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Final Report

**Project Title: REDUCING IRON DEFICIENCY AND ANAEMIA IN
WOMEN OF REPRODUCTIVE AGE**

LOCATION: THYOLO DISTRICT, MALAWI

FUNDING SOURCE: JSI-MOTHER CARE PROJECT

PROJECT PERIOD: SEPT. 1995 TO AUGUST 1998

**KEY PERSONNEL: PROGRAMME COORDINATOR
ACCOUNTS ASSISTANT
DRIVER**

270 final

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EXECUTIVE SUMMARY

The maternal anaemia programme was a joint effort of Project HOPE, London School Of Hygiene and Tropical Medicine and MotherCare. It started in May 1995 up to July 1998 working predominantly on two tea and coffee estate companies in Thyolo district in the Southern Region of Malawi. The total target population was about 106,000 of which 14,000 were staying on the estate compounds and 92,000 living in the villages surrounding the two estate companies.

The overall purpose of the Maternal Anaemia project was to determine the prevalence of anaemia and its causes in order to develop a package of appropriate services for women of reproductive age. The project had two main strategies, the research phase and intervention phase based on research findings

Overview of major Activities

During the programme implementation, the following activities were conducted: (a) Research (b) Training (c) Development and application of Information Education Communication (IEC) materials; (d) Iron Folic Acid (IFA) distribution and Supervision.

a) *Research*

Research activities included the baseline study, a qualitative formative research, productivity study, final survey and programme evaluation.

b) *Training*

Training activities involved the following groups of people: Health Care Providers, Traditional Birth Attendants (TBAs), and the Local Drama Group.

c) *Development of IEC materials*

IEC materials were developed based on results of the various research studies. The materials included posters, counselling charts, reminder to take posters, and pill bags. These materials were pre-tested and revised before incorporation into the various programme activities.

d) *Distribution of IFA tablets*

IFA tablets were distributed to the two Hospitals in the district, all health centers, and all TBAs within the impact area. The tablets were supplied to all pregnant women who attended the Ante-Natal Clinics and all recently delivered women who delivered at government, Christian Hospital Association of Malawi (CHAM) and private estate health facilities and at TBAs within the impact area.

e) ***IEC interventions in the community***

The IEC interventions in the community involved drama performances on anaemia themes, health education talks by health providers at the health clinic, by HSAs in the community and by TBAs at their clinic.

f) ***Supervision of health providers and TBAs***

The health care providers and TBAs were supervised quarterly by Project HOPE Coordinator. On some occasions the District Health office TBA Coordinator accompanied the Project HOPE Coordinator.

Project Outcomes

The following comprised the major outcomes of the project:

- a) The project significantly influenced one of the two estate companies, the Central African Company, to start antenatal clinic services for pregnant women living on the estates.
- b) The TBAs awareness of the anaemia problem, the importance of treatment, identification of side effects, and ways to manage side effects increased.
- c) The number of IFA tablets distributed to the women significantly increased over the intervention period both during pregnancy and after delivery.
- d) Haemoglobin levels significantly increased in recently delivered women, while the prevalence of anaemia was decreased in both pregnant and recently delivered women.

Lessons Learnt

Lessons were learnt from the strategies used for the programme and the way the programme was managed and implemented.

Lessons learnt on the strategies used included the following:

- a) Formative research does determine a package of maximally effective interventions BUT they are expensive, especially when external consultants as oppose to local consultants are used in the research activities.
- b) Involvement of TBAs in iron distribution is an effective strategy for improving access to iron at community level.
- c) Multiple IEC methodologies improve programme effectiveness and the profile for anaemia.
- d) Use of existing community dissemination structures assist with programme success.
- e) Inclusion of men as a target for IEC might have a positive programme impact.

- f) Separating Maternal Anaemia from other anaemia and using a comprehensive approach to address Maternal Anaemia reduction works to increase impact.
- g) A Project HOPE and Tea Estates collaboration has led to significant changes in health services on the estates and serves as a good model for public/private sector collaboration.

Lessons learnt from the way the programme was managed and implemented included the following:

- a) Lack of planning for sustainability or incorporation of lessons learned leads to risk of not leading to improved quality of services and continuity of the services.
- b) Despite the fact that the programme was working within the existing policies, some providers were still not aware of some of the policies.
- c) Iron procurement needed a contingency plan due to the dependence of project results on consistent iron supply.
- d) Limited staffing for a programme creates dependency on single individuals and problems in fulfillment of programme activities.

PROJECT BACKGROUND

Anaemia is the most common nutritional deficiency in the world (Buetler, 1980; Whitney and Hamilton, 1987). High prevalence has been reported for women of reproductive age in developing countries through out the world. In Africa it is estimated that 66.7% of pregnant and 50% of non-pregnant women may be anaemic (Winikoff, 1988). Serious anaemia in pregnant women has been associated with multiple adverse effects, including increased risk of maternal death (Winikoff, 1988; Danforth, 1982) and excess fetal pathology (Garn et al., 1981).

The consequences of anaemia are serious. Productive capacity is very sensitive to reduced levels of haemoglobin. In adults it has been found that a 1g/dl decrease in haemoglobin reduces work productivity by 10% (Levin 1985). Recent studies suggest that anaemia in early childhood results in irreversible changes in ability to learn later on in life even after iron deficiency has been rectified (Lozoff, et al., 1993).

In most developing countries, anaemia is due to iron, folic acid, and, to a lesser extent, vitamin B –12 deficiencies and parasitic infections. Women and children are most at risk because of high requirements during periods of rapid growth

(very young children, adolescents and pregnant women) and blood loss (women during reproductive years and at delivery). Nutritional anaemia is generally due to absolute low intakes of iron and folic acid, iron which is not biologically available usually because of a predominantly vegetable-based diet. Parasitic diseases are also a major cause of anaemia. Additional blood loss due to hookworm infection also increases the severity of nutritional anaemia in areas where hookworm is prevalent. High rates of anaemia due to nutritional deficiency are complicated by malaria particularly in primigravida women. It is a general rule that in areas where malaria is not endemic, anaemia, due primarily to iron deficiency increases with parity. In areas where malaria is endemic, anaemia is most severe for women in their first and second pregnancies and a major cause of anaemia for these women is malaria. Finally there may be other not yet investigated causes of anaemia. For example, the high prevalence of HIV infection in Africa may be a factor aggravating anaemia.

Background of anaemia in Malawi

In 1989, Project HOPE initiated a safe motherhood project in Thyolo district of Malawi. The project began with a survey of maternal mortality in the rural areas conducted by a national team, with technical assistance from Project HOPE that had been trained in the sisterhood method by Dr. Wendy Graham from the London School Of Hygiene and Tropical Medicine. Based on the survey results that provided information on maternal mortality and its causes, pilot activities funded by Project HOPE were implemented in collaboration with Ministry of Health Thyolo District Health Office. Educational programmes for Nurse-midwives and Traditional Birth Attendants (TBA) were developed and implemented. Essential supplies and equipment were provided to the district hospital and the poorly equipped rural maternity units. To improve on communication between referral sites and transport, a radio communication system was established between key maternity units and the referral facilities and some stretchers and bicycle ambulances provided. This provided a basis for the programme on maternal anaemia.

No national statistics on anaemia in Malawi was available, however one of the recent national studies on prevalence of anaemia in 715 pregnant women found that 66% were anaemic (Hb. <11 g/dl) (M.O.H./UNICEF, 1994). Two other recent studies showed that maternal anaemia is caused by dietary factors, malaria and hookworm are not the major cause (Broadhead, personal communication; Wirima, et al., draft undated). A small study by Ministry of Health found that anaemia was most severe in women 20-29 years of age (presumably those in lower parity) and least severe in women over the age of 40 years which seems to support the idea that malaria is not an important cause in women over the age of 40 years.

There were no focused programmes in Malawi at the time to address anaemia in pregnant women. Government of Malawi health care providers gave IFA pills

only to those women complaining of tiredness or those who showed clinical signs of anaemia. This could have been due to probable supply problems.

Nationally there were no IEC materials specifically geared towards alerting women and the community about the seriousness of anaemia and where to seek help for anaemia during pregnancy. There was little information to improve on compliance taking of iron tablets.

While most health centres were supplying the combined pills, there are separate iron and folate pills available. It had been observed that the form of pills also affected compliance but formative research had not been conducted to determine which pills women in Malawi preferred.

Hook worm and malaria were tested for if the women presented with symptoms. This policy is adequate if malaria and hookworm are of occasional occurrence. Even if malaria is not an important contributor to anaemia, women should be given treatment if placental parasites exist since their prevalence has been related to low birth weight.

To address anaemia in women of reproductive age in Malawi, Project HOPE, Mother Care and London School of Hygiene and Tropical Medicine (LSHTM) implemented this two-phase project to address the problem of anaemia.

PROJECT OVERVIEW

The Maternal anaemia project worked with the population living on the compounds of two estate companies, Nchima and Central African Company and the population of the surrounding villages. The total population estimated at 106,000 with 14,00 living on the estates (based on Project HOPE H.S.A compound survey 1995) and 92,000 living in the surrounding villages as per 1987 National Census with an annual growth rate of 2.9%.

A. *Project Objectives*

The following project objectives were addressed:

1. To determine the prevalence of anaemia and the principal causes in women of reproductive age.
2. To identify significant reproductive risk factors (e.g. birth spacing, family size, contraceptive method and bad obstetric history) and healthy outcomes (e.g. Obstetric haemorrhage) related to anaemia.
3. To describe knowledge, attitudes and practices concerning health of women of reproductive age and health care providers particularly as regards to diet, pregnancy, lactation, family planning and anaemia.
4. To identify where, when, and why women of reproductive age have contact with existing health services including family planning.

5. To devise, implement and evaluate various interventions to prevent and treat anaemia in women of reproductive age.

B. Project Inputs

The project had the following inputs:

1. Training of health care providers, TBAs, extension health workers, members of local drama groups on anaemia related issues.
2. Materials used in the design and development of IEC package.
3. IFA tablets supply.

C. Project Outputs

The following were the project's outputs:

1. Five reports of research studies done.
2. Increased number of pregnant and recently delivered women counseled on anaemia issues as a result of training given to providers.
3. 60 drama performances conducted by the local drama group within the impact area as a result of the drama training.
4. Increased demand for IFA pills by the community as indicated through anecdotal reports from health facility staff and records of increased attendance at antenatal clinics.
5. Reduction in the incidence of anaemia in pregnant and recently delivered women as demonstrated by comparative results of the baseline and final survey.

D. Project indicators

The following were the main indicators for the project:

1. % of Pregnant and recently delivered women taking at least some IFA pills.
2. % of Pregnant and recently delivered women who will have received a full course (30 pills) of IFA pills.
3. Average number of IFA pills taken by pregnant and recently delivered women over a three months period for pregnant women and one month period for recently delivered women.
4. % of Pregnant and recently delivered women who consume heme-iron-rich foods and vitamin Containing foods.
5. % of Pregnant and recently delivered women who consume vitamin A-rich foods.
6. % of Pregnant and recently delivered women who know how many IFA pills to take.
7. % of Pregnant and recently delivered women who know they should take IFA pills.
8. % of Pregnant and recently delivered women who know which foods are rich in iron or help to keep them healthy.

Programme Design

The project had two main phases, Research phase and the Intervention phase. During the research phase a number of studies were done in the following areas: Baseline, Productivity, Qualitative, Etiology and Final study. The intervention phase involved carrying out of several activities in the following areas:

1. Training of health care providers, TBAs and community outreach staff.
2. Supply of IFA tablets to all health facilities and TBAs for supply to all pregnant mothers attending antenatal services at these facilities and all women delivering at these centres.
3. Intensive IEC to the community through use of the local drama group, health talks by care providers.
4. Use of the IEC materials like posters, counseling charts, reminder to take posters and pill bags developed and produced by the project.

(a) Formative and Operations Research phase

The research phase was done to determine the prevalence of anaemia and its causes in order to develop a package of appropriate services for pregnant women. Formative research took place prior to the design of the project and was intended to directly influence the project design. The operations research was done to monitor and evaluate project activities. Specifically, the research phase was set out to:

- a) Determine the aetiology of anaemia (nutritional deficiency or parasitic infections) in the impact area, and test a package of drugs to address anaemia (malaria prophylaxis, an helmenthic and IFA).
- b) Determine the risk factors of anaemia based on socio-demographic indicators and aetiologies.
- c) Determine if giving of IFA in places of work can improve compliance, decrease anaemia (generally and those who become pregnant) and increase work output.

(b) Intervention Phase

The intervention phase had one overall goal, that is to decrease the prevalence of mild to moderate anaemia (Hb. 8.0 – 10.9g/dl) and severe anaemia (Hb <8.0g/dl) in pregnant and recently delivered women living in the impact area by at least 50% and 30% respectively by the end of three years.

Specifically, the intervention phase set out to:

- a) Conduct in service education on anaemia for health providers to update their knowledge based on research results.
- b) Develop health education messages on anaemia based on research results.
- c) Develop IEC materials.
- d) Increase IFA pill-taking behaviour so that 90% of pregnant women are taking the number of pills advocated by the programme (at least 90 pills) or practiced by MOH.

- e) Increase intakes of iron-rich foods or foods that can increase the bio-availability of iron during pregnancy.
- f) Increase intakes of Vitamin A-rich foods for pregnant women.
- g) Increase anaemia related knowledge in the community; stimulate demand for anaemia-related services and increased compliance with IFA pills.
- h) Increase knowledge and practices of health care providers to improve supply of anaemia related services.
- i) Ensure that adequate supplies of IFA pills are maintained at health facilities through out the study period.

PROJECT ACTIVITIES

During project implementation, the following activities were conducted: (1) Research (2) Training (3) Development and application of IEC materials; (4) IFA distribution and Supervision.

1. Research

Research activities included the baseline study, a qualitative formative research, and productivity study.

a) Qualitative Survey:

The first study was a qualitative survey whose ultimate objective was to identify and describe constraints to reducing anaemia in women of reproductive age in Thyolo District, Malawi, and to make recommendations on how these constraints can be overcome. Semi-structured interviews and focus group discussions were conducted over a three-week period in three communities chosen to represent different degrees of difficulty in access to healthcare and involvement with the tea estates. The first village was outside main tea estate area, 6 km from the nearest Government health facility. The second was a large tea estate compound, relatively close to tea estate clinic and the district hospital. The third and last village was in the middle of the tea estate, served by a clinic adjacent to the tea estate and the close by district hospital. Iron trials took place in one village and one estate compound.

Among the major findings of the study were:

- a) Limited knowledge of anaemia. In the poorer village with less access to health care, "lack of blood" was seen as primarily a wasting disease. In the other communities, symptoms and treatment of "lack of blood" corresponded more closely with those associated with anaemia. There were concerns in these latter communities about iron tablets causing "too much blood" and because health messages warn against taking medicine without a medical examination.

b) Compliance to IFA tablets was high. There was a demand from all sections of the community for iron tablets to help against wasting. The benefits of iron tablets were recognised by most members of the communities for treating slight lack of blood due to pregnancy and mitigating blood lost at delivery. High levels of compliance were apparent in the iron trials with more women refusing to comply because of the concerns cited in (a) than because of side effects.

c) Supply of iron tablets at antenatal classes, rather than difficulties with compliance, was given unanimously by women in *all communities* as the main reason why they did not take more tablets. They reported being given few, if any, each visit. Providers confirmed this and that the tablets are popular. Traditional Birth Attendants (TBAs) are already established in giving tablets to pregnant women. There was evidence of leakage of tablets into the market. Increased coverage by introducing additional outlets was popular, provided they were sold at a low price (5 *Tambala*). If health providers increased the number of tablets given at ANC, then demand for bought tablets may be less.

d) Health care decisions were made by the family members (relatives and husbands) and sometimes by neighbours, rather than by the individual. Men controlled the finances to purchase treatment and food. Women were sometimes treated unsympathetically by nurse/midwives. Access to radio and contact with health providers gave higher exposure to healthcare messages and was associated with greater knowledge and concerns about anaemia and iron tablets.

e) Women in the village had more limited knowledge of nutritional advice than those women on the estate but they all cited poverty as the major constraint to a varied diet. Gender was also a constraint for women. No nutritional advice on methods of increasing iron intake from the staple food (maize) was found. It was apparent that information on coca cola (thought to increase blood) needed to be provided to discourage the misconception. The role of lemons (thought to reduce blood, but actually increase absorption of iron) in the diet was unclear.

f) Aluminium or clay cooking pots were used in the study area. The introduction of iron cooking pots may be a sustainable way of increasing iron intake, but their acceptability and availability are not known.

g) Compliance with malaria prophylaxis could be problematic as this was currently not routinely practiced. This was especially the case in the tea estate compound and village 2, where malaria was known to cause "lack of blood" and to be dangerous to unborn babies. Malaria prophylaxis during pregnancy was not presently a routine. There was some evidence that if taking Fansidar as a prophylaxis during pregnancy was recommended as part of the intervention, compliance was likely to be a problem.

b) Baseline Survey:

The second study conducted was the baseline survey. Its objectives were to provide initial estimates of the prevalence of anaemia in the study area; and to investigate which, if any, of the socio-economic, demographic, nutritional, anthropometric and healthcare use factors were associated with anaemia in pregnant and recently delivered women.

The study population was defined as villages and tea estate compounds supplying workers for the estates. Three strata within this population were identified and these were pregnant women, women who delivered in the last 6 months and adult males from the same households.

Cluster sampling was used to obtain a random sample of haemoglobin measurements in 210 women in each group, and 315 men. A questionnaire was used to collect demographic and socio-economic data, and data on nutritional and antenatal clinic knowledge and practice. The collection of data lasted 30 days, commencing in June 1996

The following were the major results of the study:

- a) Demographic data showed that 50% of the women were from the Lomwe ethnic group and 93% were Christians. Two thirds lived in houses made from unbaked bricks with thatched roofs. The woman's husband headed seventy-seven percent of the households while the woman herself was head of the household in only 8% of the population interviewed. Main forms of income were estate work, petty trading and farming.
- b) The majority of pregnant women involved in the study were in the 2nd or 3rd trimester (93%). Women commonly started attending antenatal care (ANC) at around 5 or 6 months of pregnancy, although they thought they should start attending at 3 or 4 months. Only half those attending ANC received any iron folate (IFA) tablets at their last visit and were given 7 or fewer tablets.
- c) Ninety- seven percent of the women who had delivered in the last 6 months had attended ANC at least once during their pregnancy. In terms of place where they had delivered, 34% of the women had delivered at the TBAs by the TBAs and 22% had delivered at their home. While women preferred delivery at a health centre, the distance to be walked and the attitude of the midwives were cited as major constraints.
- d) Eighty-six percent of both pregnant and recently delivered women reported taking all the IFA tablets they were given, and 10% sought tablets from other sources than ANC. This demonstrated that compliance was not a major problem, rather there was an unmet need that was observed.
- e) Anaemia defined as a haemoglobin level of less than 11g/dl was found in 67% of the pregnant women. In recently delivered women, anaemia defined

as a haemoglobin level of less than 12g/dl was found amongst 61% of the women. In both these groups the majority of anaemia was mild, with severe anaemia having a prevalence of 4% or less. Only 36% of men were anaemic.

- f) *Protective factors against anaemia in pregnant women:* being Ngoni, owning a radio, 2 or more children over 5 years old in the household and having taken at least 35 IFA tablets during present pregnancy. Anaemia is less prevalent in the first trimester than in later trimesters.
- g) *Protective factors in women who delivered in the last 6 months:* eating milk or meat in the last week and receiving malaria treatment during pregnancy. Very young mothers (<20 years) were less at risk than older women.

In conclusion, the study showed that:

1. Two thirds of women in the study area were anaemic. Of these, approximately 4% were severely anaemic. (A prevalence of above 2% in a population is considered high by WHO.)
2. In this district, anaemia was associated with diet insufficiencies and low socio-economic status.
3. HIV prevalence is also likely to be a cause but could not be investigated in the present study.
4. IFA supplementation during pregnancy was non-existent or very low at the time of the study because of supply problems with IFA.
5. Compliance was not a major problem.

Overall these results suggested that the proposed intervention to promote a healthy diet, early attendance at ANC and increased coverage and compliance with taking IFA tablets and malaria prophylaxis was the correct strategy.

c) Productivity Study

The productivity study conducted among the workers on the estates specifically addressed the following three objectives:

- (a) to quantify loss of productivity due to anaemia in a population with predominately mild anaemia;
- (b) to estimate the loss of wage income attributable to anaemia over 18 days (3 weeks of 6 working days);
- (c) to investigate the impact of estate wages on the economic welfare of woman and their households.

The study subjects comprised of 217 non-pregnant women in one division enrolled for coffee picking on the first 3 days of the 18-day study period. Information obtained included the woman's home location, key demographic variables, socio-economic status, and other factors deemed to influence yield. Anthropometric measurements, haemoglobin levels and malarial parasite status

were determined, and data on absences from work and yield picked were also taken.

The following were the major results obtained in study:

- a) Anaemia may be associated with a decrease in the number of days worked and the overall amount of coffee picked over the 18 days period, but not on average kilograms of coffee picked on days the woman worked.
- b) Productivity was significantly associated with having received treatment during study period, malaria parasites, reading ability, other sources of income, and having a child over 5 years old, but not by anthropometric measurements, number of pregnancies, recent food intake and socio-economic status.
- c) Estate wages had an impact on the economic welfare of women and their households because estate women are disproportionately separated and widowed. In Thyolo the poorest 8% of the women gained their main income from estate employment, despite the fact that the wages were low, there was considerable social stigma and it was physically very demanding. Other women engaged in estate work because they disproportionately lacked access to other sources of income, and had fewer alternatives open to them. The income was mostly used to purchase food and household items such as soap and matches. Many women were in a perpetual cycle of debt.

The study therefore concluded that:

- a) There was no significant association between anaemia and lower total yields over the 18-day study period.
- b) The decrease in productivity was due to fewer days at work rather than lower productivity on days worked.
- c) Over the 18-day study period, the estimated change in earnings with each 1g/dl increase in haemoglobin was MK7.70, amounting to a 3% wage increase for mildly anaemic women.
- d) Qualitative data indicated that estate women and their families are one of the poorest groups in rural Malawi. The extra earnings would have a positive impact on their welfare, enabling them to incorporate essential food items (fish, green vegetables) into their diets and purchase other household goods.
- e) Mild anaemia may affect the productivity of Malawian women, although more research is needed to substantiate this finding. The implication is that population-based programmes against anaemia may be justifiable even for population with predominantly mild anaemia.

d) *Monitoring and Evaluation of the Maternal Anaemia Programme,*

This was conducted to address the following objectives:

- a) to assess the knowledge of anaemia, correct treatment, prevention messages and correct use of IEC materials by the healthcare providers.

- b) to assess the community's knowledge of anaemia, its correct treatment and prevention.
- c) to assess distribution of iron tablets and accuracy of record keeping by healthcare providers.

Data was collected through interviews with trainers, healthcare providers, supervisors and district health officers, focus group discussions with villagers, village leaders and drama group members, observation and assessment of healthcare providers' counselling skills, and examination of record books.

Major findings during the monitoring and evaluation exercise included the following:

- a) Health care providers had adequate knowledge of anaemia, correct treatment, prevention messages and correct use of IEC materials and were content with the one week training given except that the time allowed in relation with the content was not adequate.
- b) All providers had knowledge of, and implemented major antenatal activities. However, postnatal care follow-up was not reinforced and generally the community members were not aware of the necessity.
- c) IEC materials designed for the programme were adequate and appropriate. However, healthcare providers did not use them consistently during individual counselling sessions as it was too time consuming. IEC messages focused on taking iron tablets to prevent anaemia with little emphasis on eating the required nutrients.
- d) The community's knowledge of anaemia, its treatment and prevention was good as they had been educated about this during various IEC avenues used.
- e) Most women started antenatal care after 24 weeks gestation despite intensified IEC on early attendance. Problems in accessibility to healthcare facilities and cultural beliefs were cited as contributing factors.
- f) Apart from taking iron tablets, women used traditional methods of treating anaemia which included leaves from guava plant, *mlombwa tree* and avocado tree. However there is no scientific proof of the effectiveness of this treatment.
- g) The consistent supply of iron tablets motivated mothers to attend antenatal care. Compliance with taking iron tablets was generally good despite the side effects experienced and some misconceptions to their effectiveness.
- h) Distribution of IFA tablets from project staff to the TBAs and health centres and then to the client, was good. However there was no way accounting for the amount of iron tablets actually taken by the clients. Supervision by health care providers was inadequate due to transport problems.
- i) The sustainability of the programme was hampered by its dependence on donor funding. Due to financial constraints faced by the Ministry of Health and Population, most of the interventions, especially the supply of iron tablets and supervision, might be inadequately implemented. The programme was

relevant to the needs of Malawian women and should be sustained through every possible means.

e) *The Final Survey*

The objective of the final evaluation was to provide a basis for comparison between baseline survey results and results after interventions had been carried out. Exactly the same clusters that had been randomly selected for the baseline survey were used to collect data. Random blood samples for haemoglobin measurement were obtained from pregnant women, women who had delivered in the last 6 months and men. The same questionnaire as the one that had been used during the baseline was used to collect demographic and socio-economic data on knowledge and practice of nutrition and antenatal care.

The major findings of the final survey included the following:

- a) Anaemia, defined as haemoglobin of <11g/dl, was found in 60% of pregnant women while as this was 67% at baseline. In terms of severe anaemia, defined as haemoglobin of <7g/dl, 1.9% of pregnant women had it as oppose to 3.3% at baseline.
- b) Anaemia, defined as haemoglobin of <12g/dl, was found in 51% of women who had delivered in the past six months as oppose to 61% at baseline. In terms of severe anaemia, defined as haemoglobin of <7g/dl, 2.4% of the women who had delivered in the past six months has severe anaemia as oppose to 4.3% at baseline.
- c) Anaemia, defined as haemoglobin of <13g/dl, was found in 30% of men compared to 36% at baseline. In terms of severe anaemia, defined as haemoglobin of <7g/dl, 1.3% of men were found to have severe anaemia compared to 0.3% at baseline.
- d) Heamoglobin levels increased over the period of the study for all groups, but was significant for the recently delivered women (p.08).
- e) Types of food taken the day preceding the survey included nsima 25% compared to 28% at baseline, cooked green leaves 20% compared to 22% at baseline, and beans or peas 13% compared to 12% at baseline.

Based on the findings in the final survey, it was concluded that:

- a) The intervention had been successful in raising haemoglobin levels and decreasing the prevalence of anaemia, and were statistically significant in women who had recently delivered.
- b) The lack of significance in prevalence of anaemia for pregnant women could be because they had not been exposed to the intervention for as long as the recently delivered women (who had been exposed to it through their pregnancy and after delivery).
- c) There was little difference in antenatal care attendance.
- d) The number of IFA tablets received significantly increased over the study period, both during pregnancy and after delivery.

- e) The proportion of women reporting receiving malaria prophylaxis at ANC increased for both pregnant and recently delivered women, but was only significant for pregnant women.
- f) Mean Mid Upper Arm Circumference (MUAC) was significantly *less* in the final survey than the baseline for pregnant women, but not recently delivered women.
- g) The slight improvements in anaemia prevalence and haemoglobin levels for men could be due to the nutritional aspects of the intervention, or to other factors that could have changed over time.

f) *The Final Evaluation*

The final evaluation was conducted as a complement to both the monitoring exercise carried out in February 1998, and a final knowledge, attitude and practise (KAP) survey carried out in June, 1998. These studies found that significant impact on anaemia and significant changes in knowledge and behaviour among community members and healthcare providers had been achieved. However, it was felt that more information was needed on lessons learnt and the potential for sustaining and replicating the project.

A full evaluation was not deemed necessary as the previous studies clearly showed the project accomplishments. However, a review of lessons learned with respect to sustainability and replicability of the project had not been done. A focused effort of discussion with key personnel to identify these issues was considered important. It was also decided that there were certain areas that had not been adequately covered by the previous evaluations. The evaluation therefore specifically focused on:

- a) direct identification of project strengths, weaknesses and lessons learned.
- b) a closer examination of drug procurement efforts, supervision and training systems as they pertain to sustainability.
- c) consideration of ways to encourage earlier antenatal and more postnatal care attendance.
- d) review of community strategies and activities as they pertained to sustainability.
- e) a very rough assessment of IFA compliance since that was not covered during the final survey

The final evaluation concluded that most of the findings corroborated those found during the other evaluations and these were that:

- a) Community members, healthcare providers and estate staff all knew what the project was addressing.
- b) Healthcare providers indicated their practice had changed as a result of the project. They were more aware of anaemia and the specific interventions, and gave more priority to iron/folic acid (IFA) distribution and education during health education sessions.

- c) The research phase was thoroughly done and provided a solid basis for the intervention package and the development of IEC materials.
- d) The collaboration with the tea estates and the MOHP provide alternative models for assuring health services in areas where the private sector can be significant health service provider.
- e) Aside from the advisory group and the dissemination workshop, there was little planning for the sustainability of the project or for the integration of components and lessons learned into routine service delivery. The potential of village primary health care (PHC) structures to support community anaemia activities was not maximised.

2. Training

i) Health Care providers training

Various cadres of health care providers were trained, including a Clinical Officer, Medical Assistants, Nurses, Midwives, Health Assistants, Health Surveillance Assistants (HSAs). These health care providers were trained in importance of maternal anaemia, effects of anaemia on the health of the woman and the child, IFA dosages, appropriate anaemia counselling and interpersonal skills, and anaemia prevention. The health care providers were also trained or refresher trained in various topics on ante-natal care, with emphasis placed on nutrition in pregnancy, taking of IFA tablets and handling of its side effects.

Selected health workers were trained to be supervisors of others. This one time five-day training was provided to a total of 75 health care providers who were drawn from the two hospitals in the impact district, and all health centres belonging to the government, Christian Hospitals Association of Malawi (CHAM), and Private Agriculture Estates in the impact district of Thyolo.

ii) Training of TBAs

A total of 28 TBAs from the villages within the impact area were trained. TBAs were trained in early anaemia detection, IFA dosages, management of IFA side effects, appropriate anaemia counseling and interpersonal skills, and anaemia prevention. Information on HIV/AIDS, Family Planning, Exclusive Breastfeeding and importance of immunization was also given.

iii) Training of the Local Drama Group

A total of ten community members from the villages surrounding the estates in the impact area were trained in drama performance. Apart from training in drama skills, the local drama group members were also trained in basic information on anaemia that included signs and symptoms of anaemia, importance of taking IFA tablets and management of side effects

of IFA tablets. The drama group was also taught how to present the information in a theatre participatory approach to the community.

3. Development of IEC materials

IEC materials were developed based on results of the various research studies. The materials included posters, counselling charts, reminder to take posters, and pill bags. The poster depicted a health care provider emphasizing the importance of taking IFA tablets by pregnant and recently delivered women, as well as indicating that the IFA tablets could be present in a variety of colours. The counselling charts contained different messages. For example (a) messages relating to misconceptions associated with soft drinks such as coka cola, (b) the importance of taking anti-malarials in pregnancy, (c) recommended frequency of taking IFA tablets, (c) importance of good nutrition in pregnancy, and (d) management of side effects of IFA tablets. The reminder to take posters were small cards that were to be placed by the woman's bedside to remind her of taking the IFA tablet daily by ticking in an appropriate box when IFA tablet was taken. The pill bag was a small plastic where IFA tablets given by the health care provider were placed. On one side of the little bag there was a written instruction and a picture depicting a message on dosage and frequency of taking the IFA tablets. All these materials had been pre-tested and revised before incorporation into the various programme activities.

4. Distribution of IFA tablets

Approximately ten million IFA tablets mainly supplied by UNICEF and a few procured locally, were distributed to the two Hospitals in the district, all health centers, and to all TBAs within the impact area. The tablets were supplied to all pregnant women who attended the Ante-Natal Clinics and all recently delivered women who delivered at government, CHAM and private estate health facilities and at TBAs within the impact area. Each supplying unit maintained records of all the beneficiaries and replenishment from Project HOPE was based on the returns.

5. IEC interventions in the community

The IEC interventions in the community involved drama performances on anaemia themes, health education talks by health providers at the health clinic, by HSAs in the community and by TBAs at their clinic. Approximately 60 drama performances were conducted on the estate compounds and surrounding villages within the impact area. Numerous health education talks were conducted by health care providers and TBAs on each antenatal clinic day and

during community health meetings on the estate compounds and the surrounding villages.

6. Supervision of health providers and TBAs

The health care providers and TBAs were supervised quarterly by Project HOPE Coordinator, accompanied by the District Health Office TBA Coordinator. The brief supervisory visits focused on review of record of IFA distribution and actual stock of IFA tablets, problem identification and discussions on identified problems, and necessary corrective action taken.

LESSONS LEARNED

Over the length of the programme, several lessons were learnt on the strategies used and on the total management and implementation modalities of the programme.

A. Lessons Learnt on strategies

Among the major lessons learned on strategies were the following:

1. Formative research does determine a package of maximally effective interventions only that they are very expensive. During data collection the project always had to hire people as well as vehicles to facilitate the process.
2. Involvement of TBAs in iron distribution is an effective strategy for improving access to iron at community level. These people are already based in the community and are well accepted and respected by the community. So whatever education they give is accepted more than someone just going there for an activity like health education. Individuals who do not go to health facilities either due to poverty or other reasons usually feel free to visit these TBAs hence receive the IFA pills.
3. Multiple IEC methodologies improve programme effectiveness and the profile for anaemia. In this project the methodologies used involved giving of health talks, drama performances and use of developed IEC materials which collectively assisted in achieving the outcomes.
4. Use of the existing community dissemination structures assist with programme success. This was experienced through the use of a local drama group and HSAs who were already in the targeted community.
5. Inclusion of men as a target for IEC might have a positive programme impact. This programme did not include men as one of its targets but it was

discovered during the project implementation that men play an important role in decision making pertaining to health and nutrition in the families. So they should have been included right from the start.

6. Separating maternal anaemia from other anaemia allows effective addressing of the problem. This programme had these positive results most likely for the reason that it was run as a parallel programme that got the staff really focused on the maternal anemia problem.
7. A comprehensive approach to maternal anemia reduction works to increase impact. This was noted through a combination of strategies used in this programme.
8. Project HOPE and tea estates collaboration has led to significant changes in health services on the estates and serves as a good model for public/private sector collaboration.

B. Lessons Learnt on Management and Implementation

Among the major lessons learned on programme management and implementation were the following:

1. Lack of planning for sustainability or incorporation of lessons learned leads to risk of not leading to improved quality of services and continuity of the services.
2. Despite the fact that the programme was working within the existing policies, some providers were still not aware of some of the policies.

RECOMMENDATIONS

Several recommendations were made on strategies, programme management and implementation, and areas of further research as follows:

A. Recommendations on strategies

The following recommendations were made on strategies:

1. Future activities should focus on strengthening the community primary health care infrastructure, TBAs, HSAs, women groups, etc to promote community awareness of the need to reduce anaemia.
2. Further maternal anaemia reduction efforts should be intergrated into routine services under the District Health Office and Regional Health Office. Specific components could include iron tablet distribution, IEC on anaemia reduction, management of iron side effects, iron-rich foods and healthcare provider training on anaemia reduction.

3. IEC materials and community interventions should target all people involved with making choices around safe motherhood.
4. MOH unit should explore ways to reproduce the IEC materials produced by Project HOPE.
5. Thandizani Moyo, an NGO working with the estate communities in Thyolo is well placed to support anaemia reduction activities in addition to its Child Survival activities.

B. Recommendations on Management and Implementation

The following recommendations were made on management and implementation:

1. Supervision of and supplies for community based services should be health centre based.
2. Feedback to referrals made by Traditional Birth Attendants at community level to Health Centre or District Hospital should be improved.
3. Health Information System (HIS) for essential information should be developed and integrated as part of MOHP routine HIS as presently none exists.
4. Project HOPE should disseminate the results and hand over of the programme activities at community and district hospital levels.
5. Project HOPE should make available to relevant libraries, copies of all the reports, original papers should be made available for copying.
6. For paying institutions, IFA tablets should be included in their pre-natal and post-natal cost package.
7. Future sub-contracts should allow for certain degree of flexibility, e.g. in procurement, hiring of personnel etc.
8. Availability of IFA tablets needed a contingency plan due to the dependence of project results on consistent iron supply. This was necessary to cover the periods when the supplier of IFA tablets was not able to provide the supplies and the programme had to procure the tablets from other sources.
9. The staffing for the programme was dependent more on the one Programme Coordinator such that when he was out of station, some of the programme

activities came to a stand still. It is recommended such a programme should have more than one technical person.

C. Recommendation on areas for Further Research

Considering for further research was proposed in the following areas:

1. Ascertain compliance in taking IFA tablets among the target groups.
2. Investigate the interaction, if any, between IFA and sulphadoxide-pyrimethamine (SP or Fansidar) in pregnant women.
3. Study the impact of IFA supplementation on women continuously taking IFA between pregnancies.

D. Recommendations on the National Anaemia Task Force

Given the shortfalls identified as part of the recommendations, the National Anaemia Task Force was charged with the responsibility to:

1. Monitor national iron tablet supplies.
2. Advocate for anaemia-friendly policies to include supplementation, fortification and food diversification.
3. Review and disseminating information.
4. Co-ordinate key stakeholders in anaemia reduction, these include Ministry of Agriculture, Ministry of Education, Ministry of Gender, Youth and Community Services, Christian Health Association of Malawi (CHAM) and other NGOs.

CONCLUSION

This project re-emphasised the problem of anaemia in pregnant women and recently delivered women and highlighted the socio-cultural determinants of the deficiency. It has demonstrated innovations in programme delivery, the development of new IEC materials and methods. Compliance was shown to be not an issue and that knowledge of, and demand for, anaemia and iron deficiency prevention and control exists.

Also highlighted was the difficulty of supply of IFA tablets as a chronic, persistent problem; that collaboration among stakeholders takes time and effort to achieve; and that there was a persistent need to educate health providers and policy makers, as well as mothers and their community.

This project also identified significant operational and technical aspects associated with the implementation of the package, which could be applied on a larger scale. While much of the experience gained will assist in future anaemia reduction interventions, this project did not adequately consider the handover and integration of its specific activities into the routine Thyolo District health services. For example, the distribution and monitoring of IFA tablets should have been done through the District Health Office and the Estate drug distribution and

monitoring systems; the training conducted and follow-up after the training should have been done jointly with the District Health Office and the Estate Clinic staff. As a result of this, the momentum gained from the project, in the study area, risks being lost.

What is noteworthy however, is that through this project, stronger collaborative working relationships were developed between the District Health Office of the Ministry of Health and Population and the Private Agriculture estates in Thyolo District.