sprinkles') is an innovative potential strategy to address the problem of child anemia, and evidence of its effectiveness will facilitate large scale expansion complementary to other nutrition and disease prevention efforts.

Efficacy of 'sprinkles' home fortification to reduce anemia and micronutrient deficiencies in young children in Indonesia

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Problem: Up to 70% of young children in urban poor areas of Indonesia are anemic. The negative consequences of anemia for child health and development warrant urgent intervention, but very few successful anemia prevention programs in poor settings have yet been conducted.

Objectives: To evaluate the efficacy of daily use of an in-home fortificant ('sprinkles') on anemia, growth, and micronutrient status (plasma ferritin, retinol, and zinc concentrations) of children 6-30 months old.

Framework: In-home fortification may be a highly feasible intervention to address child anemia, especially in urban Indonesia. Mothers are accustomed to sachet use in preparing foods. Local corner shops and/or the community health posts are potential distribution points that are in close proximity to, and regularly used by mothers. Household expenditure data from this population suggest that the product would be affordable for mothers, and current production of sprinkles by private sector partners within Indonesia adds to potential sustainability.

Program: The efficacy study is the first phase of a program to test the efficacy and effectiveness of daily use of Vitalita (translated: vitamins for underfives) sprinkles. Vitalita sprinkles contain 1 RDA (1-3 year olds, US/Canada) of iron, vitamin A, zinc, vitamin C, and 10 other micronutrients. The Vitalita name and package design were developed through formative research in 2003.

Methods: 551 intervention and 266 control children aged 6-30 months from slum areas in Jakarta were enrolled during the baseline survey (Dec '03 to Feb '04). Anthropometry of mothers and children was measured, venous blood samples drawn, and information on household socio-economic status, dietary intake, and health status

was collected. A supply of Vitalita is delivered to mothers on a weekly basis (for consumption on a daily basis), and consumption is recorded by mothers using a weekly calendar. The endline survey will be conducted Jul-Aug '04. Results will be available thereafter.

Implications: In-home fortification is an innovative potential strategy to address the problem of childhood anemia, and evidence of its efficacy will facilitate large scale expansion complementary to other nutrition and disease prevention efforts.

Iron deficiency anemia among children under five in Indonesia: an alarming call for action

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Background: Iron deficiency anemia (IDA) has a large impact on human productivity, psychomotor and mental development, immunity, growth and learning capacity. IDA is the most common nutritional deficiency in Indonesia.

Aims: To assess the prevalence of anemia using data from the GOI/HKI Nutrition and Health Surveillance System (NSS) in 4 urban slum sites and 8 rural provinces in Indonesia, representing 70% of the total population.

Design: NSS cross-sectional data from Sep 1998-Aug 2003 were analyzed. Data on nutrition, health, socio-economic conditions etc. were collected quarterly, from 155,000 households per year. Blood was obtained by finger prick from children in a 20% sub sample of households and hemoglobin concentration (Hb) was assessed using a HemoCue. Children with Hb<110 g/L were classified as anemic.

Results: In the first round of data collection, Nov 1998-Mar 1999, the weighted prevalence of anemia among children 12-23 months old was 70% in the rural areas and 75% in the urban slum areas. There were some initial signs of decline in the urban slum areas in the Dec 1999-Feb 2000 and Jul-Sep 2000 periods (down to 57%), but then the prevalence increased again to 66% and remained at that level. There was no decline observed in the rural areas. In the last round of data collection, from Jun-Aug 2003, the weighted prevalence among 12-23 months old children was 66% in the rural areas and 77% in the urban slum areas.

Conclusion: The prevalence of anemia among children underfive has remained very high over time since 1998, especially among children 12-23 months old, and no significant changes were observed over the past 6 years. A combination of fortification, supplementation and dietary diversification is needed to combat this universal deficiency and to limit the long term economic cost of the consequences of anemia for the population. In addition, anemia increases the risk of lead poisoning, particularly among young children. This poses an additional and large threat, especially in urban poor areas.

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Effectiveness of soy sauce fortified with NaFeEDTA for reducing anemia in West Java, Indonesia

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Background: Iron deficiency anemia is a major problem in many developing countries with severe health and economic consequences. Fortification of condiments is one way to address this problem and NaFeEDTA is a very bioavailable, and therefore preferred, iron fortificant. Soy sauce is widely consumed in Indonesia and found very suitable for fortification with NaFeEDTA. The brand most widely consumed is ABC and the preferred packaging is the sachet containing 16 mL of soy sauce.

Aim: Assessing the effectiveness of consumption of soy sauce fortified with NaFeEDTA at the highest organoleptically feasible level (16.9 mg Fe/100 mL).

Design: Sachets containing fortified soy sauce are distributed through the normal market channels in Bandung district, West Java. Baseline data were collected in April 2003 from 600 households with underfives that were randomly sampled from 15 villages (40 households each). Hb was assessed on all underfives, their mothers and available fathers. Fortified soy sauce distribution to the warehouses started in May 2003 and market saturation at the corner shops (warung) was regularly assessed. Endline measurements of Hb will be taken in mid 2004.

Preliminary results: Baseline data showed that 414 households consumed ABC soy sauce packed in sachets and 186 did not. These households had a total of 401 and 187 children aged 6-59 mo, with a mean Hb of 106.5 and 110.3 g/L, respectively. Average consumption of soy sauce was 1 sachet per 2 days for a family of 5 people, or 1.6-2.1 mL/adult/d and 0.8-1 mL/underfive/d. At current fortification levels, that would be equivalent to an intake of 0.34 mg Fe/adult/d or 0.17 mg Fe/underfive/d. However, the EDTA will also enhance absorption of other iron present in the meal. In August 2003, 75% of the corner shops sold fortified soy sauce.

Final results, in particular on the impact on Hb of children and adults, will be available in October 2004.