

**CREDIT WITH EDUCATION IMPACT REVIEW NO. 3:**  
**CHILDREN'S NUTRITIONAL STATUS**  
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## INTRODUCTION

Freedom from Hunger has focused its efforts over the last decade on developing, testing and disseminating a chronic hunger and poverty alleviation strategy called *Credit with Education*. An integral part of this process is to rigorously evaluate whether *Credit with Education*—which combines microfinance and health and business education services for rural women—in fact achieves Freedom from Hunger's mission to improve food security and nutritional status for poor families in the developing world. This paper summarizes findings from Freedom from Hunger's efforts to assess the impact of *Credit with Education* on children's nutritional status. The conclusions presented are drawn from research done on *Credit with Education* programs in Ghana and Bolivia.

### **The Problem—Global Malnutrition**

UNICEF's annual *State of the World's Children* report helps us understand the daunting scale of the problem of global childhood malnutrition. The 1998 report states that more than 200 million children in developing countries under age five suffer from varying degrees of malnutrition. The 2002 report tells us that during the 1990s, the rates of malnutrition have declined by only 17 percent in developing countries, and in sub-Saharan Africa the absolute number of children suffering from malnutrition actually increased. The World Health Organization estimates that malnutrition contributes to more than one-half of the deaths of children under five who die every year in developing countries—equaling about 6 million deaths. In addition, more than 2 million children die each year from dehydration due to persistent diarrhea, often aggravated by malnutrition (*State of the World's Children Report*, 1998).

#### **BOX 1: KEY DEFINITIONS**

**Malnutrition.** A condition resulting from inadequate consumption (undernutrition) or excessive consumption of a nutrient, which can impair physical and mental health, and can be the cause or result of infectious diseases.

**Hungry season.** Inadequate access to sufficient foods on a cyclical or seasonal basis. Particularly in rural areas, where seasonality is more pronounced and markets less developed, the prevalence of food insecurity rises during the rainy season preceding the harvest, or the "hungry season."

**Food security.** When all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life. To be food-secure, households and individuals need to have available food, access to food and the ability to fully utilize it once it is consumed.

For those children who do survive, however, the effects of malnutrition are felt through childhood and beyond. A malnourished child is less able to fight infection and suffers longer and more frequent bouts of illness. A malnourished child has less motivation, curiosity and desire to engage in playful activities, thus reducing mental and cognitive development (*State of the World's Children Report*, 1998). And, a malnourished child who survives into adolescence

and adulthood usually becomes part of a vicious cycle of malnutrition and poor health that continues for generations.

The determinants of children's nutritional status are numerous, complex and intimately interwoven. The family's economic resources, number of children in the household, access to education, the mother's health status, frequency and severity of illnesses experienced, and sanitation in and around the home are among the many factors which can affect children's growth. Of the diverse factors underlying a child's nutritional status, two have the most direct and immediate effect: the occurrence of illness during childhood and the quality of a child's diet. Illness affects children's appetites and their willingness to eat food that is offered. High-quality (nutrient-dense) foods are crucial because of children's growth demands and the small size of their stomachs. It is not just a matter of importance whether a family *has* food, but whether the family knows and is able to give a child foods of sufficient nutritional quality.

The principal factor underlying malnutrition is poverty. According to the Food and Agriculture Organization of the United Nations, those living on less than US\$1 per day (or the poorest 1.5 billion people in the world) spend roughly 80 percent of their income on food (*The State of Food and Agriculture 1998*). Poverty and malnutrition are so closely related that interventions which address one should not ignore the other. Since the early 1990s, microfinance has become a popular strategy for poverty alleviation. Because children's nutritional status is useful as an expression of quality of life and a determinant for the future, it is important to assess the effects of microfinance on this valuable indicator. Few, however, have done just that, and therefore, relatively little evidence exists regarding the impact of microfinance services on nutritional status, particularly children's nutritional status.

## REVIEW OF LITERATURE

The impact of microfinance services on nutritional status and food security has been measured in a handful of studies, with mixed results. Studies conducted by Zeller and Sharma in Bangladesh, China and Madagascar demonstrated positive effects on household caloric availability (Zeller and Sharma 1998). However, studies in Malawi and Cameroon did not show significant impact (Diagne and Zeller 2001, Schrieder 1996). Recognizing the fact that most microloans are often used to finance consumption-related expenditures (such as food) in the household, Pitt and Khandker (1996) examined the effect of participation in microfinance programs on seasonality in consumption. They saw the largest consumption effect of microcredit in Bangladesh during the hungry season, and found those households with low consumption during the hungry season to be more likely to participate in microcredit programs.

Because nutritional status of children is dependent on a multitude of factors, as mentioned previously in this paper, it is difficult to accurately attribute children's nutritional outcomes to the factors under examination. In Bangladesh, in fact, Pitt and Khandker were unable to find a significant nutritional effect related to microcredit services (Pitt and Khandker 1996). Nutritional effects were also not seen in Niger (Schrieder and Pfaff 1997) nor in Malawi (Diagne and Zeller 2001). However, when the alternative situation—a lack of microcredit services—was studied, nutritional status of children was impacted. Foster saw that after the 1988 floods in

Bangladesh, children in poorer households confronting the disaster experienced declining nutritional status as a result of insufficient access to microcredit (Foster 1995).

Mixed results in the literature reflect important interdependencies to consider when studying the relationship of microfinance to nutritional status and food security. The impact of microfinance services greatly depend on the type of financial services offered, the kind of clients receiving the services and whether other services are offered along with the microfinance.

### The Link Between *Credit with Education* and Improved Nutritional Status of Children

Addressing the complexity and scale of malnutrition requires innovative and multi-level efforts. Strategies must be replicable, have potential for widespread expansion and outreach, and be sustainable. Freedom from Hunger’s strategy—in the form of an integrated microfinance and education program called *Credit with Education*—attempts to respond to these challenges. *Credit with Education* addresses malnutrition’s principal underlying factor, poverty, while also providing information and a problem-solving forum to address the more immediate factors, such as illness and diet quality.

Figure 1: *Credit with Education* Benefits Process

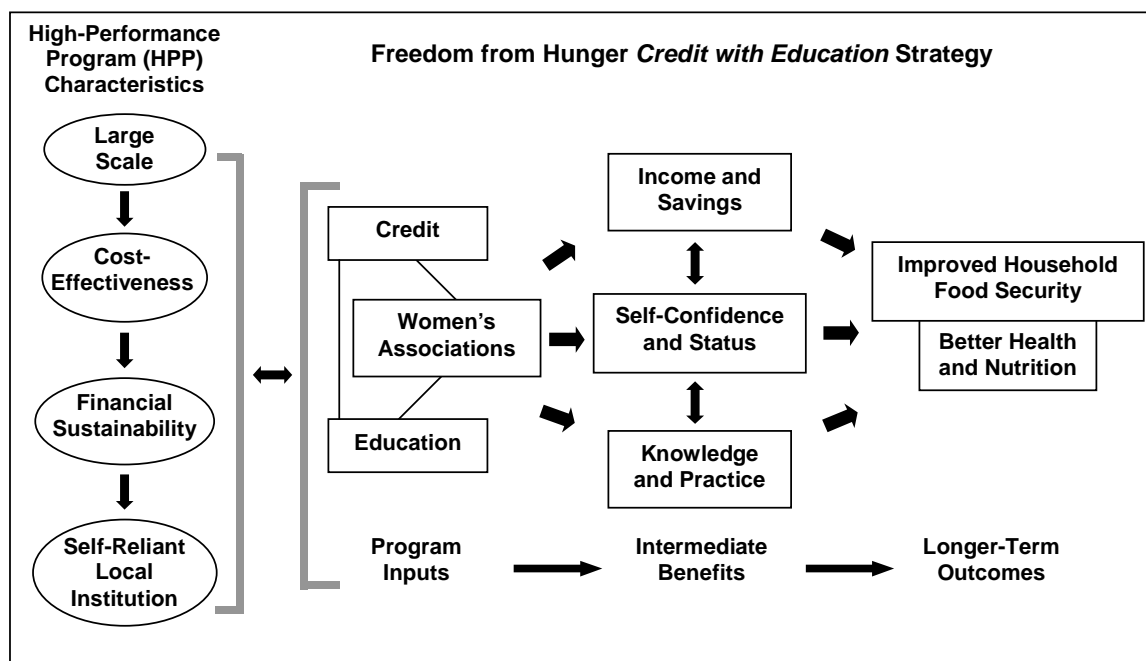


Figure 1 above depicts the hypothesized benefit process of the *Credit with Education* strategy, reflecting both intermediate and ultimate impact goals. The inputs of credit and education—channeled through women’s associations—have the potential to produce intermediate benefits, or first-order effects, that include changes in knowledge and practice, increased self-confidence and improved income and savings. These first-order effects provide the potential for the second-order, and ultimate, effects of improved food security and nutritional status. Figure 1 also reflects the fact that food security at the household level is necessary but not sufficient to improve children’s nutritional status.

The services offered by *Credit with Education* include loans, savings and education. These are offered in an integrated fashion to women in rural communities of the developing world. The education component includes topics on improved business practices as well as health and nutrition topics, such as breastfeeding, diarrhea prevention and treatment, infant and child feeding, family planning, immunization and HIV/AIDS prevention. *Credit with Education* was designed to address the problems of chronic hunger and poverty because

- 1) access to financial services (loans and savings) offers poor households a flexible and potentially sustainable means for enhancing their livelihood strategies and reducing their vulnerability;
- 2) research has shown that income increases that will have the most direct, positive impact on food security and nutrition are those earned by the poorest households, controlled by women and earned in steady and regular amounts; and
- 3) income in itself is unlikely to have a substantial impact on malnutrition of women and young children unless key practices affecting maternal and child health and nutrition are also adopted.

*Credit with Education* services are targeted to women as the group that has the greatest ability to impact children's nutritional status. Women play an essential role in the family's well-being because of their dual economic and domestic roles within the household. The significance of women's traditional work—purchasing, preparing and serving food, child care, infant feeding, maintaining a clean and safe environment, overseeing children's personal hygiene, and securing preventive and curative health services—to the nutrition and health of the family has long been appreciated. Women's productive or economic work is also critical to the health of the family, yet it is women who typically have the most limited access to formal development-oriented services such as credit.

The credit component of *Credit with Education* follows the village-banking model where women form groups, called Credit Associations, and receive loans that are mutually guaranteed by the other group members. Credit Associations meet weekly during the 16-week loan cycle to make repayments and deposit savings. Also during the weekly meetings, women participate in education sessions that offer information to build knowledge, confidence and skills women use to manage decisions around their children's illnesses, feeding practices and choices, family planning, immunization and other areas that have direct and important effects on children's nutritional status. The education sessions are designed to create and promote behavior change and utilize the principles of dialogue-based education.<sup>1</sup>

Not only are the resources of credit and education individually important, but when offered in conjunction they potentially create a synergistic effect. For example, a mother might be learning at the group meetings how adding just one or two high-quality foods to her three-year-old's diet could greatly improve the child's nutrition. At the same time, this woman may also be steadily earning more profits through her basket-making business and now has the ability to buy one or two different types of food in the daily market. Because the woman was at the same time receiving education services and improving her financial situation, the impact is greater than if

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<sup>1</sup> For more detailed information on the *Credit with Education* methodology, see Vor der Bruegge, et al., 1995.

she had access to only one of these services. This example illustrates the synergy *Credit with Education* is intended to generate to improve children's nutritional status.

## METHODOLOGY

Freedom from Hunger undertook two multi-year studies to evaluate *Credit with Education's* impact on children's nutritional status, on their mothers' economic capacity, women's empowerment and mothers' adoption of key child survival health/nutrition practices. Baseline and follow-up information was collected over a three- to four-year period with annual visits to assess the quality of the implementation and to conduct qualitative research. The sites chosen to conduct the research were the Lower Pra Rural Bank *Credit with Education* program in coastal Ghana, and the CRECER (Crédito con Educación Rural) *Credit with Education* program in the rural highlands of Bolivia (MkNelly and Dunford, 1998, 1999).

In both studies, two major survey and anthropometric (heights and weights) data collection rounds were carried out—with different mother/child pairs participating in the two time periods. A quasi-experimental design was applied at the community level to minimize possible bias. Following baseline data collection, study communities were assigned to either a program or control group. The control communities did not receive *Credit with Education* services until the evaluation research was completed. Baseline respondents were later classified as “future participants” or “nonparticipants,” depending on whether or not they joined the program (when and if it was offered in their community).

Three sample groups of women with children under three years of age were included in the follow-up research: *Credit with Education* program participants of at least one year; nonparticipants in program communities; and residents in control communities selected **not** to receive the program for the period of the study. Women for the two nonparticipant groups were randomly selected from comprehensive lists of all women with children younger than three years of age.

Program impact was evaluated by comparing the magnitude and direction of change in the responses and measurements between the two data collection rounds—program participants versus nonparticipants and residents in control communities.

### **BOX 2: ANALYZING RESULTS BY THE QUALITY OF EDUCATION RECEIVED**

To assess the effect of the relative quality of education received in Bolivia, each Credit Association in the study was given a score based on an assessment of the performance of the field agent(s) assigned to that Credit Association over the period of the study. For the follow-up period, the education scores were used to divide clients into three groups of approximately equal numbers—those who received the “worst,” “average” or “best” education. Baseline participants were assigned to the same education-quality categories as the follow-up participants living in the same community.

## STUDY RESULTS—PROGRAM IMPACTS

*“The credit allows me to buy vegetables in larger quantities so I have more to sell. This increases my profit. I can then buy milk for my son. My income also allows me to save. Now I have a reserve to meet an emergency and to help my family through hard times before, I didn’t. We’ve learned about feeding practices for infants and children. We’ve also learned about the importance of good hygiene to prevent sickness such as diarrhea. I value this education very much. Many women in our village lost their children when they became sick. I know how to protect my son and I share that knowledge with others in my community—even the older women.”*

**Rosemary Flores**, a 20-year-old mother of a two-year-old son and *Credit with Education* member in Bolivia.

The results of the studies in Ghana and Bolivia<sup>2</sup> demonstrated *Credit with Education*'s impact on first-order effects (changes in knowledge and practice, improved economic capacity and increased empowerment), which are necessary for impact on the second-order effects of improved food security and children's nutritional status.

### Changes in Food Security

*Credit with Education* offers financial services of loans and savings which are intended to enhance women's economic capacity. This, in turn, can augment household production and consumption, thereby affecting food security within the family. When Freedom from Hunger assessed the changes in women's economic capacity as a result of participation in *Credit with Education*, the following effects were discovered:

- Wide-ranging, but significant, positive increases were seen in Ghana in participants' nonfarm incomes.
- In Bolivia, there was no change in women's individual nonfarm incomes; however, general family incomes of participants were significantly higher.
- A certain amount of each loan is channeled directly to consumption and to augment assets. In Bolivia, one in three borrowers used at least part of their loans for family needs. Also in Bolivia, it was common for *Credit with Education* participants to use their loans to buy animals for the family.<sup>3</sup>

A positive change in household food security is likely to result from the improved economic capacity of women participating in the *Credit with Education* program.

Freedom from Hunger attempted to measure improvements in food security of *Credit with Education* participants, acknowledging the fact that food security is necessary but not independently sufficient to achieve good nutritional status. In both studies, household food security was measured by whether the respondents' families had experienced a time in the last 12

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<sup>2</sup> Full reports and briefs for each evaluation are available on the Freedom from Hunger Web site at [www.ffhtechnical.org/publications/index.html](http://www.ffhtechnical.org/publications/index.html)

<sup>3</sup> “*Credit with Education* Impact Review No. 2: Economic Capacity and Security” is available on the Freedom from Hunger Technical Services Web site at [www.ffhtechnical.org/publications/summary/impactreview2.html](http://www.ffhtechnical.org/publications/summary/impactreview2.html)

months when they had to eat less or less well, and if so, how long the period had lasted and how their households coped.

### Ghana

In Ghana, the *Credit with Education* program had a positive and significant impact on household food security. For the program participant group, the percentage of families who had experienced a period when they had to eat less or less well during the preceding 12 months was cut almost in half. Virtually no change was evident for either nonparticipants in program communities or for residents in control communities. As fewer program-participant households experienced a hungry season, the mean duration of the hungry season was also growing shorter for participants—less than one month in 1996 compared to a mean of almost two months for residents in control communities. This result indicated a positive and significant impact of the *Credit with Education* program in shortening the duration of the hungry season.

Households that had experienced a hungry season typically ate less fufu (a starchy staple made from cassava, often with some yam, plantain or cocoyam added), rice and meat but more gari (dried, processed cassava), cassava or kenkey. These dietary changes reflect a shift to nutritionally inferior, less expensive foods (more gari/cassava and less rice/meat) as well as reduced availability of fresh cassava for preferred staple dishes like fufu, since many women reported that the heavy rains “spoiled” cassava that was still in the ground.

### Bolivia

Study results indicated that the *Credit with Education* program had no significant impact on household food security in Bolivia. Across the three survey groups, women reported that the follow-up year had been a favorable one with especially good harvests. All three groups saw a decline in the percentage of households reporting that they had experienced a period when they had to eat less or less well during the preceding 12 months. While this decline between the baseline and follow-up periods was relatively greatest at 21 percent for the participant sample compared to 13 percent for nonparticipants and 17 percent for controls, there were no significant differences among the groups when controlling for community. The mean duration of the hungry season in the follow-up period was also very similar—two months, on average—for each of the three survey sample groups. While again the relative decline in the average length of the hungry season was greatest for participants, there was no significant difference between the years relative to nonparticipants or residents in control communities.

The follow-up survey included a series of questions designed to capture more specific manifestations of food insecurity. Women were asked if in the last 12 months their families experienced a time when they were forced to eat less than three meals a day, reduce the amount they ate during a given meal or limit the types of food they fed their children. Again, the results were very similar for the three sample groups, with no significant differences between participants and nonparticipants or between participants and residents of control communities. It is indicative of the prevalence of poverty in the Altiplano program area that the majority of households in each of the three sample groups reported experiencing these types of hardships and dietary deprivation.

Households that had experienced a “hungry season” also reported adjusting to this period of particular hardship by eating differently. They ate less of certain foods (potato/*chuño*, vegetables, fruits, meat, cereals) and more of others (flour, yucca, and again potatoes and *chuño*). These dietary changes reflect a shift to nutritionally inferior, less expensive foods (more yucca and less vegetables/fruit/meat) as well as reduced seasonal availability of fresh produce, fruit and potatoes due to relatively undeveloped local markets and the expense and difficulty of transporting during the rainy season.

**BOX 3: KEY LEARNINGS FOR CHANGES IN FOOD SECURITY**

- In Bolivia, there was little evidence of improved household food security of *Credit with Education* participants.
- In Ghana, program participant households showed significantly improved food security compared to the two nonparticipant groups.

**Changes in Mothers' Health/Nutrition Practices**

The first-order effect of women's empowerment was addressed in the studies based on the assumption that when women feel more empowered (or more able to take effective action) they are more likely to take action on behalf of their children and can have a greater impact on their children's health. Analysis of research<sup>4</sup> at each of the two study sites on meaningful indicators of empowerment at the individual, household and community levels demonstrated the following:

- At the community level, women's degree of civic involvement and the strength and variety of social networks they maintain beyond their families improved in both study areas.
- At the individual level, women's self-confidence, self-perception and attitude improved in Ghana.
- At the household level, there were few significant results, except for greater “say” in Bolivia in how much to spend on house repairs and greater “say” in Ghana in whether or not their children went to school.

Positive effects of *Credit with Education* on women's empowerment suggest that women participants would be more receptive to making changes in behaviors and practices, including those related to the caring and feeding of their children. *Credit with Education* attempts to improve care-giving and health-seeking practices of mothers—a factor which can directly impact children's nutritional status—through education on breastfeeding, child feeding, diarrhea treatment and prevention, immunization and family planning. Changes in the health and nutrition practices of participant mothers were found in both the Ghana and Bolivia program sites.

Ghana

In comparing responses from the 1993 baseline and 1996 follow-up surveys in Ghana, program participants demonstrated positive and significant increases when compared to nonparticipants and/or residents in control communities in the following feeding practices promoted by the *Credit with Education* program:

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<sup>4</sup> “*Credit with Education* Impact Review No. 1: Women's Empowerment” is available on the Freedom from Hunger Technical Services Web site at [www.ffhtechnical.org/publications/summary/cweimpactrevu1oct01.html](http://www.ffhtechnical.org/publications/summary/cweimpactrevu1oct01.html)



- Giving newborns the antibody-rich first milk, colostrum.
- Delaying the introduction of liquids and first foods in addition to breastmilk closer to the ideal age for a baby, which is about six months.
- Not using feeding bottles.
- Introducing complementary foods at the ideal age of about six months.
- Increasing the mean number of enrichments (bean/cowpea, egg, fish, groundnut, milk, palm oil) added to the traditional complementary food (*koko*).
- Enriching *Weanimix* (a complementary food promoted and distributed by the Ministry of Health) with fish powder.
- Increasing the frequency of feeding children.

Despite the time and involvement that program participants spent with their loan-financed activities in Ghana, their children were not weaned earlier and were just as likely as children of nonparticipants to be breastfed into their second year of life.

Program participants also showed more improvement in the area of diarrhea treatment and prevention:

- Participants were more likely to rehydrate children who had diarrhea by giving them either Oral Rehydration Solution (ORS) (made from the packets) or home liquids such as tea or rice water.
- Compared to program participants, the two non-client groups were more likely to report potentially deleterious practices for “treating children” by giving them an enema or “modern medicines” not prescribed by health professionals.
- Participants seemed to feel more empowered to deal with cases of diarrhea, as they were significantly less likely than residents in control communities to report taking the child to a health center when the child had diarrhea.
- Participants had better knowledge of diarrhea prevention, especially identifying “covering food to avoid flies” and “keeping food clean” as ways they could prevent diarrhea.
- Fewer program participants said they knew of no action to prevent diarrhea versus both nonparticipants and residents in control communities.

However, no significant difference among the three groups was found when asked about other steps promoted by the program to prevent diarrhea, such as hand-washing, exclusive breastfeeding, reheating cooked food before serving, not keeping cooked food long before serving, and using clean water. In addition, no positive program effect was found on the deleterious practice of limiting or withholding food from children having diarrhea. The study concluded that additional nonformal education about these issues was needed. Also, no program effect was found on immunization coverage. This is likely explained by the fact that immunization coverage rates were rather high even in the baseline period and this topic was not addressed until the second year of a Credit Association's participation in the program.

### *Bolivia*

In comparing responses from the baseline and follow-up surveys, program participants in Bolivia demonstrated positive and significant increases relative to nonparticipants and/or residents in control communities in the following health/nutrition practices promoted by the *Credit with Education* program:

- Giving newborns the antibody-rich first milk, colostrum.
- Delaying the introduction of liquids and first foods in addition to breastmilk closer to the ideal age for a baby, which is about six months.
- Not using feeding bottles.
- Introducing complementary foods at the ideal age of about six months.
- Feeding children foods of high nutritional quality, such as meat and fish.
- Giving more liquids than usual to children who are suffering from diarrhea.
- Having children immunized.
- Completing later-series vaccinations, such as DPT3.

Upon follow-up in 1997, program participants also had better knowledge of diarrhea prevention, especially identifying “covering food” and “keeping food clean” as ways of preventing diarrhea compared to nonparticipants and/or residents in control communities.

Credit Associations included in the study in Bolivia were drawn from a relatively large study area covering five different provinces on the Altiplano, or highland region around Lake Titicaca. While there is relative uniformity in the credit policies and terms, over the course of the research it became clear that the amount and quality of education services facilitated at the Credit Associations' regular meetings varied across borrower groups. Members of certain Credit Associations could talk at length about the specific health and nutrition behaviors they were discussing and trying, and their meeting places would be decorated with posters depicting the health topics that the groups had discussed. At the other extreme, members of some Credit Associations complained that their groups had received little to no education other than the basic credit methodology.

In contrast to the education services in Ghana, which were consistently of high quality, the quality of education services in Bolivia varied greatly. This was particularly true in areas that had experienced considerable staff turnover and implementation challenges related to expansion and internal control. During the six to ten months preceding the follow-up data collection round, CRECER management and staff had undertaken a variety of improvements in training and materials development to strengthen the strategy's education component. These efforts were beginning to produce results. A dramatic and significant improvement was seen from the baseline to the follow-up period in the percentage of participants who reported learning about good health and nutrition practices relative to nonparticipants and residents in control communities. An overwhelming majority of the 1997 participants (98%) rated the information they had acquired through the education sessions as “useful” or “very useful.” Still, the quality of education participants received over the course of the study period varied greatly. Given this variability within the client sample, an opportunity existed to explore whether the quality of the education services clients receive affects their knowledge and practice, independent of credit and group solidarity effects.

When results were analyzed by the quality of education the participants received, a few other significant differences were seen. There was a significant and positive difference between baseline and follow-up in the frequency of carrot and squash consumption for those receiving relatively average or worse education compared to those receiving best education (when controlling for child's age and distance to a major market). Children of mothers who received

the best education showed significant and positive differences in the greater consumption of green, leafy vegetables compared to those receiving average education. In the topic areas of diarrhea and immunization, the trends or improvements tended to be greatest for those receiving the best-quality education, but this positive difference in knowledge and practice was not significantly greater than for those receiving average or worse education.

#### Change in the Care of Young Children

In both countries, one of the survey questions attempted to capture how the possible improvements in feeding practices promoted by the program had translated into real change in the way mothers cared for their babies. The mothers were asked whether there had been any differences in how they fed or breastfed the study child as compared to their other, older children, and if so, they were asked to describe the differences. Their responses were classified by whether the change was positive, neutral or negative in relation to recommended practices.

Of the women in Ghana who had more than one child, significantly more participants (63%) in 1996 reported positive differences in how they breastfed or fed the child included in the study as compared to their other children. Only 23 percent of the nonparticipants and 20 percent of the residents in control communities reported the same. Since the *Credit with Education* program had been operating for just two years in the study communities, the percentage of participants making positive changes would likely increase over time.

In Bolivia, significantly more participants (21%) in 1997 reported differences in feeding practices that reflected positive changes than did residents in control communities (only 9%). The quality of the education services Bolivian participants received through the *Credit with Education* program showed a direct relationship to whether they had made positive changes in child-feeding practices. Participants who received best-quality education were significantly more likely (38%) to report making positive changes than participants who received average or worse education (8%). Similarly, when the participant sample is divided into three groups based on the classification of the changes (positive, neutral or negative), those receiving the best education were significantly more likely than those receiving the worst education to make positive changes (42% vs. 9%). So, while a modest positive change was evident in the full client sample, almost twice as many mothers who received best-quality education improved the way they either breastfed or fed their child.

#### Young Children's Dietary Intake in Ghana

An independent study, completed in 1996 by Dr. Margaret Armar-Klemesu of the Noguchi Memorial Medical Institute, supports the findings of Freedom from Hunger's impact study in Ghana. A subsample of Ghanaian children included in the follow-up round was selected for more in-depth dietary intake assessment. By administering a 24-hour recall survey with mothers, food and breastmilk intake for two non-consecutive days was assessed for children between the ages of 8 and 20 months in the study's three groups (participants, nonparticipants and control). The mothers identified measures (e.g., cups, spoons, handfuls) used to offer food to the children, indicated the amount of food offered, and reported on proportions consumed in reference to local measures and fist size. Samples of all foods reported were taken to the lab for calorie and nutrient content analysis using appropriate food composition tables.

Key results of this study showed the following:

- Feeding frequency was not greater for the participants' children relative to the other two groups.
- Dietary quality of the foods given was significantly higher for the participants' children relative to the other two groups.
- Estimated caloric intake was significantly higher for the participants' children relative to the other two groups. A significant difference in caloric intake was also found between participants' children who met or exceeded the caloric requirements (100% or more), and residents of control communities, whose intake was "less than 80 percent" of the requirement.

These conclusions provide strong evidence that improved household food security and changes in reported feeding practices actually translate into improved quality and quantity of children's food intake, which directly affects their nutritional status.

**BOX 4: KEY LEARNINGS FOR CHANGES IN HEALTH/NUTRITION PRACTICES**

- In Ghana, significant improvement was seen across a greater range of practices than in Bolivia. Also, more dramatic differences in those practices were evident between participants and nonparticipants in Ghana compared to Bolivia.
- Between the baseline and follow-up periods, the most dramatic differences in knowledge and practice seen in Ghana were regarding exclusive breastfeeding.
- Participants in both countries reported significant positive differences in how they fed or breastfed the study child as compared to their other, older children.
- The quality of the education received by participants seems to influence whether and to what extent learning and recommended behavior change takes place.
- Improved household food security and positive behavior change by mothers, due to *Credit with Education* participation, actually leads to improved food intake of very young children.

**Changes in Children's Nutritional Status**

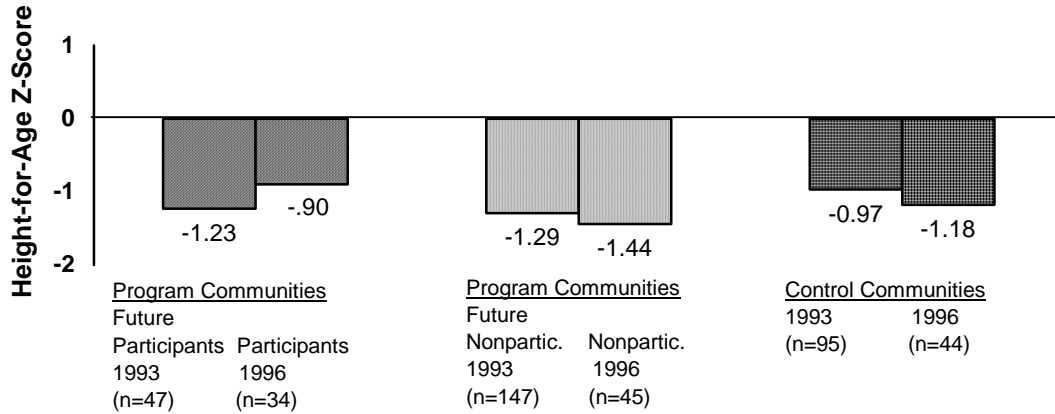
Impact of *Credit with Education* on children's nutritional status was determined by measuring heights and weights in the baseline and follow-up periods. These measurements were converted into height-for-age (HAZ) and weight-for-age (WAZ) z-scores, which control for the variation in heights and weights at different ages and by gender. Z-scores represent the standard deviation from the National Center for Health Statistics (NCHS) median for children of that age and sex. For example, a z-score of 0 would indicate a height-for-age measurement equal to the NCHS median, while z-score values of 1 or -1 represent one standard deviation above or below the median. The World Health Organization and others classify measurements falling between -1 and -2 standard deviations as "mildly malnourished," between -2 and -3 standard deviations as "moderately malnourished," and below -3 standard deviations as "severely malnourished."

Ghana

The results of the study in Ghana are clear. Figures 2 and 3 show that in both height-for-age and weight-for-age, participants' one-year-old children showed improved nutritional status compared to the children of residents of control communities. The mean height-for-age z-score (HAZ) for participants' one-year-olds was 0.3 better in the follow-up period, whereas the mean HAZ for

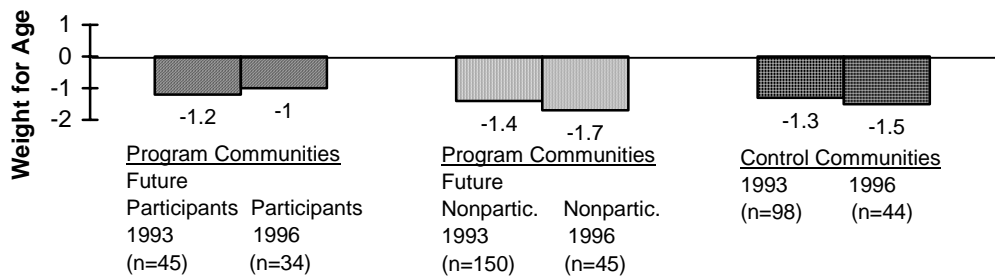
children in control communities was 0.2 worse, and for those in the nonparticipants group, it was 0.15 worse.

**Figure 2: Nutritional Status—Height-for-Age of One-Year-Old Children in Ghana**



**Comparing 1993 and 1996**

**Figure 3: Nutritional Status—Weight-for-Age of One-Year-Old Children in Ghana**



**Comparing 1993 and 1996**

It is also important to consider these results in light of the fact that when nutritional status was measured at baseline, the children in communities assigned randomly to the control group had significantly better nutritional status compared to the children in communities assigned to receive the program.

Weight-for-age measures are often referred to as measures of short-term or acute malnutrition, because a child's weight can fluctuate more dramatically than his/her height in a relatively short period. For the same reason, height-for-age measures are said to better capture longer-term or chronic malnutrition. The study results in Ghana indicated that *Credit with Education* had positive and significant impact on both the chronic and acute malnutrition of participants' one-year-old children. Both height and weight for age improved for participants' children between 1993 and 1996, while the two nonparticipant groups showed deterioration in both scores.

A similar, although statistically insignificant, effect was found in the prevalence of chronic and acute malnutrition. Fewer of the participants' children (15%) were malnourished upon follow-up in 1996 relative to the children of nonparticipants in program communities (20%) or residents in control communities (23%).

### Bolivia

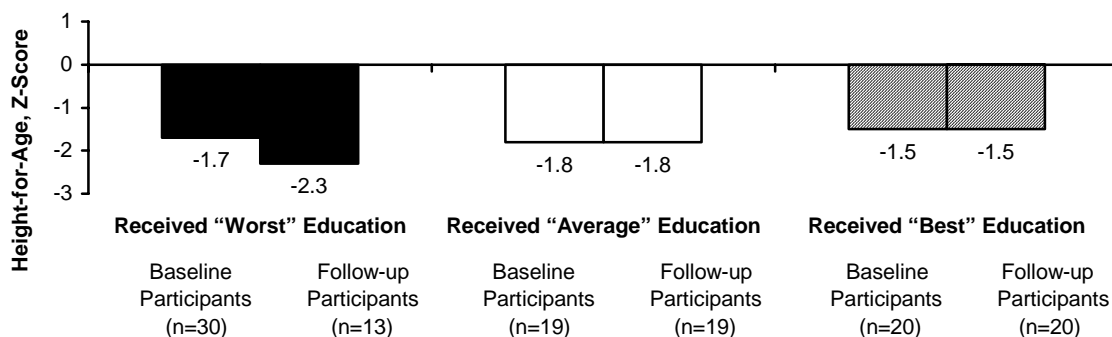
Results from the study in Bolivia showed a lack of positive difference in the nutritional status of *Credit with Education* participants' children compared to nonparticipants' children. Essentially, women's participation in the program seemed to have no effect on the nutritional status of their children.

One possible explanation for not realizing a positive impact on children's nutritional status was that participation in the program did not lead to sufficient change in clients' health and nutrition behaviors to improve their children's growth. Assuming that the maternal and child health behaviors promoted by the program are associated with better child health and nutrition, the amount and quality of health education services provided through the program would affect caregiver practices and ultimately child growth.

As described previously, the quality of health/nutrition education offered to the Credit Associations in Bolivia varied widely. *Credit with Education* clients in some of the study communities participated in several loan cycles of participatory and interactive learning sessions on a variety of health topics—diarrhea management and prevention, breastfeeding, child feeding, immunization and family planning. Members of other Credit Associations, however, received little to no health education due to implementation problems such as limited supervision and lack of training of field agents and a high field agent turnover rate. Unfortunately, the sample sizes are relatively small when the clients are divided into three categories based on the quality of education received. Still, over the study period, the trend in children's nutritional status shows a pattern of improvement that is more favorable among those who received better-quality education than those who received the relatively worst-quality education.

Figures 4 and 5 below show the mean height-for-age and weight-for-age z-scores of children divided into **three** groups—those whose mothers received the relatively worst, average or best education. In these graphs, the relative decline in nutritional status for the worst group is more pronounced than for those who received average or best education. The children whose mothers received the worst education have a mean height-for-age that is .6 z-scores lower and a mean weight-for-age that is .5 z-scores lower in the follow-up relative to the baseline period. In contrast, the children in the group that received the best education show constant or slightly higher mean z-scores in the follow-up as compared to the baseline period. Comparison between those receiving the worst versus best education is significantly different between baseline and follow-up for children's mean weight-for-age z-scores when controlling for a variety of variables associated with child, household, community and province.

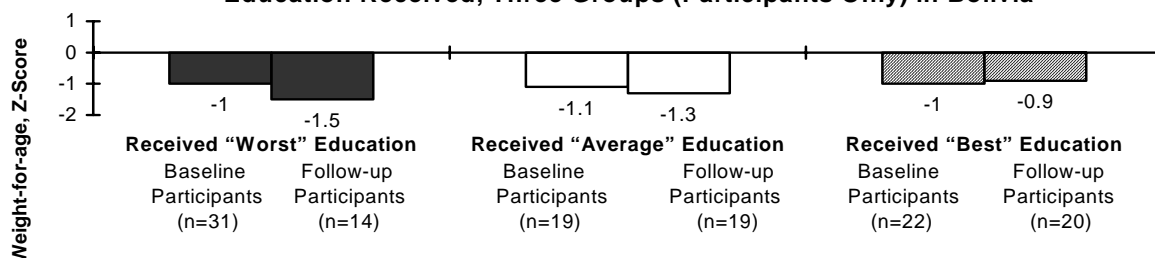
**Figure 4: One-Year-Olds' Nutritional Status—Mean Height-for-Age Z-Score (HAZ) by Quality of Education Received, Three Groups (Participants Only) in Bolivia**



**Comparing Baseline and Follow-up, by Quality of Education**

No significant difference, when controlling for child’s age, month child measured, mother’s height, per capita value of household assets, distance from La Paz and community population.

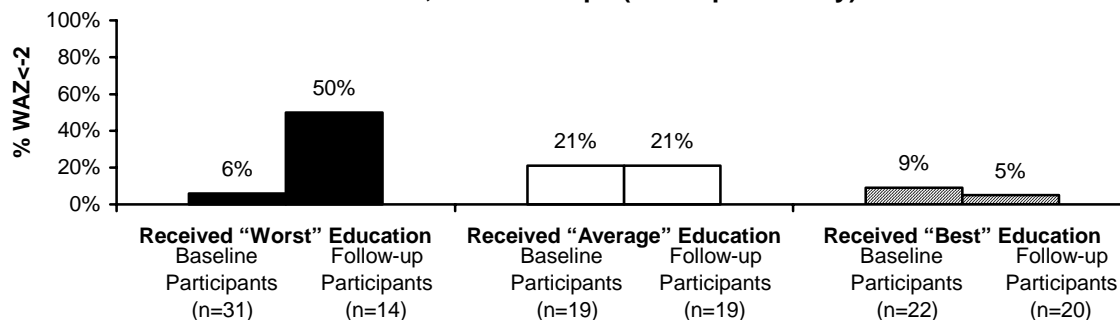
**Figure 5: One-Year-Olds' Nutritional Status—Mean Weight-for-Age Z-Score (WAZ) by Quality of Education Received, Three Groups (Participants Only) in Bolivia**



**Comparing Baseline and Follow-up, by Quality of Education**

In the follow-up, a higher percentage of one-year-old children were categorized as malnourished compared to those of the baseline period for mothers receiving the “worst” education. As shown for this group in Figure 6 below, the percentage of children malnourished (WAZ<-2) was only 6 percent in the baseline period but 50 percent at the follow-up. Even with the small sample sizes, a significant difference is evident in children’s nutritional status between these client groups. Particularly in terms of children’s weight-for-age, better quality of education services provided through the *Credit with Education* program seems positively associated with better nutritional status.

**Figure 6: Percentage of One-Year-Old Children Malnourished (WAZ<-2) by Quality of Education Received, Three Groups (Participants Only) in Bolivia**



**Comparing Baseline and Follow-up, by Quality of Education**

Significant difference ( $p < 0.05$ ) for those receiving "worst" and "average" education when controlling for child's age, mother's height, per capita value of household assets and distance to market. Marginally significant difference ( $p = 0.06$ ) between years for those receiving "worst" and "best" education, controlling for same variables.

**BOX 5: KEY LEARNINGS FOR CHANGES IN CHILDREN'S NUTRITIONAL STATUS**

- ♦ In Ghana, *Credit with Education* participants' children showed positive and significant improvements in nutritional status compared to nonparticipants' children.
- ♦ In Bolivia, no evidence was found for improved nutritional status of participants' children until results were disaggregated by the quality of the education received by participants. Some significant results were then found in nutritional status and percent malnourished of children of mothers receiving good-quality nutrition education.

**Discussion**

After considering the study results—good and bad—in their totality, the synergistic effects of *Credit with Education* seem to be proven. The program in Ghana shows us the potential of *Credit with Education* to affect care-giving behaviors, food security and improvement of children's nutritional outcomes. Clearly, the program sites where behavior changes and food security impacts were greater experienced more positive changes in the nutritional status of participants' children.

Freedom from Hunger's studies in Ghana and Bolivia to evaluate the impact of *Credit with Education* on children's nutritional status showed mixed results. The nutritional status of participants' children in Ghana was positively and significantly different; however, results from Bolivia were not so clear. Basic methodological challenges exist for weeding out *Credit with Education* effects from the other factors impacting nutritional outcomes of children. For example, it is nearly impossible to ensure the similarity of three distinct population groups in two separate time periods, a key challenge in Freedom from Hunger's studies.

Another issue relates to one specific factor that impacts children's nutritional status: low birth weight and length. Differing opinions abound regarding whether babies who are born small and continue to be small in weight and height are, in fact, malnourished. Based on findings from other studies, it seems likely that children included in Freedom from Hunger's study in Bolivia



had relatively short lengths at birth, which continues to affect their relative heights at one year of age. It may be that interventions that improve infants' birth weights and lengths, perhaps by improving maternal nutrition, would have more dramatic impacts on the height-for-age values of one-year-olds.

Given the methodological difficulties and cost implications, the impact of *Credit with Education* on children's nutritional status is not assessed on a routine basis. However, Freedom from Hunger's research studies in Ghana and Bolivia offer important lessons for ensuring that beneficial effects can be achieved by *Credit with Education* programs throughout the world. First and foremost, Freedom from Hunger and its local partner organizations must focus on ensuring that the **quality** of microfinance and education services for clients remains high. The research in Bolivia points specifically to the importance of good-quality health education in order to achieve intended outcomes.

Another key learning highlighted the importance of providing **appropriate** services that match clients' real needs. This was especially true for the financial services. Terms and policies should be conducive for clients to achieve economic return. Also, effort should be made to observe the clients themselves. *Credit with Education* is a program designed specifically to meet the needs of families dealing with chronic hunger and poverty. Therefore, implementing organizations must ensure that the program is in fact reaching poor households that will experience the intermediate and ultimate effects of the program.

Finally, Freedom from Hunger learned that the goal of financial self-sufficiency need not be compromised to see beneficial effects on health and nutrition. In fact, the impacts reported in this paper were achieved by *Credit with Education* programs committed to financial self-sufficiency. The follow-up round of the impact evaluation research in Ghana was conducted when the Lower Pra Rural Bank, using entirely its own loan capital, had been offering *Credit with Education* for about four years. At that time, the program had an operating self-sufficiency ratio of 81 percent, meaning that the interest paid by borrowers covered 81 percent of the Lower Pra Rural Bank's costs of delivering *Credit with Education* as one of its several services to surrounding communities. As of March 2003, the program in Ghana reported operating self-sufficiency of 105 percent. And CRECER, the *Credit with Education* provider in Bolivia, was one of three microcredit institutions profiled by Gibbons and Meehan in *The Microcredit Summit's Challenge: Working Towards Institutional Financial Self-Sufficiency While Maintaining a Commitment to Serving the Poorest Families* (1999). CRECER's efficiency and sustainability ratios were comparable to, some even better than, the other two institutions that offered very little or no education in addition to financial services. As of March 2003, the *Credit with Education* program in Bolivia reported an operating self-sufficiency of 119 percent.

Freedom from Hunger is confident that the positive impacts of microfinance on the health of children and their families can be realized without compromising the goals of financial sustainability. We **can** deliver on the potential of microfinance to impact children's nutritional status, but we must be intentional and deliberate in doing so.

## REFERENCES

- Armar-Klemesu, Margaret. 1996. *Freedom from Hunger Ghana Impact Evaluation Survey: Findings of 24-Hour Dietary Recall Study on Pre-School Children*. Noguchi Memorial Institute for Medical Research, University of Ghana, Legon, Ghana.
- Diagne, A. and M. Zeller. 2001. *Access to credit and its impact on welfare in Malawi*. Research Report No. 116. International Food Policy Research Institute, Washington, D.C.
- Dunford, Christopher. 2001. *Building Better Lives: Sustainable Integration of Microfinance and Education in Health, Family Planning and HIV/AIDS Prevention for the Poorest Entrepreneurs*. The Microcredit Summit Campaign, Washington D.C. (also published in Daley-Harris, Sam. 2002. *Pathways Out of Poverty: Innovations in Microfinance for the Poorest Families*. Kumarian Press, Inc., Bloomfield, CT).
- Foster, A. 1995. "Prices, credit markets, and child growth in low-income areas." *Economic Journal*. 105 (430): 551-570.
- A Future with Hope: Hunger 2002. 12<sup>th</sup> Annual Report on the State of World Hunger*. 2001. Bread for the World Institute. Washington, D.C.  
([http://www.bread.org/institute/hunger\\_report/2002-pdf.html](http://www.bread.org/institute/hunger_report/2002-pdf.html)).
- Gibbons, David S. and Jennifer W. Meehan. 2000. *The Microcredit Summit Challenge: Working Towards Institutional Financial Self-Sufficiency While Maintaining a Commitment to Serving the Poorest Families*. The Microcredit Summit Campaign, Washington, D.C.  
([www.microcreditsummit.org/papers/papers.htm](http://www.microcreditsummit.org/papers/papers.htm)).
- MkNelly, Barbara and Christopher Dunford. 1996. *Are Credit and Savings Services Effective Against Hunger and Malnutrition? A Literature Review and Analysis*. Freedom from Hunger Research Paper No. 1, Freedom from Hunger, Davis, CA  
(<http://www.ffhtechnical.org/publications/summary/r1.html>).
- MkNelly, Barbara and Christopher Dunford. 1999. *Impact of Credit with Education on Mothers and Their Young Children's Nutrition: CRECER Credit with Education Program in Bolivia*. Freedom from Hunger Research Paper No. 5, Freedom from Hunger, Davis, CA  
([ffhtechnical@freefromhunger.org](mailto:ffhtechnical@freefromhunger.org)).
- MkNelly, Barbara and Christopher Dunford. 1998. *Impact of Credit with Education on Mothers and Their Young Children's Nutrition: Lower Pra Rural Bank Credit with Education Program in Ghana*. Freedom from Hunger Research Paper No. 4, Freedom from Hunger, Davis, CA  
([ffhtechnical@freefromhunger.org](mailto:ffhtechnical@freefromhunger.org)).
- Pitt, M. M., and S. R. Khandker. 1996. *Household and intrahousehold impact of the Grameen Bank and similar targeted credit programs in Bangladesh*. World Bank Discussion Papers No. 320. World Bank, Washington, D.C.

Schrieder, G. and K. Pfaff. 1997. *Mise en place d'un réseau de caisses d'épargne villageoises au Niger*. Working Paper No. 28. University of Hohenheim, Stuttgart, Germany.

Schrieder, G. 1996. *The role of rural finance for food security of the poor in Cameroon*. Lang Verlag, Frankfurt, Germany.

*The State of the World's Children 1998*. 1998. The United Nations Children's Fund (UNICEF), New York, NY (<http://unicef.org/publications/index.html>)

*The State of the World's Children 2002*. 2002. The United Nations Children's Fund (UNICEF), New York, NY (<http://unicef.org/publications/index.html>)

*The State of Food and Agriculture 1998*. 1998. FAO Agricultural Series. Food and Agriculture Organization of the United Nations, Rome, Italy.

Vor der Bruegge, Ellen and Maureen Plas, Christopher Dunford, and Kathleen E. Stack. 1995. *Credit with Education: A Self-Financing Way to Empower Women*. Freedom from Hunger, Davis, CA ([ffhtechnical@freefromhunger.org](mailto:ffhtechnical@freefromhunger.org)).

Zeller, M. and M. Sharma. 1998. *Rural finance and poverty alleviation*. International Food Policy Research Institute, Washington, D.C.

Zeller, Manfred and Richard L. Meyer. 2002. *The Triangle of Microfinance: Financial Sustainability, Outreach, and Impact*. The International Food Policy Research Institute, Washington, D.C.