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EVALUATION OF THE AIN-C PROGRAM IN HONDURAS

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Abstract

The Honduras AIN-C (*Atencion Integral a la Ninez en la Comunidad* [Integrated Community Child Health Program]) is a volunteer-led, community-based growth monitoring and promotion program aimed at preventing under-nutrition in children under two years of age. AIN-C was initially launched in the mid 1990s and intensely developed and supported by USAID over the period 1998-2005. An impact evaluation covering this period was conducted in 2002. The original quasi-experimental, "intention-to-treat" evaluation design called for pre- and post-comparisons between intervention and control communities. A multi-stage cluster sampling design was employed; data were collected on 1467 households at baseline and 1343 households in the final evaluation. Due to issues including non-equivalent groups, extensive contamination of control communities, and reduced intensity of implementation due to unanticipated diversion of funding during the evaluation period, the pre-post, intervention-control community comparison was replaced with an analysis based on individual, community-level participation in AIN-C. Data were analyzed from approximately 1300 households (600 AIN-C; 700 "No-GMP") and 1200 children (580 AIN-C; 611 "No-GMP").

The results demonstrate that AIN-C had a significant, positive impact on young child feeding and care practices and on nutritional status, especially among poorer households and children who participated more regularly in the program. Exclusive breastfeeding rates among infants younger than six months of age, the proportion of caregivers who fed children 6–23 months appropriately, the percentage of children who were fully immunized by 13 months, and the percentage of children through 23 months who received iron and vitamin A supplementation were all significantly higher in the AIN-C group than the group that did not participate in GMP. Controlling for socio-economic status and age, AIN-C participants had mean weight-for-height Z-scores .122 higher than non-participants. The impact of AIN-C was two to three times greater among poorer households. Intensity of participation also increased impact; each additional month of participation yielded a .042 increase in weight-for-age Z-score.

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Acknowledgements

The planning, implementation, analysis, and reporting of an evaluation that tries to capture a rapidly expanding and evolving program is a complex undertaking requiring the collaboration and hard work of numerous individuals. This evaluation of the AIN-C program is no exception, as it depicts results of the initial four plus years of implementation of a dynamic program.

USAID/BASICS is indebted to its partner, The Manoff Group, Inc., for providing invaluable support from the inception of AIN-C through the completion of this evaluation report, including championing the issues addressed here and advocating the use of this analysis to improve global programming in child health and nutrition.

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More information about the Honduran AIN-C Program can be found at the following websites:

USAID/BASICS—www.basics.org
The Manoff Group, Inc.—www.manoffgroup.com
World Bank/Nutriition in Latin America and the Carribbean—www.worldbank.org/lacnutrition

Acronyms

AIN	*Atención Integral a la Niñez* (Integrated Care of the Child)
AIN-C	*Atención Integral a la Niñez en la Comunidad* (Integrated Care of the Child in the Community)
ARI	Acute Respiratory Infection
BASICS	Basic Support for Institutionalizing Child Survival Project
BCG	Bacillus Camille-Guerin (Tuberculosis vaccine)
CDC	Centers for Disease Control
CESAMO	*Centro de Salud con Medico* (Health Center with Doctor)
CESAR	*Centro de Salud Rural* (Rural Health Center)
COMSAIN	*Comunicación en Salud Infantil* (Communication in Child Health)
DHS	Demographic and Health Surveys
DPT	Diptheria, Pertussis, Tetanus
FANTA	Food and Nutrition Technical Assistance Project
GOH	Government of Honduras
GMP	Growth Monitoring and Promotion
IDB	Inter-American Development Bank
IMCI	Integrated Management of Childhood Illness
INE	*Instituto Nacional de Estadísticas* (National Institute of Statistics)
MDGs	Millennium Development Goals
MOH	Ministry of Health
MMR	Measles, Mumps, and Rubella
NGO	Non-Governmental Organization
ORS	Oral Rehydration Solution
ORT	Oral Rehydration Therapy
PAHO	Pan-American Health Organization
PPS	Probability Proportional to Size
PRAF	*Programa de Asignación Familiar* (Family Assistance Program)
SES	Socio-Economic Status
TBA	Traditional Birth Attendant
TOT	Training of Trainers
UNICEF	United Nations International Children's Fund
UPS	*Unidades Proveedores de Salud* (health centers)
USAID	United Status Agency for International Development
WHO	World Health Organization

Executive Summary

Background

History of AIN. The *Atención Integral a la Niñez* (AIN) program in Honduras began in the early 1990s when the Ministry of Health (MOH) revised health center[1] norms to require the detection of faltering growth[2] in children and to use that indicator for providing services. The U.S. Agency for International Development (USAID) has long assisted the Honduran government (GOH) in its efforts to increase access to and equity in the use of health services. The *Atención Integral a la Niñez en la Comunidad* (AIN-C) program is a major effort to extend the reach and coverage of public health services to poor communities. USAID's support to the MOH to develop and implement AIN-C began in 1991, starting with the bilateral Health Sector I and II programs (1991–2000), continuing with the *Nueva Programación* agreement between the MOH and USAID for 2001–2003, followed by the Sustainable Improvements Program (2003–2005). USAID also provided technical support to the MOH for AIN-C through the Basic Support for Institutionalizing Child Survival (BASICS) I and II projects, and more recently through the Food and Nutrition Technical Assistance (FANTA) project.

Description of AIN-C. The goal of the AIN-C program is to prevent under-nutrition by maintaining newborn health or recuperating the infant with low birth weight by ensuring adequate monthly growth (weight gain) until 24 months of age. After that period, AIN-C targets children until they are five years old only when they are sick, to be sure that they receive timely and adequate attention. All children in the community are eligible at birth, and parents are encouraged to participate in the monthly growth monitoring and promotion (GMP) session, which includes weighing and counseling based on growth performance, until their child reaches 24 months of age. The counseling focuses on adequate nutrition, care, and health-seeking practices. When a child is seriously ill or has persistent or acute growth failure, the health worker refers the caregiver to the health clinic. Other activities flow from the monthly GMP session, making AIN-C a model of community-based growth promotion (CBGP): home visits for children who did not attend or who need special attention; reporting of child growth information to the community; and detection, assessment, and treatment of common childhood illnesses.

Evaluation Design and Sample

Original Design. The AIN-C program evaluation plan was developed in 1997 during the first phase of BASICS support to the AIN-C program. The original design was quasi-experimental and called for pre- and post-intervention comparisons between intervention and control communities with baseline, midterm, and final assessments. Data collection for the 2002 final evaluation survey employed the same set of survey parameters used in the 1998 baseline

[1] These health facilities are known locally as *CESAMOs (Centros de Salud con Médico*) or *CESARs (Centros de Salud Rural*), depending on whether there is a physician on staff.

[2] Faltering growth is the failure to gain the expected minimum amount of weight according to population-based norms.

household survey. Multi-stage cluster sampling was used at baseline. For the follow-up evaluation impact survey in 2002, a new random sample of households with children younger than 2 years was taken from the same community clusters surveyed in the baseline. The actual baseline sample obtained was 1,467 households from 100 communities. The final impact evaluation sample obtained from the same communities included 1,343 households.

Revised Analysis. Due to issues including non-equivalent groups, extensive "contamination" of control communities, and reduced intensity of implementation during the evaluation period due to an unanticipated diversion of funding to other areas, the pre/post, intervention/control community comparison was replaced with an analysis based on individual, community-level participation in AIN-C. Using the follow-up data, children who participated in AIN-C were compared with children who did not, regardless of the community in which they lived. Children who participated in GMP only at a Health Center were excluded so that the evaluation focused on the impact of CBGP. The total sample size available for the revised analytical approach was 1336 households. With this change, an "intention-to-treat" assessment was not possible, but rather this evaluation shows the impact of AIN-C services on individuals who received them. Also, no comparison of communities was possible and the socio-economic differences between AIN-C and control communities remained.

Characteristics of Sample

Household Characteristics. Significant differences were noted between households that participated in AIN-C and those who did not (or "No-GMP"). A greater percentage of households who enrolled in AIN-C had access to an improved sanitation facility. Generally, improved sanitation indicates greater wealth, but in this case, the more likely explanation is that AIN-C households were targeted for assistance with sanitation facilities by both government and NGOs, as they were in "poorer" communities. Point-of-use water purification was more common among AIN-C than "No-GMP" households, possibly a reflection of the specific AIN-C project recommendation that families chlorinate their water if any child has diarrhea. Additional differences between AIN-C and "No-GMP" households indicate that on average, AIN-C households were not as wealthy as the "No-GMP" households. AIN-C households lived further from health centers. Significantly more (43.5 percent) AIN-C households had dirt floors than did non-participating households (29.9 percent) and fewer AIN-C households had electricity or owned expensive durable goods (television, refrigerator, telephone, or motor vehicle). Radio ownership was equally common all households.

Caregiver Characteristics. AIN-C and "No-GMP" caregivers attained different levels of education. The percentage of mothers with any formal education was not significantly different between AIN-C and "No-GMP" households ($p=0.057$) however, among those mothers who had some schooling, the "No-GMP" group had more: a significantly smaller percentage of AIN-C mothers had completed primary or had any secondary education compared to the "No-GMP" group. In other respects—size of household, presence of father or male in the family—the households were not different. Mothers of AIN-C participants had similar reproductive health histories, although parity was significantly higher among AIN-C mothers.

AIN-C Implementation

Age of Entry and Participation. The GMP program was well established in the AIN-C communities. Almost 100 percent of the participants in the AIN-C program knew the activities supported by the program and the person in the community responsible; 90 percent knew this person as the *monitora*. Indicators related to entry into and participation in the program suggested that the quality of implementation was high. Although not quite achieving the program goal of registration of all children in the first month of life, more than half were registered within two months and 75 percent within three months. Attendance among AIN-C participants was consistent: almost 90 percent of AIN-C children had been weighed two or more times in the three months prior to the survey. This weighing occurred through monthly sessions as well as home visits. Almost 90 percent of growth cards reviewed were found to have an accurate interpretation of the growth trend.

Monthly GMP and Home Visits. Seventy-five percent of caregivers reported receiving counseling on breastfeeding and feeding practices during GMP monthly sessions. The project called for counseling of all caregivers regardless of the growth trend of the child, so this result did not fully meet project expectations. Home visits were another major element of the AIN-C program; about 30 percent of caregivers reported receiving a home visit. Many of these visits were to follow-up on sick children, and referral to the health center was three times more frequent in home visits than in the monthly GMP sessions. Very few caregivers (based on the very small sample of mothers who had sick children at the time of the survey) recalled receiving messages related to continued and increased frequency of feeding during illness, indicating some area for improvement in nutrition counseling for sick children.

Understanding Adequate Weight-Gain. The caregivers who participated in the AIN-C program were significantly more likely than the "No-GMP" group to understand the signals (especially weight gain) of healthy growth, and a small proportion—although still significantly more than the "No-GMP" group—understood that inadequate weight gain was a sign of poor growth. About half of AIN-C participants, compared to a third of the "No-GMP" caregivers, responded that gaining weight was a sign of good growth. For a sign of poor growth, 17.1 percent of AIN-C participants, compared to 12.7 percent of "No-GMP" caregivers, named inadequate weight gain as a sign of poor growth. Even among AIN-C participants, very few articulated the relationship between poor growth and inadequate weight gain. Given that one of the key messages of AIN-C was the relationship between adequate weight gain and health, this suggests that the communication of messages either at the level of trainer to *monitora*, or *monitora* to caregiver, needs additional strengthening.

Quality of Counseling. More than 80 percent of AIN-C participants whose children were faltering in growth received counseling. The specific advice received as reported by these caregivers shows mixed results in terms of the appropriateness and specificity of the messages. Ten percent of caregivers of children less than six months recalled being counseled to give their child more food than accustomed, despite the recommendation of exclusive breastfeeding for the first six months. Very few respondents reported messages other than "continue breastfeeding" and "give more food than accustomed." More specific messages related to the quality of foods for children over six months of age, such as "give thick soups," "give mashed foods" and "pay attention to the amount eaten" were mentioned only 18.1, 13.7, and 6.6 percent, respectively. The "special" counseling cards used in the AIN-C program were widely, although not universally, recognized by AIN-C participants. While more than 70 percent of AIN-C participants had seen the cards, 45 percent of the "No-

GMP" group also recognized the cards. Among the "No-GMP" participants, 91 percent had seen the cards in the health center.

Breastfeeding, Complementary Feeding, and Care during Illness

Improved Breastfeeding Practices. AIN-C mothers practiced exclusive breastfeeding longer, as shown both in terms of the percentage of mothers who were practicing exclusive breastfeeding at six months (55.8 percent of AIN-C mothers, compared to 40 percent of "No-GMP" mothers) and in terms of the median duration of exclusive breastfeeding. Among AIN-C mothers, the mean duration of breastfeeding was 1.5 months longer than among "No-GMP" mothers. Furthermore, the rate at which mothers ceased exclusive breastfeeding was much slower in the early months and more rapid as six months neared; while true for both groups, a greater proportion of AIN-C mothers ceased exclusive breastfeeding closer to six months than the "No-GMP" mothers.

Improved Complementary Feeding Practices. Overall, the AIN-C program had a positive impact on the frequency of complementary feeding for children 6–8 months and 9–11 months; in AIN-C, 98.7 and 94 percent, respectively, met the recommendation compared to 88.9 and 84 percent, respectively, in the "No-GMP" group. However, even among the AIN-C group, where more than 90 percent of children 9–11 months met the recommendation for frequency of feeding, only 15.6 percent met the recommendation for the amount of food needed. Although almost double the proportion of children in the "No-GMP" group, this reflects very few children being fed adequately. Among children 12–23 months of age, the AIN-C group showed some improvement in the frequency of providing food compared to the "No-GMP" group: 16.1 percent compared to 5.8 percent, respectively. However, this shows a dramatic decline in the proportion of children who are meeting the recommendation for frequency of feeding compared to the 9–11 month age group. The percentage of children who received the appropriate quantity of food dropped in the AIN-C group; there was no difference in meeting this recommendation between the AIN-C and "No-GMP" children for this age group. The results show that the AIN-C program did not adequately address practices related to the amount of food for children 6–23 months.

Care during Illness. AIN-C mothers were more likely to increase the quantity and frequency of feeding and less likely to decrease or cease breastfeeding during diarrheal illness and an episode of acute respiratory infection (ARI) than mothers in the "No-GMP" group. About half of both the AIN-C and "No-GMP" mothers either increased or maintained the quantity and frequency of food provided to their children during diarrheal disease or ARI. The results for care-seeking related to ARI show that AIN-C and "No-GMP" participants had comparable low rates of care-seeking for ARI; 55.4 percent and 58.8 percent, respectively. The difference between the two groups is seen in the length of time it took to seek care among the group who ultimately sought care from a trained health provider and in the knowledge of danger signs. AIN-C participants took the child for care 2.6 days after the beginning of the illness, compared to 3.0 days for the "No-GMP" group. AIN-C caregivers were significantly more knowledgeable on danger signs associated with diarrhea and ARI.

Use of Health Services

Births and Postpartum Visits. Fewer AIN-C mothers used facilities for delivery of infants, likely a reflection of the targeting of the AIN-C program toward communities with greater socio-economic needs. At the time of this evaluation, AIN-C participants received significantly more postpartum visits than "No-GMP" mothers, although the percentage of AIN-

C mothers was relatively small (not quite 40 percent). The main postpartum activities, for all who made visits, including the *monitoras,* were examination of the mother and baby. Enrollment in AIN-C did not occur through these visits.

Vaccination and Micronutrient Supplementation. Significantly more children in AIN-C had records of their immunizations than non-enrollees. Children enrolled in AIN-C had higher rates of complete immunization coverage at 13 months than non-enrollees. Children enrolled in AIN-C were far more likely to receive iron (65.6 percent [AIN-C]; 29.5 percent ["No-GMP"]) and vitamin A (94.3 percent [AIN-C]; 87.5 percent ["No-GMP"]) supplementation than were children not enrolled in any form of growth promotion.

Impact of AIN-C on Nutritional Status

Bivariate Analysis Suggests Positive Impact on Nutrition. Descriptive results (mean and median z-scores) show that AIN-C participants did not differ from the "No-GMP" group in terms of weight-for-height (wasting), but AIN-C children in the 0–6 month age group did have lower height-for-age and weight-for-age z-scores than their "No-GMP" counterparts, as did the combined 0–23 month age group. This analysis did not account for differences in socio-economic status and age, both of which are correlated with nutritional status. The major difference in nutritional status between the two groups is in height-for-age under six months. Children 0–5 months of age have statistically lower z-scores in the AIN-C group compared to the "No-GMP" group, while there are no differences in nutrition status in the 6–11 and 12–23 month age groups. This suggests that AIN-C participation protects against height-for-age faltering. AIN-C participating infants may begin life shorter-for-age than the "No-GMP" group, but they "catch-up" to the "No-GMP" children by the age of 6–11 months, indicating more rapid height gain among AIN-C participants. This conclusion is not definitive, since a pre/post-intervention comparison of height-for-age status of these two groups was not possible.

Controlling for Age and Socio-Economic Status Shows Positive Impact of AIN-C. There are highly significant differences between AIN-C and "No-GMP" groups in terms of asset score, a reasonable proxy for economic status. In addition, the samples of the two groups differ in distribution of ages of children: AIN-C participation is more common for younger infants/children than for older ones. Analyses were restricted to infants/children from either group whose household asset score was equal to or lower than the median value for both groups combined—the poorer half of all households. Comparisons between groups were controlled for infant/child age by including age in a multiple linear regression predicting nutritional status.

Infant/child age was highly and negatively associated with all measures of nutritional status: with each additional month of age, weight-for-height, height-for-age, and weight-for-age decreased 0.057, 0.073, and 0.072 Z-score, respectively. No negative association between AIN-C participation and height-for-age and weight-for-age is seen in the controlled, restricted analysis. A positive and marginally significant ($p<0.10$) effect of AIN-C participation on weight-for-height was observed in the controlled, restricted analysis (participation was negatively associated with weight-for-height in uncontrolled comparisons). The mean weight-for-height Z score is 0.122 higher among AIN-C participants, holding age constant and excluding wealthier households.

Participation Increases Impact on Nutritional Status. The intensity of participation was positively associated with nutritional status for all measures: strongest for weight-for-age ($p=0.004$), less strong but still highly significant for weight-for-height ($p=0.011$), and marginally significant for height-for-age ($p=0.083$). Holding infant/child age and assets scores constant, for every 1 percent increase in participation intensity, weight-for-age increased 0.005 Z-score, and weight-for-height increased 0.004 Z-score. Age and participation intensity explain a much greater proportion of the variability in nutritional status among poorer households than among wealthier households. The size of the positive effect of participation intensity is 2–3 times greater among poorer households than it is among wealthier households. The association between participation intensity and nutritional status is highly significant for weight-for-height and weight-for-age among poorer households, while no association exists between participation intensity and nutritional status among wealthier households.

1. Introduction

1.1 Situational Analysis of Honduras

Honduras is a Central American republic with an estimated population of 7.2 million and an annual growth rate of 2.4 percent.[3] The per capita gross national income of $1030 in 2004 makes Honduras the third poorest country in Latin America, after Haiti and Bolivia. Fifty-one percent of the population is below the poverty line and seventy-five percent of rural households are extremely poor. Although Honduras is modernizing, almost one-half of the population resides in rural areas. About eighteen percent of Honduran households have no connection to a water supply system and almost one-third lack an adequate sanitary facility.[4]

The infant mortality rate in Honduras declined from 34 to 30 per 1,000 live births between 2001 and 2005 as a result of improvements in post-neonatal mortality. There has been no change in the level of the neonatal contribution to infant mortality.[5] Infant and child deaths are concentrated in the rural areas, particularly among mothers with no or little formal education. Diarrhea with dehydration and acute lower respiratory infection are two leading causes of child death. The prevalence of both these illnesses has increased since 1996, especially that of acute respiratory infection (ARI). Contributing to the under-five mortality rate is under-nutrition in young children. Nationally, chronic under-nutrition, measured by height-for-age, is 34.5 percent (based on 2001 data)—about double the average for Latin America. Overall, under-nutrition as measured by weight-for-age was 12.5 percent in the same period. These national statistics mask much higher levels of chronic and under-nutrition in some regions of the country. Chronic under-nutrition was over 50 percent and overall under-nutrition was 20 percent or more in Regions Two and Five[6] in the western part of the country.[7]

Public health services are provided by the *Secretaría de Salud* (Ministry of Health, or MOH). The MOH is responsible for implementation of major health strategies at national and local levels. Central headquarters carries out health programs, oversees regulatory issues, and provides technical support to its own regional offices and the private subsector. Major on-going health programs by the MOH include the HIV/AIDS Prevention program; the Sexually Transmitted Infections Control Program; the Tuberculosis Control Program; the Cervical Cancer Control Program; the National Oral Health Program; and the Expanded Program on Immunization. The Comprehensive Family Health Care Department of the MOH administers women's health programs (prenatal care, deliveries, postpartum care, and family planning services) and programs for children under the age of five and for adolescents.

[3] Instituto Nacional de Estadisticas (INE). Proyecciones de Población 2001-2005. Tegucigalpa:INE; 2004.
[4] Honduras, Instituto Nacional de Estadistica. Censo de Población y Vivienda 2001. Tegucigalpa: INE; 2003.
[5] Honduras, Instituto Nacional de Estatdistica. Proyecciones de población 2001-2015, Tegucigalpa; INE; 2003.
[6] In May 2004 the MOH was reorganized along functional lines. 18 Departmental Health Regions and 2 Metropolitan Health Regions were created to coincide with the country's political-administrative sub-divisions.
[7] World Health Organization, who.int/nutgrowthdb/database/countries/who_standards/hnd.pdf

The U.S. Agency for International Development (USAID) has been a major supporter of the efforts of the MOH, and continues to provide assistance in basic child health prevention and treatment services in the most vulnerable areas of the country. USAID has long assisted the Honduran government (GOH) in its efforts to increase access to and equity in the use of health services. The *Atención Integral a la Niñez en La Comunidad* (AIN-C)program is a major effort to extend the reach and coverage of public health services to poor communities. USAID's support to the MOH to develop and implement AIN-C began in 1991, starting with the bilateral Health Sector I and II programs (1991–2000), continuing with the *Nueva Programación* agreement between the MOH and USAID for 2001–2003, followed by the Sustainable Improvements Program (2003–2005). USAID also provided technical support to the MOH for AIN-C through the Basic Support for Institutionalizing Child Survival (BASICS) I and II projects, and more recently through the Food and Nutrition Technical Assistance (FANTA) project.

1.2 History and Development of the AIN and AIN-C Programs

The AIN program in Honduras began in the early 1990s when the MOH revised health center[8] norms to require the detection of faltering growth[9] in children, and to use that indicator for providing services. By 1994, the majority of health centers had adopted the growth promotion approach to well child visits. A review of the program in 1994 led to the realization that public health impact could not be achieved by limiting services to the facility level. This led to the development, testing and implementation of AIN-C— the community AIN approach. In December 2000, the MOH issued a decree establishing both the facility and community components of AIN as the National Child Health and Nutrition Program. Guidance issued with the decree specified that AIN-C was first to focus on prevention and early detection and referral of sick children under two, and then to introduce the illness management model for all children under five. Beginning in 2001, a number of NGOs and a government entity, PRAF (*Programa de Asignación Familiar*—an income transfer program of the President's office funded by the Inter-American Development Bank) supported the implementation of AIN at the community level.

USAID support to the MOH for AIN-C implementation continued over the evaluation period 1998–2005, although the health areas receiving assistance shifted over this time period. Under USAID's Health Sector II support, nine health areas were supported from 1998–2001. In 2001, when USAID renegotiated its assistance, four of these nine health areas were dropped, while five new areas were added. From 2001–2005, USAID supported 10 health areas. All tallied, by 2002–2003 there were 24 different health areas that had received some kind of support for AIN-C implementation from a variety of financial sources. By the time data were collected for this evaluation, two of the six areas that participated in the baseline survey and were part of the impact evaluation design had been without extra-budgetary support for the AIN-C program for almost one year.[10] See Table 1.1 for a timeline of the history and

[8] These health facilities are known locally as *CESAMOs (Centros de Salud con Médico*) or *CESARs (Centros de Salud Rural*), depending on whether there is a physician on staff.

[9] Faltering growth is the failure to gain the expected minimum amount of weight according to population-based norms.

[10] In 2004, the MOH received resources from both the Inter-American Development Bank (IDB) and the World Bank to expand AIN to the most disadvantaged communities nationwide. The AIN program also was included in the MOH National Nutrition Strategy to help meet the Millennium Development Goals (MDGs). Today, in 2008, AIN-C is present in all health areas and continues to expand into new communities, while an effort is made to give periodic support to communities in areas that do not have extra budgetary support.

development of the AIN-C Program, as well as important events that occurred during the course of the initial implementation of AIN-C.

Table 1.1 Timeline of Events in the Development and Implementation of AIN-C: 1990–2002

Year	Event or Activity
1990	Secretariat of Health replaced nutrition status tracking with growth faltering as the indicator of child health at the clinic level—beginning of AIN.
1992-1993	Pilot testing of the community component of AIN in a few communities in Copan, Lempira, and La Paz.
1994	Review of clinic-based strategy and recognition of need to reach the community.
1995	BASICS I study of initial experience with AIN-C finds strong commitment among health workers and high participation rates among mothers, but inconclusive results.
1996	National Workshop convened by MOH identified need for: systematizing program operations, incorporating inter-country lessons learned, developing tools for volunteer workers and supervisors, creating a training system, and linking AIN with national strategy for equity in health care delivery (*ACCESO*[11]*).*
1996–1997	BASICS I helped produce: guide for MOH personnel, manual for volunteer community workers, training curriculum, TOT (training of trainers) guide, series of 20 counseling cards (*láminas).*
1998	Re-launch of the revised community program began in nine USAID-supported health areas in most populated and poorest regions. Baseline survey conducted prior to implementation.
1998	Introduction of WHO/UNICEF Integrated Management of Childhood Illness (IMCI) protocols at facility level to assess, classify, and treat sick children under 5.
1998	Hurricane Mitch hit many communities that had just begun or were scheduled to begin AIN-C; implementation stopped for three months. When program continued, reports indicated that communities with AIN-C in hurricane-affected areas "recuperated" the growth of children more quickly than non-AIN communities.
1999	AIN-C initiated in the hardest hit health areas with the extra-budgetary support from Mitch reconstruction. Ten additional health areas were fully trained in AIN-C and an initial set of communities began with USAID support in 1999.
1999–2000	Integration of IMCI protocols and training within existing AIN protocols at the facility level. Extension of IMCI to the community under AIN-C; training for community workers and supplying them with antibiotics, oral rehydration solution (ORS), and micronutrients for all children under five.
1999–2000	Mitch resources used to develop communication campaign (COMSAIN) to support health-promoting behaviors identified by AIN-C with a strong emphasis on hygiene and diarrheal disease control. Program launched with print materials and radio.
2000	Mid-term Evaluation in 60 of 100 original communities showed improvements in knowledge and behavior related to childcare and feeding practices.
2001	World Bank-supported pilot project and several NGOs adopt AIN-C; interagency AIN-C implementation group formed.
2002	COMSAIN expanded nationally.

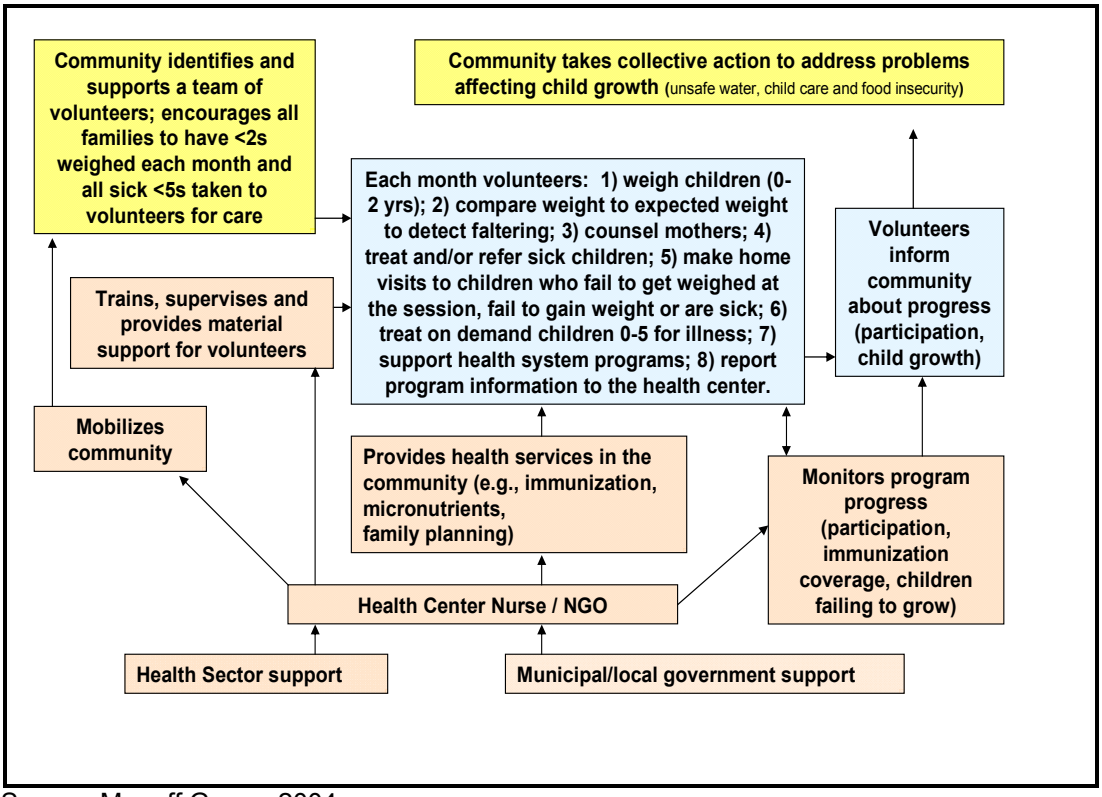
[11] A project to improve health care coverage in disadvantaged districts

1.3 Description of the AIN Program

The goal of the AIN-C program is to prevent under-nutrition by maintaining newborn health or recuperating the infant with low birth weight by ensuring adequate monthly growth (weight gain) until 24 months of age. After that, children are covered under the program until they are five years old only when they are sick, to be sure that they receive timely and adequate attention. All children in the community are eligible at birth, and parents are encouraged to participate in the monthly growth monitoring and promotion (GMP) session, which includes weighing and counseling based on growth performance, until their child reaches 24 months of age. The counseling focuses on adequate nutrition, care, and health-seeking practices. When a child is seriously ill or has persistent or acute growth failure, the health worker refers the caregiver to the health clinic. The nurse auxiliary from the health post often attends the GMP sessions, where she updates immunizations, distributes micronutrient supplements, provides medicines to children, and discusses family planning with new mothers. Other activities flow from the monthly GMP session, making AIN-C a model of community-based growth promotion (CBGP): home visits for children who did not attend or who need special attention; reporting of child growth information to the community; and detection, assessment and treatment of common childhood illnesses.

The AIN-C operational framework is shown in Figure 1.1 below. In addition to what happens in the community, growth information is shared with municipality officials, and they support community activities that foster healthy growth in children.

Figure 1.1 Operational Framework: AIN-C Program



Source: Manoff Group, 2004

1.3.1 AIN-C Training and Supervision

A week-long training for health area staff and nurses initiates the program in a health area to ensure that those who will be supervising the program are able to support it. Five days of training are also provided to the community volunteer and community-level auxiliary health staff. Monthly meetings also serve as in-service trainings. Supervision is designed to be supportive and regular: for the first six months of implementation, a supervisor attends the community weighing sessions. A key practice of the program is the use of a team of volunteers in the community rather than relying on one person. This aspect of program design ensures that the work is not too burdensome for one person and adds to overall capacity by drawing on the different strengths of the various team members.

1.3.2 AIN-C Program Monitoring

A simple information system is an important management tool of AIN-C. At the end of each month, growth information from all of the children in a community is compiled into bar graphs that use five simple indicators: number of children under two in the community, number weighed that month, number gaining adequate weight, number with inadequate weight gain, and number gaining inadequate weight for two or more months.[12] These indicators help volunteers to target home visits, focus supervision, and mobilize the community. These data are also shared within the health system and sent to municipal authorities.

By March/April 1998, the initial group of communities had concluded the preparatory phase and begun the work of the program, seeing children under two monthly to detect and resolve their health problems. The evaluation described in this report looks at the impact of the first communities to implement the AIN-C program in areas of the country where USAID collaborated with the GOH on implementation.

[12] An adaptation of the SKDN system used in Indonesia. SKDN is the abbreviation for the columns in the bar chart; S=number of children, K=number of children enrolled in the program, D=number of children weighed, N=number of children who gained adequate weight.

2. Methodology

2.1 Conceptual Framework for the Impact Evaluation

Figure 2.1 describes the conceptual framework for the impact evaluation of the AIN-C program in Honduras. The design was an "intention-to-treat" analysis of the effect of available program services on child nutrition and health, mediated through caregivers' participation in the program, caregivers' knowledge and attitudes about child health and nutrition, and caregivers' actions promoting and protecting child nutrition and health.

Figure 2.1 Conceptual Framework for the AIN-C Evaluation

2.2 Original Evaluation Design

The AIN-C program evaluation plan was developed in 1997, during the first phase of BASICS support to the AIN-C program. The original design was quasi-experimental and called for pre- and post-intervention comparisons between intervention and control communities with baseline, midterm, and final assessments. Data collection for the 2002 final evaluation survey employed the same set of parameters used in the 1998 baseline household survey. The design was based on the following assumptions:

1. Reasonably uniform CBGP services were provided in all areas targeted for the introduction of AIN-C, and GMP services were absent in areas not targeted for AIN-C.
2. Caregivers participated when and where services were available, and caregivers did not participate when and where services were unavailable.
3. Basics health services (e.g., immunizations) were received by those who participated in the program, as well as individual counseling.
4. Individual counseling improved knowledge and attitudes among caretakers.
5. Improved knowledge and attitudes resulting from individual counseling led to improved caregiver practices.
6. Improved nutritional and health status resulted from improved caregiver practices.

The results presented in the sections below demonstrate the extent to which each of these assumptions proved to be true.

Internationally-recognized indicators related to improved feeding practices for children less than two years of age, as well as improved care-seeking and treatment for diarrhea and acute respiratory illness (ARI) are among the priority outcome and impact indicators that are measured in this evaluation. The following is a list of the key indicators measured in this evaluation:

- Proportion of children 0–23 months of age with diarrhea who received oral rehydration solution (ORS);
- Proportion of children 0–23 months of age with diarrhea who received increased fluids;
- Proportion of children 0–23 months of age with diarrhea who continued feeding;
- Proportion of children 0–23 months of age with cough and difficult and/or rapid breathing who were taken early to a trained provider;
- Proportion of children fully immunized by 13–23 months;
- Proportion of children receiving vitamin A and iron supplementation;
- Proportion of infants less than six months exclusively breastfed;
- Proportion of children 6–23 months who are appropriately fed for their age;
- Height-for-age z scores;
- Weight-for-age z scores;
- Weight-for-height z scores.

2.2.1 Sampling Design

Multi-stage cluster sampling was employed at baseline as follows (see Table 2.1):

1. Random selection of health areas in three urbanization strata (urban, mixed, and rural);[13]
2. Probability proportional to size (PPS) random sampling of *Unidades Proveedoras de Salud* (UPS, or health centers);
3. PPS random sampling of communities from a MOH list of those selected for the introduction of AIN-C in the first year. Communities with fewer than 40 households and, at the direction of the MOH, those too distant from Health Centers for appropriate monitoring, were excluded from the list;
4. Random sampling of households based on a community map list showing households with children younger than two years of age. One child was sampled per household.

Individual randomization was not possible, as is the case with most evaluation studies of social service programs. For the follow-up evaluation impact survey in 2002, a new random sample of households with children younger than two years was taken from the same community clusters surveyed in the baseline.

[13] The purpose for creating urbanization strata was to ensure that the range of AIN-C program contexts were captured, but the categories are relative rather than based on a standard definition. That is, they characterize the degree of urbanization in the health areas *relative to each other* only. The majority of the communities in five of the six selected health areas were in fact predominantly rural (Metro San Pedro Sula being the exception).

Table 2.1 Summary of the Levels and Process of Selection of the Sample

Level	Selected	Criteria	Type of sampling
1	Health Areas	3 urbanization strata USAID support	Random within stratum
2	UPS	None	PPS* random
3	AIN-C Communities	AIN-C current or planned** 40+ households	Random
	Control Communities	Similar in size, government Socio-Economic Status (SES) ranking and UPS proximity No planned AIN-C	Matching
4	Household	At least 1 child < 2 years	Random

* Probability proportional to size; ** Generally, based on government SES ranking

2.2.2 Sample Size

To estimate sample size, the minimum programmatically meaningful effect size for nutritional indicators (e.g., stunting) was set at 10 percent. The one-tailed probability of a Type I error and the power of the test were fixed at 5 percent ($\alpha = 0.05$) and 80 percent, respectively. Because the variance of the key nutritional indicators was unknown, an estimated variance of 0.25 for a dichotomous variable (assumed prevalence of 50 percent) was used, with an estimated design effect of 2 resulting from cluster sampling. Non-response/refusal was estimated at 20 percent. Based on these parameters, a minimum sample of 1,350 households was necessary, and a target sample of 100 communities was adopted (50 AIN-C, 50 control; 15 households/village yielding a total of 1,500 households). The actual baseline sample obtained was 1,467 households from 100 communities. The final impact evaluation sample obtained from the same communities was 1,343 households.

Eight of the original 100 baseline communities were omitted from the follow-up survey. Reasons for removing these communities were that some “AIN-C” designated communities did not implement the program and thus were removed along with their matched controls. Damage from Hurricane Mitch in 1998 completely destroyed one control community, necessitating its elimination along with its AIN-C pair.

2.3 Issues with the Original Evaluation Design and Analysis

For several reasons, the original quasi-experimental, pre/post-intervention comparisons between intervention and control communities were not valid.

2.3.1 Non-Equivalent Groups

Analysis of the baseline data indicated that matching failed: intervention and control communities differed significantly according to the distance and size matching criteria. In addition, intervention and control communities differed according to a number of socio-economic factors because MOH targeting criteria for AIN-C gave priority to the most

disadvantaged communities.[14] Nutritional status did not differ between the AIN-C and control communities at baseline; however the differences in distance/size matching criteria and in economic status may have influenced endline nutritional status. If such bias did occur, its magnitude and direction are unknown.

2.3.2 "Contamination" of Control Communities

Over the course of the evaluation period, spillover of AIN-C activities increasingly "contaminated" the control areas: AIN-C and matched control communities were within the same Health Center catchment area; health Centers overseeing AIN-C participating communities improved GMP activities at the Health Center; services offered by the Health Center staff lacked the community-based aspects associated with AIN-C (*e.g.*, collective response to non-behavioral causes of malnutrition), but were otherwise similar; and nurses were trained as AIN-C supervisors and had easy access to the counseling cards and other AIN-C tools. As a case in point, the final evaluation found that 48 percent of respondents in control communities recognized the *laminas*, and 88 percent of those who recognized them had seen them at the CESAR/CESAMO (health center).

The MOH also decided to introduce AIN-C into some communities that were designated at baseline as control communities. In these cases, the GMP intervention received by children in the control area was identical to that being evaluated in the intervention areas. At the follow-up survey, 8.4 percent of children in the control communities were enrolled in AIN-C.

The original evaluation design failed to anticipate these "contaminating" influences; however, these issues are not uncommon in evaluation research. Furthermore, AIN-C (and facility-based growth promotion) services are presumed to be beneficial—even to save lives—and restricting the availability of these services for the sake of analytical purity would have been unethical. The spillover of GMP and the introduction of AIN-C into the control group may have been undesirable for the AIN-C evaluation, but it was desirable for child health and nutrition.

2.3.3 Reduced Intensity of Intervention during the Evaluation Period

Although USAID provided continuous support to the MOH for AIN-C throughout the evaluation period, four of the original six selected Health Areas lost AIN-C assistance when funds were shifted to support activities in other areas in 2001 (see Table 2.2). By the time of the final evaluation survey, these four areas had been without extra-budgetary support for almost one year.

[14] The Government of Honduras implemented AIN-C under the ACCESO program, which ranked communities according to a variety of socio-economic factors. AIN-C communities tended to rank in the lowest two of ACCESO's five socio-economic categories.

Table 2.2 Bilateral USAID Program Support in Health Areas Included in the Evaluation

Health Areas included in AIN-C evaluation	Years of USAID Support for AIN-C
Metro San Pedro Sula	1998–Sept. 2001
Choloma/Lima	1998–Sept. 2001
Puerto Cortes	1998–Sept. 2001
Santa Cruz de Yojoa	1998–Sept. 2001
Siguatepeque	1998–present
La Paz	1998–present

This withdrawal of funds influenced the intensity of supervision and the involvement of health center personnel in AIN-C. Perhaps as a result, at the follow-up survey in 2002, 17 percent of eligible children in the AIN-C communities were not enrolled in a growth promotion program of any kind (community-based or at the Health Center). The extent to which this non-participation rate resulted from changes in funding (or simply from mothers' choices not to participate) is unknown.

Non-participation or drop-out, for whatever reason, is an important element of intention-to-treat analysis, which attempts to understand the overall effect of *available* treatment (AIN-C) on the community, not just the effect on the individuals who receive it. Had funding remained constant, a strong case could be made that the non-participation rate is characteristic of the AIN-C project in Honduras. However, because of the withdrawal of funding, equally plausible is that the high non-participation rate existed because services were not characteristic of AIN-C.

2.4 Revised Data Analysis

Due to these issues—non-equivalent groups, extensive contamination of control communities, and reduced intensity of implementation during the evaluation period—the pre/post, intervention/control community comparison was replaced with an analysis based on individual, community-level participation in AIN-C. Using the follow-up/final evaluation data, children who participated in CBGP were compared with children who did not, regardless of the community in which they lived. Children who participated in growth promotion only at a Health Center were excluded, so that the evaluation focused on the impact of *community-based* growth promotion.

Analysis by participation was deemed the best option based on the issues in the sample; however, this type of analysis has several important ramifications that must be considered in the interpretation of the results.

1. Analysis by participation does not provide the desired "intention-to-treat" assessment of the AIN-C program's impact. Rather, it provides an assessment of impact of AIN-C services on individuals who receive them.

2. Since “treatment” (AIN-C) was allocated to communities, not individuals, proper analysis would require comparisons between communities, not individuals—but this analysis is not possible.

3. While analysis by participation may circumvent the problems caused by contamination of the control group and changes in the intervention (e.g., changing levels of external support for Health Area), the problems due to failed matching and the socio-economic differences between AIN-C and the control group remain. Most AIN-C participants resided in AIN-C communities and most non-participants resided in the original control communities. The socio-economic differences that exist between these communities are more likely to have reduced the observed impact of the intervention, rather than enhanced it.

2.5 Design and Content of the Questionnaires

The household and individual child questionnaires[15] used in the follow-up impact evaluation survey were based closely on the questionnaires used for the baseline in 1998. They were modified slightly for the following reasons:

- The rewording of some questions was needed to allow better distinction between the activities of AIN *monitoras* and those of traditional birth attendants (*parteras*) and CESAR/CESAMO health center staff;
- Some questions were adjusted to allow for pre-coding of responses;
- Questions were added to obtain more information on the programmatic aspects of AIN;
- The order of the questions in the questionnaire was revised to create a more logical flow including better skip patterns;
- A section on participation in community activities, including growth promotion programs, was moved from the individual questionnaire to the household questionnaire to ensure that responses relating to the AIN *monitoras* were clearly identified from the beginning of the interview.

The household questionnaire contained items that addressed general information on the child’s environment including aspects of housing, socioeconomic status, age and gender composition of the family, and participation in community social assistance programs.

The child questionnaire focused on the “index child” of each household: a child under two years of age living in the household at the time of the survey. This questionnaire contained questions on the following topics:

- Characteristics of the caregiver
- Delivery and postpartum care
- Vaccinations and micronutrient supplementation
- Growth and development
- Diarrheal disease
- ARI
- Breastfeeding
- Feeding practices
- Height and weight measurements for the child

[15] Copies of the household and individual questionnaires are available at www.basics.org

2.6 Training, Field Work, and Logistics

A senior Honduran program manager with extensive experience in field research led the final evaluation survey operations. Four study teams collected the data; each team included one supervisor, two interviewers, a dietary interviewer, a person responsible for anthropometry, and one driver. The majority of the personnel in these field teams were experienced in conducting surveys on maternal and child health.

Supervisors received training in the content of the evaluation and approach to completing the questionnaires. A manual was prepared and distributed at the training. A separate training session was conducted on anthropometry.

Training on the content of the questionnaire and interview methodology took place from June 3–7, 2002. The classroom training included:

- Discussion of the technical content of the interviews;
- Review of each section of the questionnaire, with explanations of the concepts involved and the manner in which to ask the questions and record responses;
- Discussions on the AIN model and the job of the *monitoras* to assess and record weights for children;
- Discussions on the content of counseling provided to mothers; and
- Role plays of interviewing techniques.

Interviewers and supervisors field-tested and validated the questionnaire to test its functionality and to complement the classroom training.

Fieldwork began on June 12, 2002 and continued until July 22, 2002. Supervisors were supplied with logistical information to facilitate travel and overnight stays for the fieldwork teams, with listings of children under the age of two in the study communities, and with maps of the study communities. The maps were prepared in the weeks prior to the initiation of survey field work by two cartographers, and provided the interview teams with color-coding for all households in the community having a child under two years of age.

Upon completion of each interview, the interviewers reviewed the questionnaires before leaving the household. Each child's weight and recumbent length was measured using standard anthropometric techniques and recorded on the individual's general questionnaire. At the end of the day's work, the survey teams met to exchange experiences, review the questionnaires with their supervisors, and make any necessary corrections before leaving the community. The supervisors and the study coordinator rotated among the interviewer staff to observe interviews and ensure high standards of data quality.

2.7 Data Handling and Analysis

Data entry was conducted using the EpiInfo Program (Version 6) developed by the U.S. Centers for Disease Control (CDC). Data editing, entry and cleaning were handled by a team comprised of a Data Coordinator, three Data Entry Clerks, and a Data Entry Supervisor. Oversight and technical guidance were provided by a BASICS II Technical Officer.

All questionnaires were double-entered for validation purposes. Data entry began concurrent to the survey fieldwork and was completed in mid-August 2002. General guidelines on data cleaning were prepared and used to guide the programmer responsible for the cleaning process.

2.8 Statistical Analysis

Statistical analysis was conducted using SPSS for Windows Version 12.0. Bivariate relationships between variables of interest and participation status were tested using Pearson Chi-Square tests and analysis of variance methods. Specific *p* values for test statistics appear as footnotes to the tables displaying the results or in the discussion of the results in the text. All data presented in this report are unweighted.

For some program outcome and impact indicators, further analyses were carried out using regression in an attempt to control for socio-economic differences between participants and non-participants. Nominal or linear regression models were employed as appropriate for controlled analysis of the relationship between participation and diarrhea treatment, health care-seeking behavior, exclusive breastfeeding, young child feeding practices and nutritional status.

3. Description of the Sample

3.1 Total Sample for Revised Analysis

The total sample size obtained for the final evaluation using the revised analytical approach to overcome the issues in the original evaluation design was 1336 households. This is somewhat less than the projected sample size of 1500 households described in the survey design, but it is adequate to show statistically significant change. The final evaluation sample is comprised of 603 AIN-C and 733 no-GMP households. Table 3.1 shows the distribution of the sample by health area.

Table 3.1 Final Evaluation Sample Size, by Health Area

Health Area	AIN-C		No GMP		Total	
	% of total	Number of Households	% of total	Number of Households	% of total	Number of Households
Metro San Pedro Sula	10.8	65	11.2	82	11.0	147
Choloma/Lima	15.3	92	14.7	108	15.0	200
Puerto Cortés	17.7	107	15.8	116	16.7	223
Siguatepeque	27.4	165	25.6	188	26.4	353
Santa Cruz de Yojoa	14.9	90	13.9	102	14.4	192
La Paz	13.9	84	18.7	137	16.5	221
Total number of households	603		733		1336	

3.2 Sample by Gender and Age

The total number of children in the impact evaluation sample for which there was a gender designation was 1211. Overall, there were slightly more males than females in the sample, 52.7 percent versus 47.3 percent, respectively. This proportion of males to females was similar in the AIN-C and the no-GMP groups, as shown in Table 3.2 below.

Table 3.2 Final Evaluation Sample Size, by Sex of the Index Child

Sex of the child	AIN-C		No GMP		Total	
	% of total	Number of Children	% of total	Number of Children	% of total	Number of Children
Male	52.3	309	53.1	329	52.7	638
Female	47.7	282	46.9	291	47.3	573
Total number of children	591		620		1211	

The final evaluation sample was distributed across age groups as shown in Table 3.3. In each household, the index child selected was the youngest child of the children under two years of age living in the household.

Table 3.3: Final Evaluation Sample Size, by Age Group of Child

Age of the child in months	AIN-C		No GMP		Total	
	% of total	Number of children	% of total	Number of children	% of total	Number of children
0 to 5	20.3	120	21.7	135	21.0	255
6 to 11	30.1	178	26.8	167	28.4	345
12 to 17	26.6	157	22.2	138	24.3	295
18 to 23	23.0	136	29.3	182	26.2	318
Total number of children	591		622		1213	

4. Characteristics of Households

The surveys collected data on the basic measures of housing that describe the source and type of water used, the type of sanitary facilities available to the household, the number of rooms and bedrooms in the house, whether one room was dedicated to use as a kitchen, the type of fuel used in cooking, the presence of certain appliances, and the type of flooring. The time and cost of reaching the nearest health center were also queried as an indication of household access to health services.

4.1 Water and Sanitation

As seen in Table 4.1, by far the most common source of water for both AIN-C (77.3 percent) and "No-GMP" (78.5 percent) households was a tap located inside the house or on the property. There were no significant differences between the two groups in water sources. Significantly more AIN-C (41.8 percent) households purified their water compared to "No-GMP" households (32.1 percent). Overall, almost two-thirds of households consumed water directly from the source with no further treatment. AIN-C households (58.2 percent) were significantly more likely to have an improved toilet (indoor, sealed latrine) than "No-GMP" households (50.5 percent).

Table 4.1 Water and Sanitation Characteristics of Households

	AIN-C		NO-GMP		TOTAL	
	%	Number of Households	%	Number of Households	%	Number of Households
Principal source of water						
Tap inside house or on property	77.3	N/A	78.5	N/A	77.9	N/A
Tap off property < 100m	7.6		9.0		8.3	
Tap off property > 100m	4.2		3.5		3.9	
Natural source (river, lake, etc.)	5.9		4.3		5.1	
Well (with and without pump)	4.1		4.5		4.3	
Other	0.8		0.2		0.5	
Water purification practices ‡						
Purify water by electro-purification, chlorination or boiling	41.8	582	32.1	614	36.8	1169
Consumed straight from source	58.2		67.9		63.2	
Type of sanitation *						
Improved (indoor toilet, sealed latrine)	58.2	591	50.5	622	54.2	1213
Non-improved (open pit, open air/none)	40.8		48.6		44.8	
Other	1.0		1.0		1.0	

* ($p<0.05$), ‡ ($p<0.001$)

4.2 Housing and Amenities

Most of the households surveyed in the final evaluation had three rooms or fewer. AIN-C households (71.4 percent) were more likely to use a separate room as a kitchen compared to "No-GMP" households (66.1 percent) and more likely to use firewood as cooking fuel (82.6 percent) compared to the "No-GMP" households (68.2 percent). The principal material used for flooring was significantly different in the AIN-C compared to the "No-GMP" households: 43.5 percent compared to 29.9 percent, respectively, had earth floors and 47.9 percent compared to 58.0 percent, respectively, had cement floors.

Table 4.2 Characteristics of Housing

	AIN-C		NO-GMP		TOTAL	
	%	Number of Households	%	Number of Households	%	Number of Households
Number of Rooms in the Household						
One room	20.6	591	20.7	622	20.7	1213
Two rooms	31.8		29.1		30.4	
Three rooms	20.1		20.3		20.2	
Four rooms	13.7		15.8		14.8	
Five or more rooms	13.7		14.2		13.7	
Number of Rooms used as a Bedroom‖						
One	65.7	591	61.7	622	63.6	1213
Two	21.7		27.3		24.6	
Three or more rooms	12.7		10.6		11.6	
Separate Room used for Kitchen*						
Yes	71.4	591	66.1	622	68.7	1213
No	28.6		33.9		31.3	
Type of Cooking Fuel‡						
Firewood	82.6	591	68.2	622	75.2	1213
Liquid gas/kerosene	3.6		8.7		6.2	
Propane	9.5		15.0		12.3	
Electricity	4.4		8.2		6.3	
Principal Material in Flooring‡						
Earth	43.5	591	29.9	622	36.5	1213
Wood	0.7		1.0		0.8	
Cement	47.9		58.0		53.1	
Clay Tile	0.2		1.1		0.7	
Ceramic Tile	7.8		10.0		8.9	

‖ (p=0.052); * (p< 0.05); ‡ (p<0.001)

Significant differences were also found between the two groups of households in terms of their household possessions. Almost two-thirds (65.6 percent) of the "No-GMP" households had electricity, compared to 44.7 percent of AIN-C households. AIN-C households were also less likely than "No-GMP" households to own televisions, refrigerators, telephones, and motor vehicles: 42.6 and 54.5 percent for televisions, 17.6 and 25.4 percent for refrigerators, 3.0 and 6.1 percent for telephones, and 4.7 and 7.1 percent for motor vehicles, respectively.

Table 4.3 Household Possession of Amenities

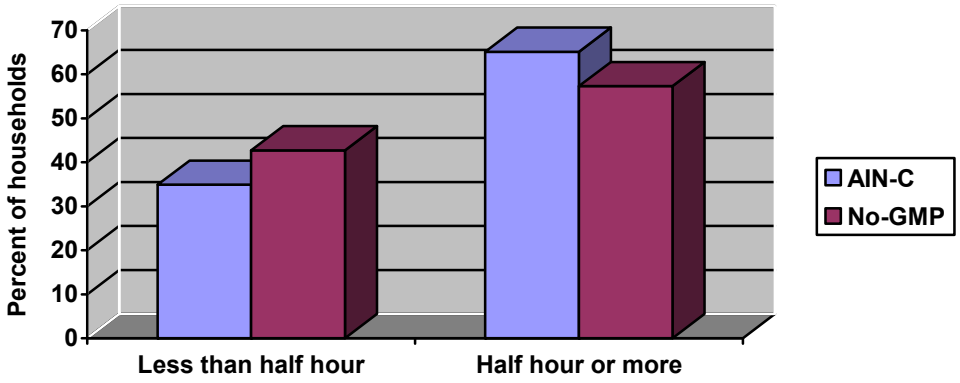
	AIN-C		NO-GMP		TOTAL	
	%	Number of Households	%	Number of Households	%	Number of Households
Utilities and Possessions						
Electricity ‡	44.7	591	65.6	622	55.4	1213
Radio	82.1		83.6		82.9	
Television ‡	42.6		54.5		48.7	
Refrigerator ‡	17.6		25.4		21.6	
Telephone *	3.0		6.1		4.6	
Motor vehicle ¶	4.7		7.1		5.9	

* (p< 0.05); ‡ (p<0.001); ¶ (p=0.085)

4.3 Access to Health Services in Terms of Time

As already noted, access to the health center was found to be significantly different between the two "original" groups: the AIN-C and control communities. Therefore it is not surprising to see in this analysis that the AIN-C participants are more likely to reside further from the health center than the "No-GMP" group (statistically significant p<0.05); 65 percent of AIN-C participants compared to 57 percent of "No-GMP" households live half an hour or more away for the health center. (See Figure 4.1)

Figure 4.1 Time to Reach Health Services



4.4 Social Assistance Programs

In addition to the AIN-C program, several other social assistance programs were operating at the time of the evaluation survey. AIN-C participants had more contact with all of these programs than the "No-GMP" group, as shown in Table 4.4 below.

Table 4.4 Contact with other Social Assistance Programs

	AIN-C		NO-GMP		TOTAL	
	%	Number of House-holds	%	Number of House-holds	%	Number of House-holds
Social Programs Active in the Community						
AIN-C	88.3	591	15.3	622	50.9	1213
Maternal Child "Bono"	30.1		17.4		23.6	
Plan International/Honduras	21.2		16.7		18.9	
School Lunch	17.4		10.5		13.8	
Aldea Global	15.4		4.0		9.6	
World Vision	3.9		0.5		2.1	
CARE	3.6		0.8		2.1	
Other	6.6		4.5		5.4	

4.5 Discussion of Findings

Overall, these results on the characteristics of AIN-C and "No-GMP" households indicate some significant differences in sanitation facilities, water purification practices, housing features, and the availability of household amenities.

The World Health Organization (WHO) and UNICEF define sanitary facilities by the type of technology used. Facilities may either be improved or unimproved. An improved sanitation facility includes a household connection to a public sewer system, a connection to a septic system, a pour-flush latrine, a covered pit latrine and a ventilated pit latrine. Unimproved sanitation facilities include any public or shared latrine, open pit latrine, a bucket latrine and any open-air location. A significantly greater percentage of households who enrolled in AIN-C had access to an improved sanitation facility. Improved sanitation may indicate greater wealth, but in this case, the fact that AIN-C households have better access to improved sanitation is assumed to reflect that both government and NGOs have targeted these "poorer" communities for assistance with sanitation facilities. These improvements should reduce the risk of fecal contamination in AIN-C compared to "No-GMP" households.

Access to clean water also relates to fecal contamination. The majority of households in both groups had access to tap water either in their house or on their property. Nevertheless, point-of-use water purification was more common among AIN-C than "No-GMP" households, most likely reflecting the specific AIN-C recommendation for families to chlorinate their water if any child has diarrhea.

Exposure to indoor smoke increases the risk of respiratory infection. Significantly more households participating in AIN-C had a separate room in the house for a kitchen than "No-GMP" households. However, significantly more AIN-C participant households used firewood for cooking fuel than "No-GMP" households, which may explain this difference. While only 17.5 percent of AIN-C households used kerosene, propane, or electricity for cooking, almost

a third (31.9 percent) of non-participating households used these more expensive fuel alternatives. Among households that did not have a separate room for the kitchen, a greater percentage of AIN-C households relied on firewood for cooking (71.6 percent vs. 55.5 percent; $p < 0.001$), indicating that a greater percentage of children in the AIN-C group were exposed to indoor smoke.

Significantly more AIN-C households (two-fifths) had dirt floors than did non-participating households, and fewer AIN-C households had electricity or owned expensive durable goods (television, refrigerator, telephone, or motor vehicle). Radio ownership was as common among AIN-C households as it was among "No-GMP" households. Overall, the differences between the two groups for important indicators of wealth suggest that the households participating in the AIN-C program were, on average, not as wealthy as the "No-GMP" households.

Household Characteristics: Summary of Key Findings

- Households with children participating in AIN-C had similar access to safe water, but they were more likely to purify their water.
- A greater percentage of AIN-C households had improved sanitation, perhaps due to recognition by NGOs and the Government of Honduras that these are "poorer" communities.
- Fewer AIN-C households had more than one room for the family to sleep in, however the total number of rooms in the living structures were not significantly different in the AIN-C compared to the "No-GMP" houses.
- More AIN-C houses had earthen floors and used firewood for cooking; both of these are an indication of lower economic status.
- AIN-C households lived further from health centers.
- Fewer AIN-C households had electricity or owned a television, refrigerator, telephone, or motor vehicle. Radio ownership was the same in both groups.
- AIN-C households had more contact with other social assistance programs.

5. Caregiver Characteristics

In this section, basic characteristics of the caretakers and mothers are analyzed, including age, educational level, employment, number of deaths among children under four, parity, the nature of the relationship between the child and the caretaker (e.g., mother, grandmother, other relative), and the presence of a husband or male companion in the household.

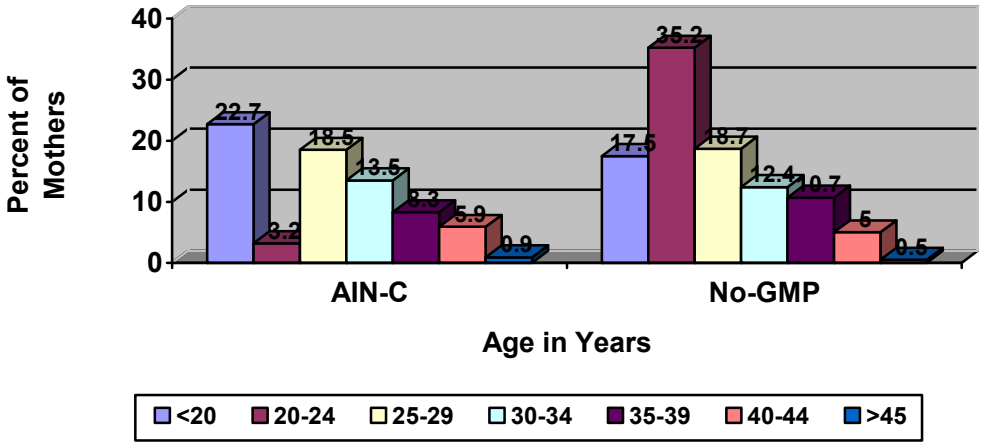
5.1 Relationship of Caregivers to Children

The vast majority of children in these communities were cared for by their mothers (AIN-C: 95.9 percent; “No-GMP:” 93.6 percent). Most of the other children were cared for by their grandmothers (AIN-C: 3 percent; “No-GMP:” 4 percent), a few by other relatives and a very few were cared for by a non-relative.

5.2 Age and Educational Background of the Mother

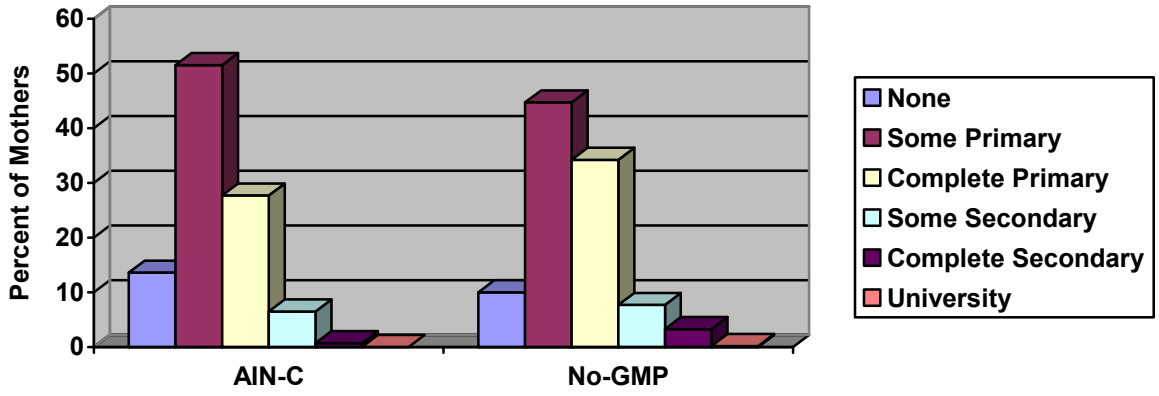
Figure 5.1 below shows the age distribution of mothers among AIN-C and “No-GMP” participants. The mean age of mothers in both groups is similar; 25.96 percent for AIN-C participants and 25.92 for “No-GMP.”

Figure 5.1 Age Distribution of Mothers



Educational data collected on these mothers show that 13.6 percent and 10.0 percent of mothers in AIN-C and “No-GMP” groups, respectively, have not completed any formal education. Mothers of children who participated in AIN-C were much less likely to have completed primary school compared to mothers of children in the “No-GMP” group. Very few in either group went on to complete secondary school; however a significantly greater proportion of the “No-GMP” mothers did so. See Figure 5.2 for this educational data in detail.

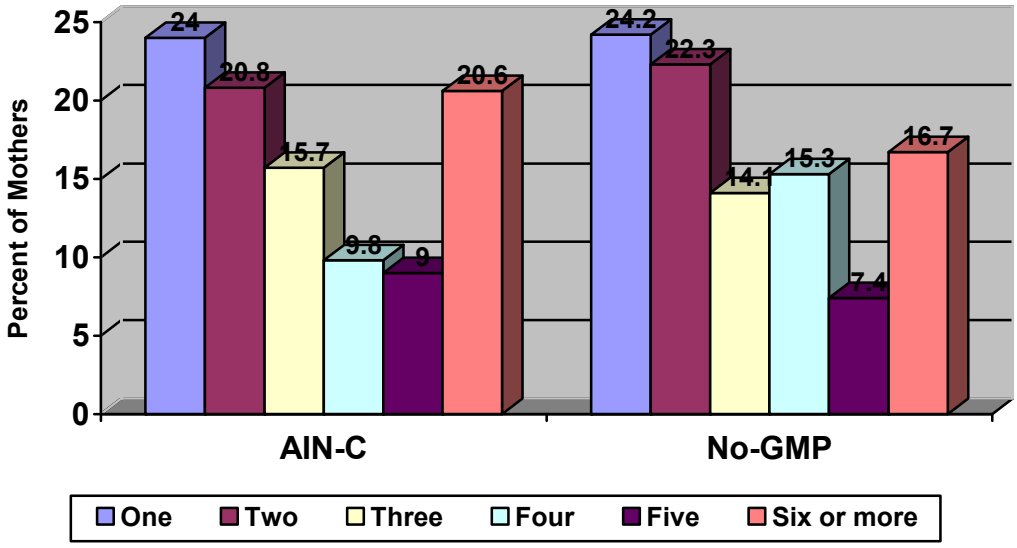
Figure 5.2 Maternal Educational Levels



5.3 Live Births and Mortality among Children under Four Years of Age

About 24 percent of both AIN-C and "No-GMP" mothers reported having only one live birth. This is consistent with the age distribution of the population; almost one-fifth of AIN-C and "No-GMP" mothers surveyed were under 20 years of age. An additional 20.8 percent in AIN-C and 22.3 percent of "No-GMP" mothers reported two live births. The remaining 55.2 percent in the AIN-C group and 53.6 percent in the "No-GMP" group had three or more live births. The two groups are significantly different ($p \leq .05$) if one compares the mean number of live births; the mean for AIN-C was 3.7 compared, to 3.4 for the "No-GMP" group.

Figure 5.3 Number of Live Births Reported



Of the mothers represented by these groups, 16.4 percent of AIN-C participants reported having at least one case of a child born alive who subsequently died before age four. For the

"No-GMP" participants, the percentage was slightly lower at 15.1 percent, but this was not statistically significant.

5.4 Mother's Employment and Male Presence in Households

In response to questions concerning whether a mother works for pay, both groups reported that about 18 percent worked for compensation. Also similar was the proportion of mothers who reported that they worked outside of the home; about half of AIN-C mothers (54.3 percent) and "No-GMP" mothers (51.9 percent) were employed outside of their home. For both groups, 82 percent of the families had a husband or a companion living at home.

5.5 Discussion of Findings

The percentage of mothers with any formal education was not significantly different between AIN-C and "No-GMP" households (p=0.057). Among those mothers who had some schooling, the "No-GMP group had more: a significantly smaller percentage of AIN-C mothers had completed primary or had any secondary education compared to the "No-GMP" group. Since children's nutritional status generally is positively associated with maternal education, this lower level of formal school for AIN-C mothers called for attention to health and nutrition practices.

The slightly higher parity among AIN-C mothers (3.70) compared to "No-GMP" mothers (3.40) is not likely to represent a significantly higher child care burden. No other characteristics—having a husband/companion living at home, maternal employment and place of employment, maternal age, principal caregiver, number children under four years old who had died—were significantly different in the AIN-C and "No-GMP" groups.

Summary of Key Findings: Caregiver Characteristics

- Mothers of children enrolled in AIN-C had completed fewer years of formal education.
- Mothers of AIN-C participants had similar reproductive health histories, although parity was significantly higher among AIN-C mothers.

6. Participation in AIN-C Program Activities

This section provides background information on AIN-C program participants. It includes a description of some of the important characteristics of "participation," age of entry into the program, and consistency of participation, as well as the activities that take place during the GMP sessions, accuracy of plotting weights on growth cards by *monitoras* and activities in follow-up home visits.

6.1 Knowledge of AIN-C

Respondents were asked about their knowledge and participation in growth promotion programs. Nearly all respondents (99.8 percent) from AIN-C-enrolled households knew a person in their community who was responsible for weighing children every month. Ninety percent of these respondents cited "*monitora*" as the person who takes these weights.

6.2 Age of Entry into Program

During the period under study, AIN-C norms required newborn registration in AIN-C no later than three months after delivery. Registration of infants during the first month was an objective of the program. Based on age at first attendance recorded on growth promotion cards presented by respondents, only about 25 percent of children who participated in AIN-C were enrolled within one month of birth. However, approximately 75 percent were enrolled within three months and half of the participating infants/children were enrolled within 2 months of delivery.

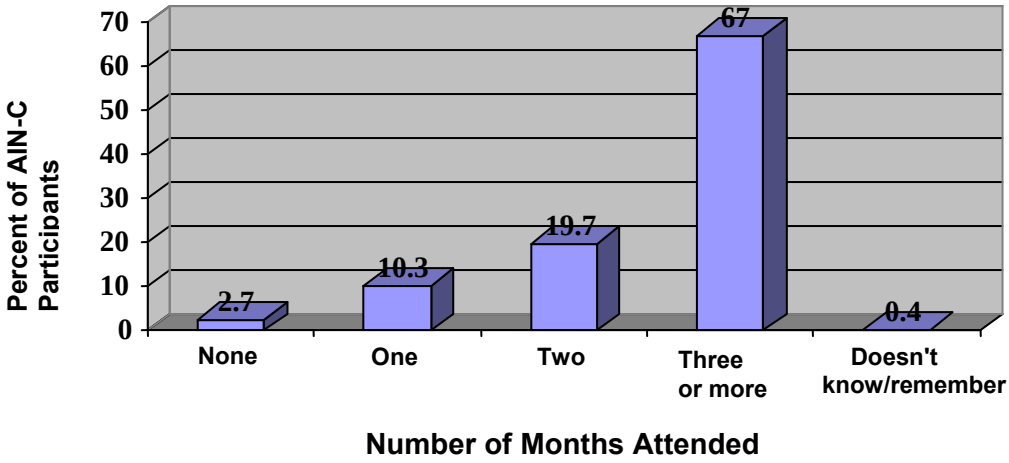
Table 6.1 Age of Entry into AIN-C

Age in Months	Percent
< 1	24.2
1	33.3
2	17.9
3	6.3
4	4.9
5	3.4
6-8	5.6
9–11	1.7
12–23	2.7
Mean Age of Entry	1 month

6.3 Level of Participation

The norm for the AIN-C program is for children to attend monthly until they reach two years of age. The program objective is for a child to participate 80 percent of the time, *i.e.* attend monthly growth promotion sessions 10 out of 12 times a year. According to the growth cards presented by respondents, 67 percent of AIN-C participants attended all three monthly sessions during the three months prior to the survey (Table 6.2). Eighty-seven percent had attended two or more times.

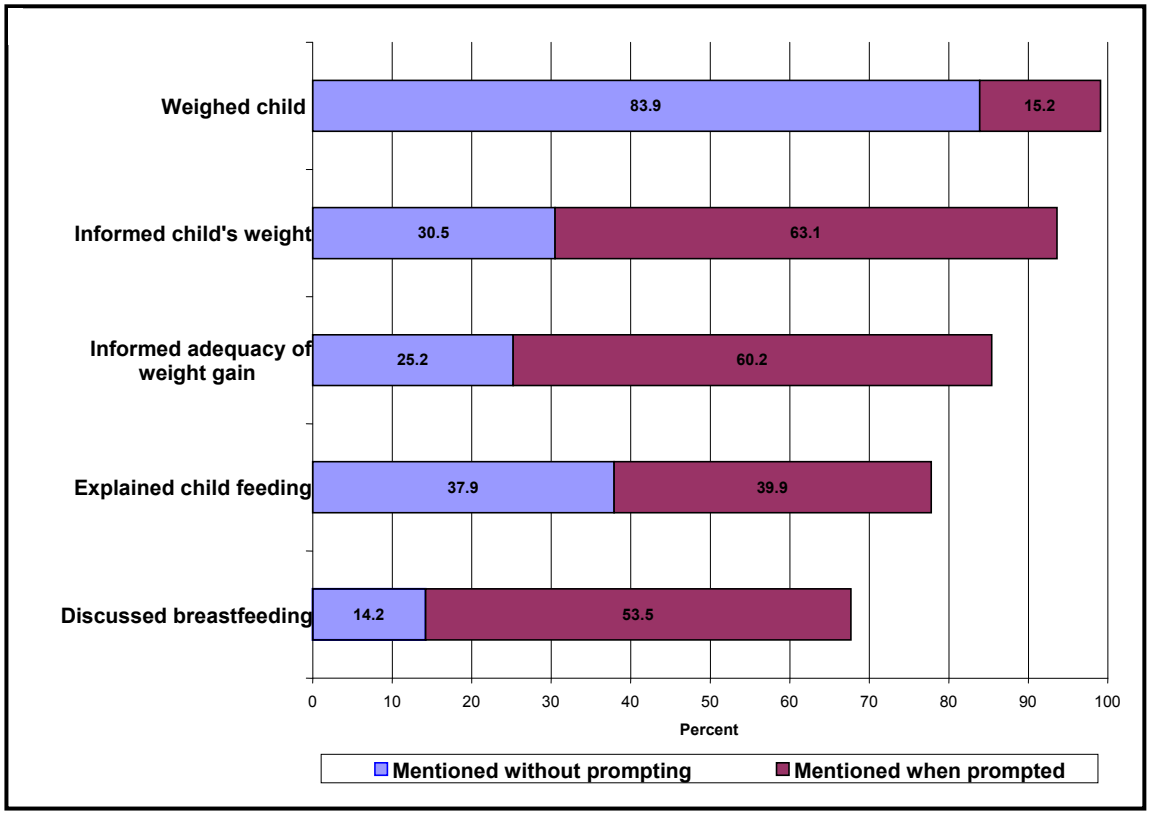
Figure 6.1 Growth Promotion Attendance in Last Three Months; Children ≥ 3 Months



6.4 Activities during Growth Promotion Sessions

Information on activities taking place at the previous growth promotion session was obtained both from caregivers' spontaneous reports and with prompting. The main activity at the growth promotion session is weighing the children. Ninety-nine percent of caregivers reported that their child had been weighed at the previous session (only 83.9 percent did so without prompting [Figure 6.1]). A slightly lower but high percentage reported being informed of their child's weight (93.6 percent), and of the adequacy of the child's weight gain (85.4 percent). More then 75 percent reported that the *monitora* explained child feeding issues to them, and nearly 70 percent (67.7 percent) reported discussing breastfeeding. The percentage of caregivers reporting breastfeeding discussions was scarcely different among infants younger than 6 months and infants/children 6–23 months (69.0 percent and 67.5 percent, respectively; data not shown).

Figure 6.2 Activities at Previous Growth Promotion Session as Reported by Caretakers



6.5 Accuracy of Growth Card Plotting by *Monitoras*

The accuracy of plotting child weights from month to month on the growth chart (the detection of growth faltering) by *monitoras* was assessed for children participating in AIN-C who had at least two weights marked on their growth cards. Ninety-three percent of children had at least two weights recorded on their cards with no greater than a two month interval between two weights. The interpretation of the growth trend for these children was determined to be accurate in 87.9 percent of these cases.

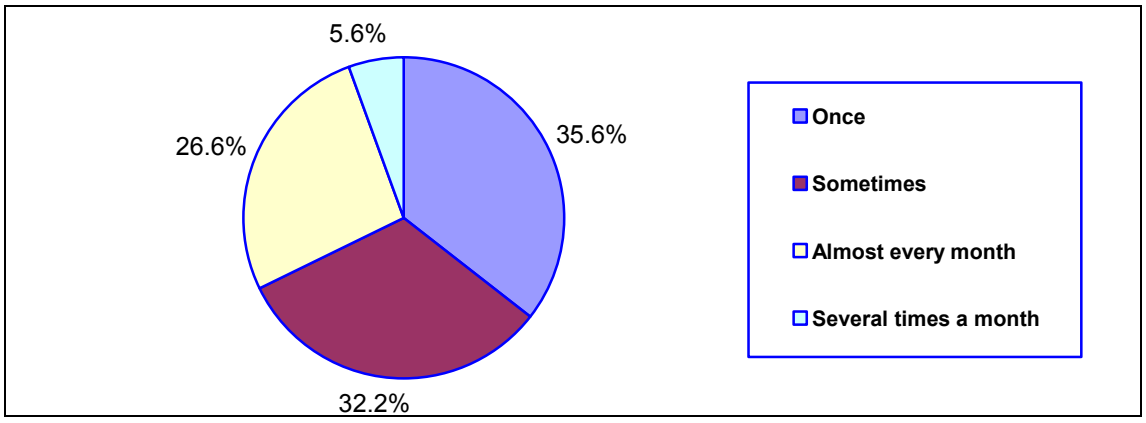
Table 6.2 Accuracy of Plotting on Growth Cards All Children Combined

Category of Child	Percent	Total Number of Children
Two or more weights marked on card	93.3	511
Two or more weights marked on card within 3 month period	92.0	477
Two or more weights marked on card within 3 months period with accurate interpretation of growth trend	87.9	477

6.6 Home Visits by Personnel from GMP Programs

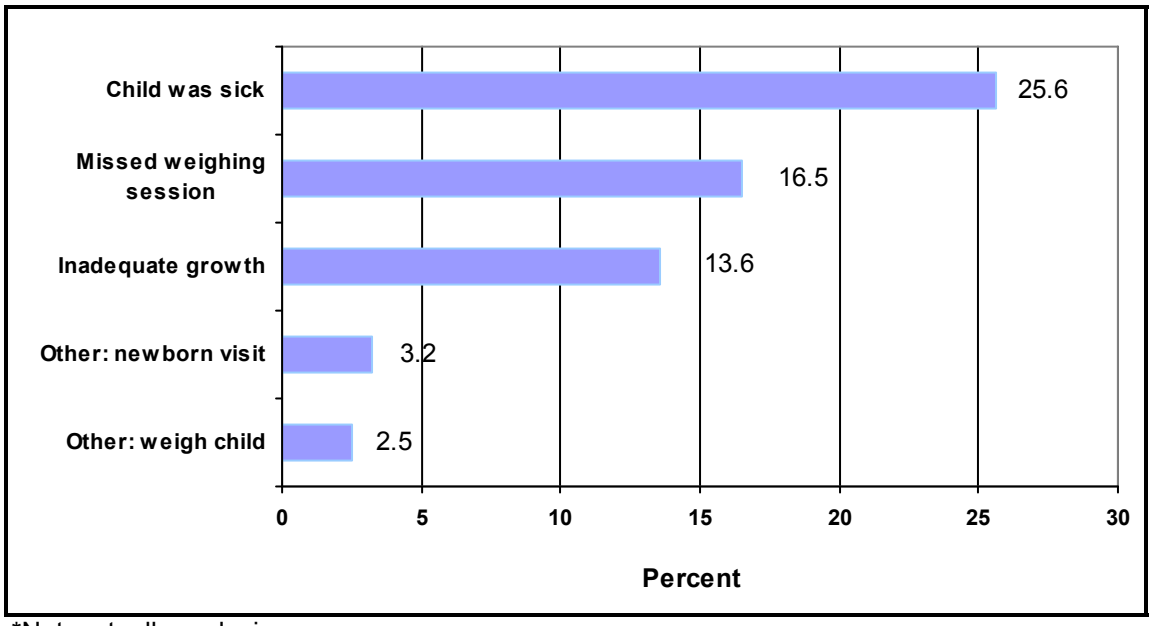
Home visits are made by *monitoras* for a variety of reasons, including to enroll newborns and to follow-up on children who have missed growth promotion sessions or who have failed to gain adequate weight. Almost 30 percent of AIN-C participants reported having received at least one home visit from a *monitora* (Figure 6.3). Among those families receiving visits, 35.6 percent had received one visit and another 32.2 percent reported receiving multiple visits.

Figure 6.3 Frequency of Home Visits as Reported by Caregivers



Among the caregivers who received home visits, the main reasons cited for the home visit were that the child was sick, had missed a weighing session, or had been found to have inadequate growth at the growth promotion session (Figure 6.4).

Figure 6.4: Reasons* for Last Home Visit by an AIN-C *Monitora*

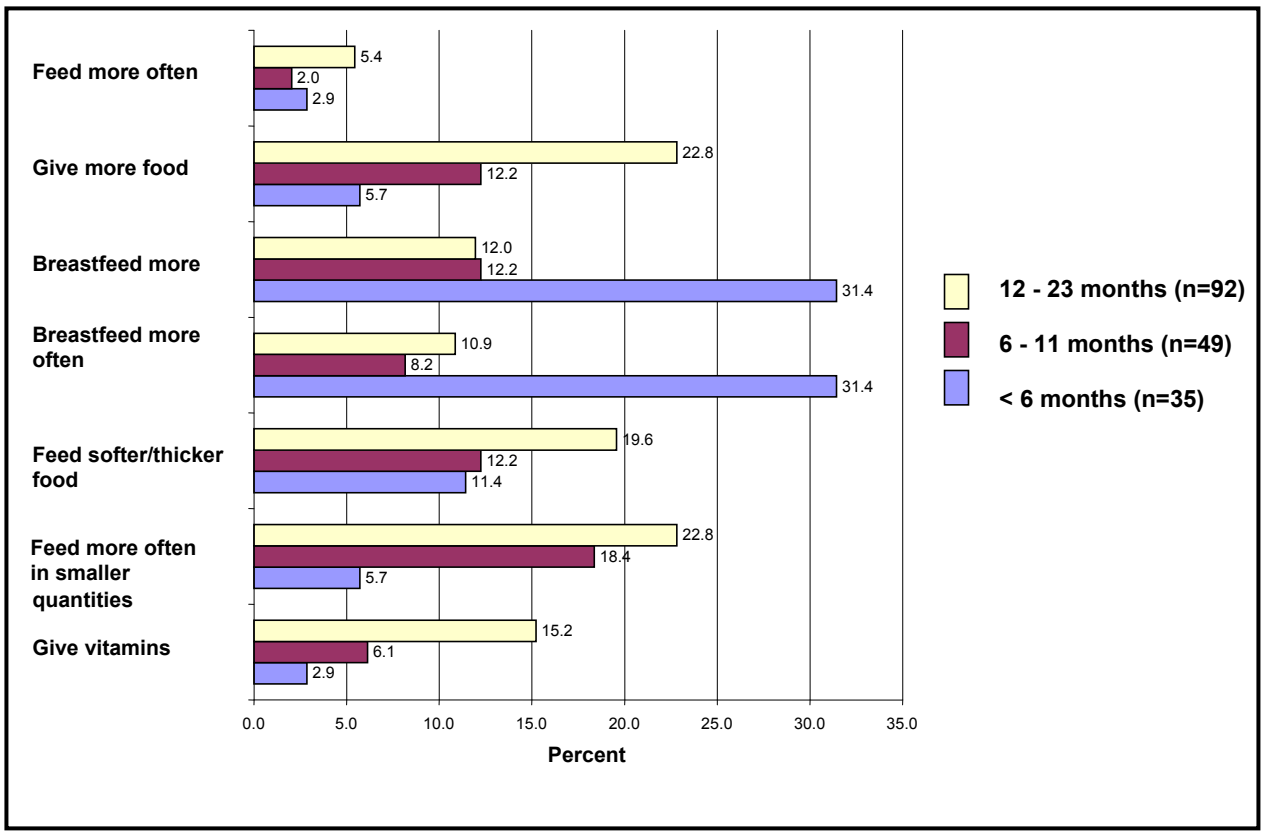


*Not mutually exclusive

The most common activity reported among caregivers (almost 72 percent) as occurring during a home visit was counseling/advice provided to the caregiver from the *monitora*. Other activities included weighing the child (32.2 percent), reviewing the growth card (10.7 percent), and referring to the health center (8.5 percent).

Figure 6.5 shows caregivers' recall of the counseling topics or advice discussed during home visits by the age of the child. Among caregivers of infants younger than six months, counseling for increased amount or frequency of breastfeeding was the most common topic for counseling. However, more than 10 percent of these caregivers recalled receiving advice concerning feeding of solid or semi-solid food.

Figure 6.5 Specific Advice Given* by Age of Child during Last Home Visit



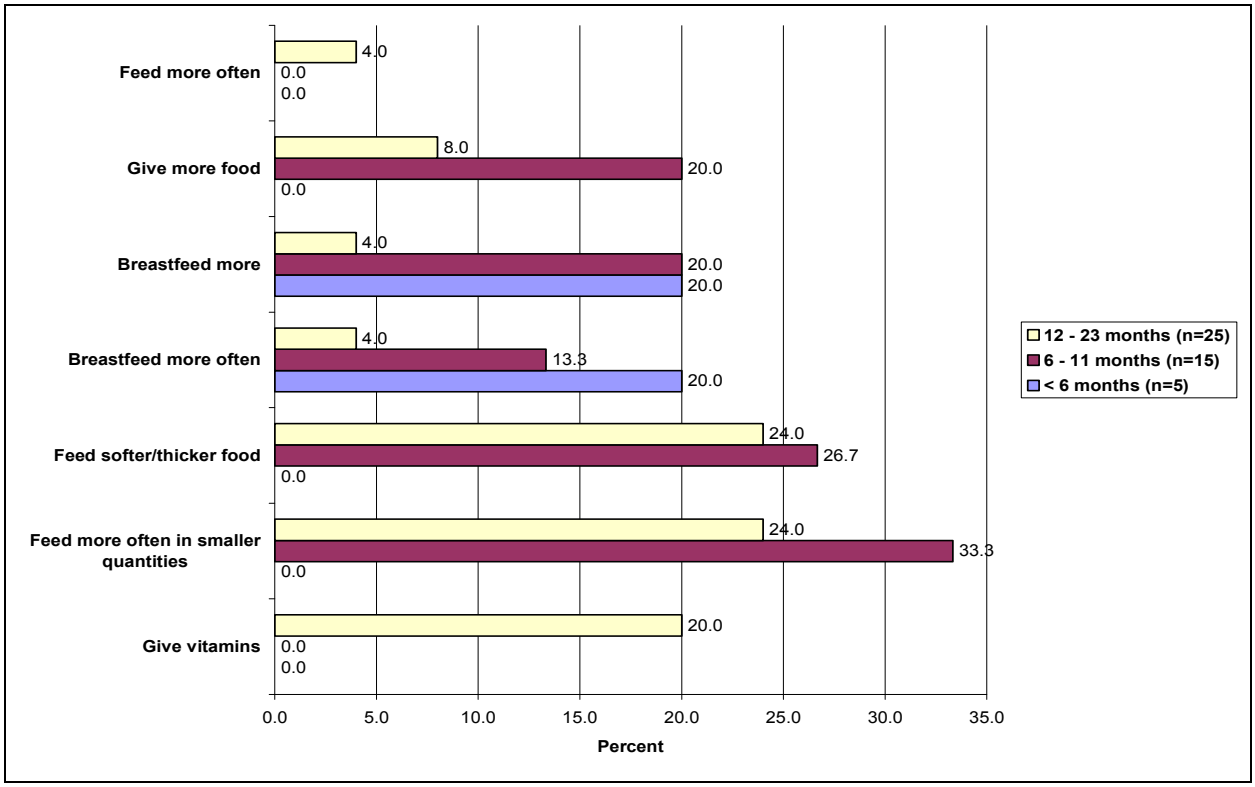
*Not mutually exclusive

Only 45 caregivers cited infant/child illness as the reason for their visit from the *monitora*, and only 5 of these caregivers had infants younger than 6 months. When the reason for the last home visit was child illness, the percentage of caregivers receiving advice was approximately the same as for all visits, but referrals to the health center were nearly three times as common. None of the caregivers of children younger than six months who received a sick child visit from the *monitora* recalled advice concerning feeding of solid or semi-solid food. Only one of the five recalled receiving advice related to increased frequency or quantity of breastfeeding[16] (Figure 6.7). Very few of the mothers of sick children aged 6–11 months or 12–23 months received advice to increase frequency and quantity of breastfeeding, but 53

[16] Response to any of Figure 6.6 categories for "breastfeed more" or "breastfeed more often".

percent of mothers with 6 to 11-month-olds and 36 percent of mothers with 12 to 23-month-olds received some advice concerning increased feeding of solid or semi-solid food.[17]

Figure 6.6 Advice Given* for Sick Child, by Age of Child, during Last Home Visit



*Not mutually exclusive

6.7 Discussion of Findings

The GMP program was well established in the AIN-C communities. Almost 100 percent of participants in the AIN-C program knew the activities supported by the program and the person in the community responsible; 90 percent knew this person as the *monitora*. Community-based growth promotion is based on the understanding that children under the age of two grow rapidly, and those who don't grow adequately are at increased risk for malnutrition, which is associated with increased morbidity and mortality. To effectively prevent malnutrition in a community, all children under the age of two should have the opportunity to participate on a monthly basis. Indicators related to entry into and participation in the program suggest that the quality of AIN-C implementation was high. Although not quite achieving the program goal of registration of all children in the first month of life, more than half were registered within two months and 75 percent within three months. Monthly participation of all children under two is also critical to effective program functioning. Attendance among AIN-C participants was consistent: almost 90 percent of AIN-C children had been weighed two or more times in the three months prior to the survey. This weighing occurred through monthly sessions as well as home visits. Almost 90 percent of growth cards reviewed were found to have an accurate interpretation of the growth trend.

[17] Response to any of Figure 6.6 categories for "Feed more often", "Give more food", or "Feed more often in smaller quantities".

In addition to the weighing activity, which included informing caregivers of the child's weight and the adequacy of weight gain, counseling on breastfeeding and feeding practices were major activities cited by a large majority (75 percent) of AIN-C caregivers during GMP sessions. This is less than the 100 percent expected to have received counseling, since AIN-C is designed to provide support to caregivers regardless of the growth trend of the child. The content of the counseling varied according to the age of the child and whether the child was healthy or sick. In most cases the focus of counseling for caregivers with infants less than six months of age was on breastfeeding, although ten percent of caregivers recalled messages related to food as well as breastfeeding, which is not consistent with the recommendation for exclusive breastfeeding for the first six months.

Home visits are another major element of the AIN-C program; about 30 percent of caregivers reported receiving a home visit. Many of these visits were to follow-up on sick children, so the content of the advice included referral to the health center three times more often than during the monthly growth promotion session. Based on this small sample of mothers (45) whose children were sick at the time of the survey, *monitoras* may need additional support to provide appropriate advice on nutritional care of the sick child. Very few caregivers recalled receiving messages related to continued and increased frequency of feeding during illness.

Summary of Key Findings: Participation in AIN-C

- Three-quarters of children who participated in AIN-C were enrolled by the end of the second month of life.
- Attendance at AIN-C growth promotion sessions was consistent and *monitoras* followed up through home visits with caregivers who miss a session.
- Most caregivers indicated child weighing as the primary activity taking place at growth promotion sessions, with more than 90 percent reporting that *monitoras* informed them of their child's weight and 85 percent reporting that *monitoras* informed them about the adequacy of their child's weight gain.
- The capacity of the *monitora*s to interpret growth trends was high; 87.9 percent of cards checked were determined to be accurate.
- In addition to child weighing, mothers report that *monitoras* routinely discussed child feeding and breastfeeding with caregivers at growth promotion sessions.
- Counseling during sick child visits appears to be inadequate (based on a very small sample of caregivers who had sick children at the time of the survey); very few recalled advice on continued feeding during illness.

7. Child Growth and Development Knowledge and Actions for Improvement

This section presents contrasting information related to caregiver perceptions and knowledge of child growth among AIN-C and "No-GMP" participants, as well as their knowledge of the growth promotion program, including advice that they have been given in counseling.

7.1 Caregiver Perceptions of Child Growth

Caregiver's perception of their child's growth differed by participation status (Table 7.1). The percentage of caregivers who felt their child was growing well was essentially identical in both the AIN-C and the "No-GMP" groups. However, among caregivers who said that their child was not growing well, a higher percentage of those in the "No-GMP" group said they did not know their child's growth status, while a higher percentage of those in the AIN-C group said that they knew that their child was not growing well.

Table 7.1 Caregivers' Perceptions of their own Child's Growth

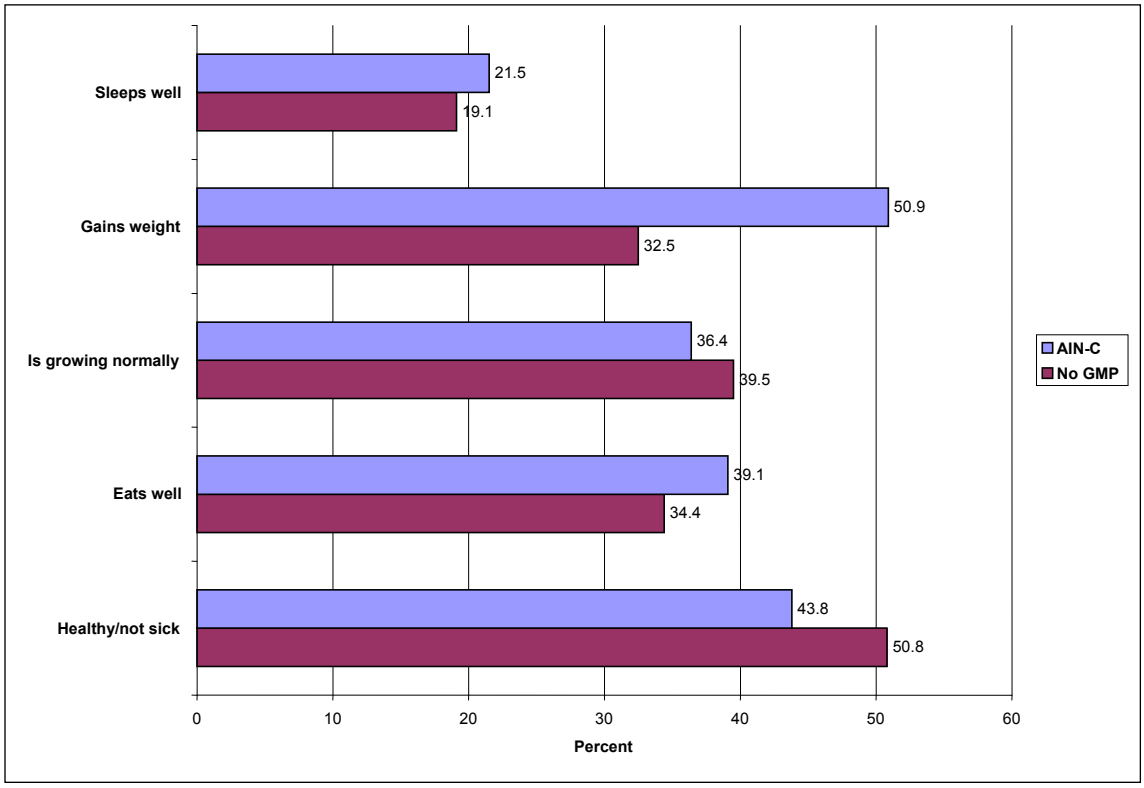
Perception of Child's Growth*	AIN-C		NO-GMP		TOTAL	
	%	Number of Children	%	Number of Children	%	Number of Children
Growing Well	81.2	591	82.3	622	81.8	1213
Not Growing Well	15.2		11.6		13.4	
Do not Know	3.6		6.1		4.9	

* $\chi^2 = 7.143$; p=0.028

7.2 Caregiver Knowledge of Signs of Good Growth

Caregivers were asked what they feel indicates that a child is growing well (Figure 7.1). About half of AIN-C participants responded "gains weight," compared to 29 percent of the "No-GMP" groups. This difference is statistically significant ($\chi^2 = 42.523$; $p<0.001$). About half of "No-GMP" participant caregivers mentioned that a child who is "healthy/not sick" is a child who is growing well, compared to only 43.8 percent of AIN-C respondents; this too was a statistically significant result ($\chi^2 = 5.922$; $p<0.05$). No other differences in the responses to this question by the two groups were statistically significant, however more than 30 percent of AIN-C participants said that growing normally and eating well indicated good growth.

Figure 7.1: Signs of Good Growth Named by Caregivers*

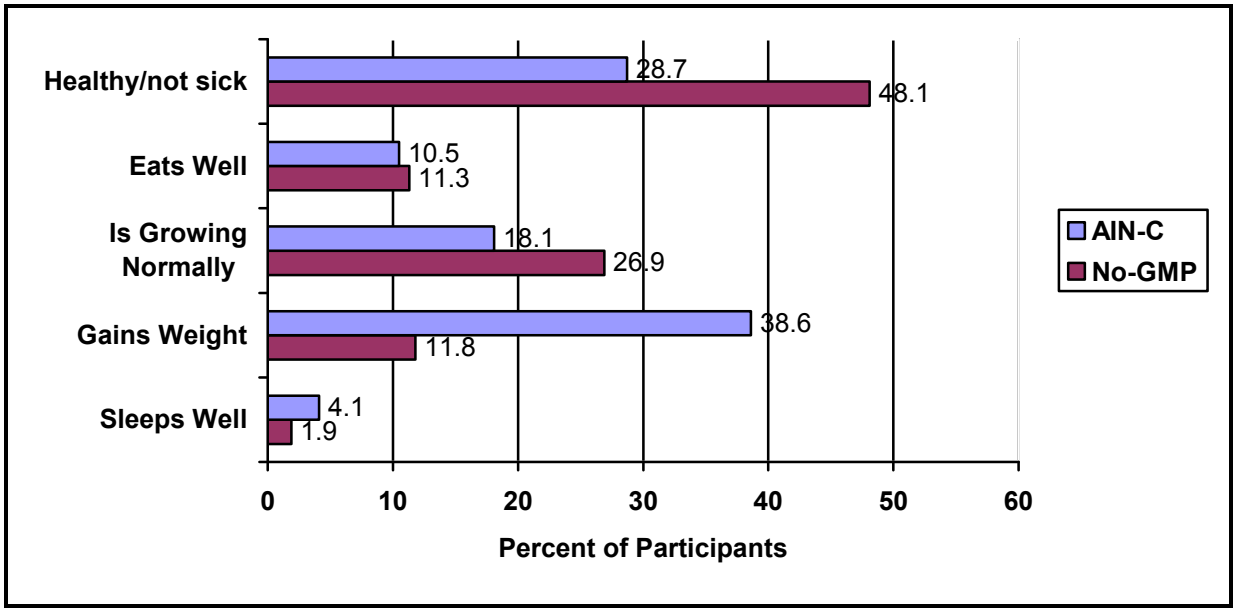


*More than one response possible

Although “gains weight” is the primary sign of good growth promoted by the AIN-C project, the other responses given by caregivers also can be understood, in some sense, as accurate signs of good growth.

An examination of caregivers who gave only a single response (rather than several responses as above) may provide insight into the extent to which AIN-C participants consider gaining weight to be the primary sign of good growth. Among the respondents who cited only one sign of good growth (29.4 percent of 581 AIN-C participants and 35.9 percent of 591 non-participants provided a single response; $\chi^2 = 5.522$; $p<0.05$), a highly significantly greater percentage of AIN-C participants cited “gains weight” as the sign of good growth compared to “No-GMP” participants; 38.6 compared to 11.8 percent, respectively. However, less than half of AIN-C participants who named only one sign of good growth cited “gains weight.” In addition, a highly significantly smaller percentage of AIN-C participants (28.7 percent) cited “healthy, not sick” compared to “No-GMP” participants (48.1 percent) as the sign of good growth. The percentage of AIN-C participants who responded that a child who is growing normally is a sign of good growth (18.1 percent) also was significantly smaller than the percentage of the “No-GMP” group who gave this response (26.9 percent).

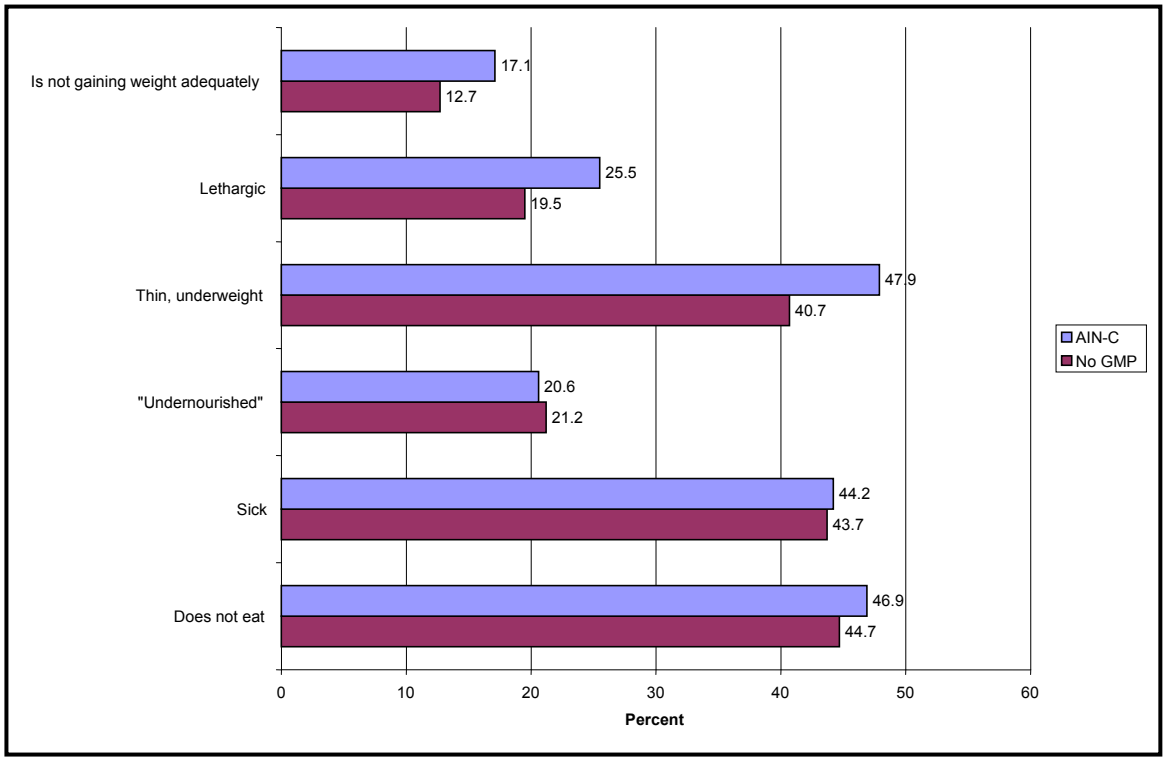
Figure 7.2 Signs of Good Growth Named by Caregivers who gave a Single Response, by Program Participation



7.3 Caregiver Knowledge of Signs of Poor Growth

Caregivers also were asked to name signs of poor child growth (Figure 7.3). In both groups the most common responses were “thin, underweight”, “undernourished,” and “does not eat.” Fewer than 20 percent of AIN-C participants named “not gaining weight adequately” as a sign of poor growth. This percentage, although low, was significantly higher than the 12.7 percent of “No-GMP” participants who cited “not gaining weight” as a sign of poor growth (χ^2 = 4.619; $p<0.05$). The proportion of AIN-C participants who responded that a child who was “thin, underweight” or lethargic” was a sign of poor growth responses was significantly higher than among non-participants (χ^2 = 6.387, $p<0.05$ and χ^2 = 6.472, $p<0.05$, respectively). The groups did not differ in the proportion of caregivers who responded that poor growth was signaled by a child who is “undernourished,” “sick,” and “does not eat.” (See Figure 7.3.)

Figure 7.3: Signs of Poor Growth Named by Caregivers, by Program Participation



Among caregivers who gave only one response for signs of poor growth, “thin, underweight” and “sick” were the most common responses in both groups. No differences were seen between groups for any response category, and fewer than 10 percent of AIN-C participants who named only a single sign of poor growth named “not gaining weight adequately” as that sign.

7.4 Counseling for Improved Child Growth

AIN-C program norms call for all mothers to receive counseling, facilitated by the program’s special counseling cards. Approximately 75 percent of AIN-C participant caregivers recalled having seen the AIN-C counseling cards. Most recalled seeing these during a contact with an AIN-C *monitora*, but some also reported seeing them at the public health facility (Table 5.2). Twenty-five percent of the AIN-C participants interviewed reported that they had not seen the counseling cards; this despite the fact that the program expectation is for all mothers to be counseled at every weighing session.

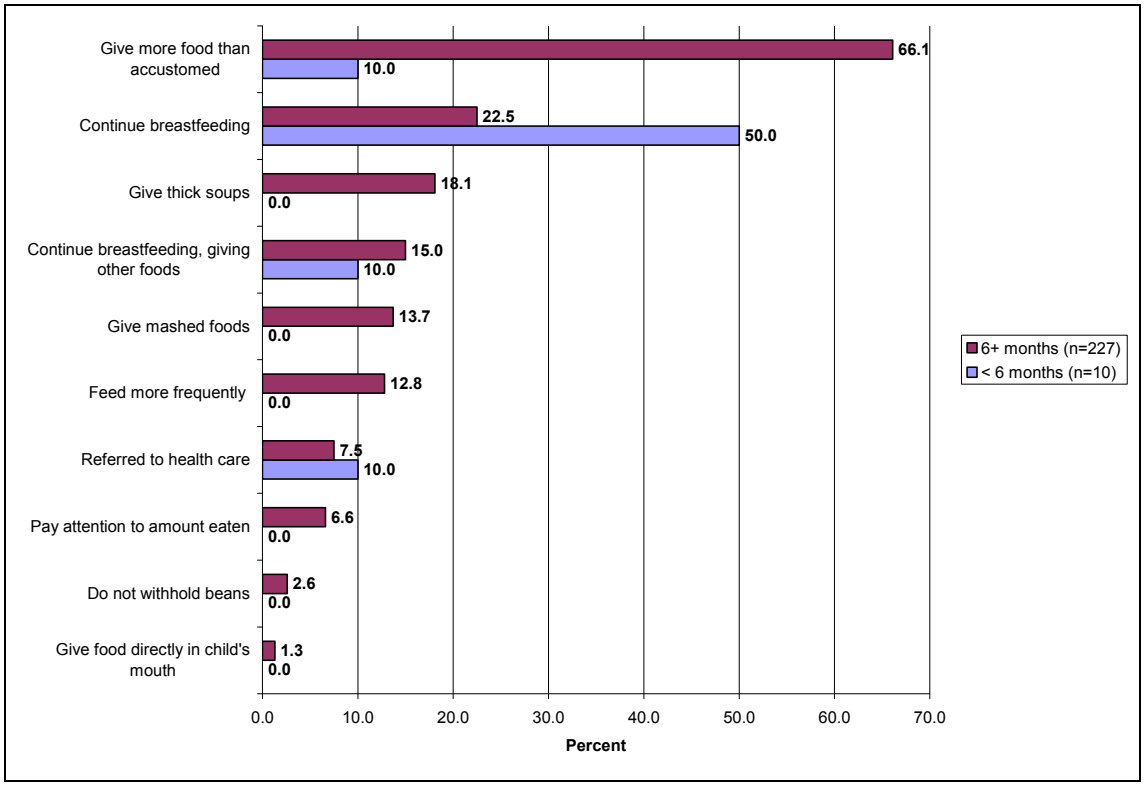
Forty-five percent of the “No-GMP” group also reported having seen the cards; four percent of them reported that they had seen the counseling cards from an AIN-C *monitora* despite the fact that their children were not enrolled in the program.

Table 7.2 Recognition of AIN-C Counseling Cards

	AIN-C		No GMP	
	% of Total	Number of Households	% of Total	Number of Households
Have seen counseling cards		591		622
Yes	73.3		44.9	
No	26.7		55.1	
Location where cards were seen		510		283
CESAR / CESAMO	35.8		91.0	
With AIN-C *Monitora*	76.7		4.3	
Elsewhere	5.3		6.1	

Interviewers noted whether the child had an episode of growth faltering (inadequate monthly weight gain) indicated on their growth card and, if so, asked the respondents whether they received advice related to improving the child's weight gain and the specific content of that counseling. Eighty-one percent of AIN-C participants reported receiving advice. The most frequent advice received was "give more food than accustomed." Sixty-four percent of caregivers of infants and children six months or older and ten percent of caregivers with children under six months reported receiving this advice. Fifty percent of caregivers of infants younger than six months with faltering growth on the card reported "continue breastfeeding" as the advice they received, although the sample was only ten caregivers. "Continue breastfeeding" also was the second most common advice reported for caregivers whose children with faltering growth were six months or older.

Figure 7.4 Advice Provided for Children with Inadequate Gain Weight: AIN-C



7.5 Discussion of Findings

The AIN-C program is built around the concept that adequate weight gain is a good proxy for health, and that by regular monitoring of weight gain in children (0–24 months of age) and tailored counseling based on that growth information, malnutrition can be prevented. The results of this evaluation show that the caregivers who participated in the AIN-C program were significantly more likely than the "No-GMP" group to understand the signals (especially weight gain) of healthy growth, and a small proportion, although still significantly more than the "No-GMP" group, understood that inadequate weight gain was a sign of poor growth. About half of AIN-C participants compared to a third of the "No-GMP" caregivers responded that gaining weight was a sign of good growth. For a sign of poor growth, 17.1 percent of AIN-C participants compared to 12.7 percent of "No-GMP" caregivers named inadequate weight gain as a sign of poor growth; even among AIN-C participants, very few articulated the relationship between poor growth and inadequate weight gain.

One of the key messages of AIN-C was "*El Niño o Nina que crece adecuadamente es sano; el Niño o Nina que no crece adecuadamente esta enfermo*" [A child who grows adequately is healthy, while a child who grows inadequately is sick]. The significant differences in the two groups of caregivers understanding of the relationship between weight gain and growth suggest that this message was communicated to some extent through the program. However, the fact that only 50 percent of AIN-C participants could articulate this relationship is a signal that the project failed to effectively convey this concept. The reason for this result is unclear since the survey didn't provide any data to identify whether this was a problem with the training of the *monitoras* or a communication issue between the *monitora*s and the caregivers.

One of the most important aspects of the AIN-C program was the counseling provided to the caregiver by the *monitora,* based on the growth information. A set of 20 laminated counseling cards was a key job aid for the *monitoras* developed through the AIN program and intended to facilitate the counseling process. These cards covered topics including establishing breastfeeding for children 0–7 days old, managing adequate and inadequate growth with or without breastfeeding for children 0–2 and 3–5 months, and managing adequate or inadequate growth with proper feeding for children 6–8, 9–11, 12–17, or 18–23 months (see BASICS.org website for sample cards). At the time of this evaluation, 75 percent of the AIN-C participants had seen the counseling cards; this despite the expectation that all caregivers would be counseled regardless of the growth status of their children. Notable is that almost half (45 percent) of the "No-GMP" caregivers had also seen the counseling cards. This result bolsters the earlier conclusion that the AIN-C program had "spilled over" into the "control" areas where the majority of the "No-GMP" group resided (see Chapter two). This suggests that the "No-GMP" group is likely to have some familiarity with the feeding and care messages contained in the counseling cards.

Knowledge of the growth status of children under two years of age on a regular basis is the foundation for the counseling messages provided through the AIN-C program. Furthermore, when a child is encountered with inadequate growth, the *monitora* is expected to provide specific, tailored advice to the caregiver of that child to help improve weight gain. The results of this evaluation show that more than 80 percent of AIN-C participants whose children were faltering in growth received counseling. The specific advice received as reported by these caregivers shows mixed results in terms of the appropriateness and specificity of the messages provided. Ten percent of caregivers of children younger than six months recalled being counseled to give their child more food than accustomed. Very few respondents reported messages other than "continue breastfeeding" and "give more food than

accustomed;" more specific messages related to the quality of foods for children over six months of age such as give thick soups, give mashed foods, and pay attention to the amount eaten were mentioned only 18.1, 13.7, and 6.6 percent of caregivers, respectively.

Summary of Key Findings: Child Growth Concepts and Actions for Improvement

- The concept of weight gain as a signal of "good" growth was understood by more than 50 percent of AIN-C participants; this result was significantly different from "No-GMP" participants who only cited weight gain one-third of the time.
- Half of the AIN-C participants did not mention adequate weight gain as a sign of health, despite the fact that this was a key message of the AIN-C program.
- The concept of the "inadequate weight gain" was not well understood; only 17 percent of AIN-C participants identified this as a sign of "poor" growth.
- The "special" counseling cards used in the AIN-C program were widely, although not universally, recognized by AIN-C participants.
- While nearly 75 percent of AIN-C participants had seen the cards, 45 percent of the "No-GMP" group also recognized the cards.
- Among the "No-GMP" participants who recognized the cards, 91 percent had seen them in the health center.
- Among caregivers who had children with faltering growth, more than 80 percent received counseling.
- "Give the child more food than accustomed" was the most common message recalled by caregivers of children with inadequate growth over six months of age.
- Among caregivers of children younger than six months with inadequate growth, "continue breastfeeding" was the most common message recalled (50 percent), while 10 percent recalled "give the child more food than accustomed."

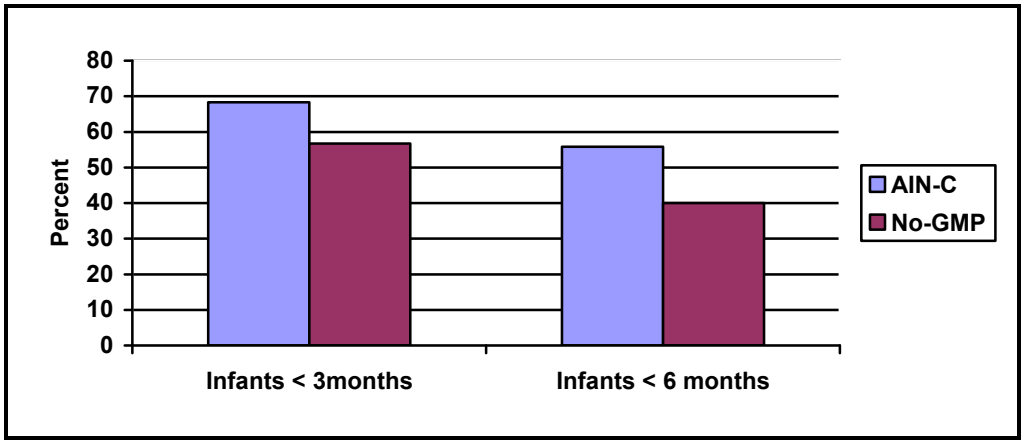
8. Infant and Young Child Feeding Practices

Mothers were asked a series of questions about breastfeeding and the introduction of other liquids, complementary foods, and the frequency of daily feeding. This information was analyzed for differences in optimal feeding practices between the AIN-C and the "No-GMP" participants according to the age of the child.

8.1 Exclusive and Any Breastfeeding Practices

Girls and women who were breastfeeding during the time of the survey were asked the number of times that they gave their child any other liquids or food in the 24 hours prior to the survey interview. Infants whose mothers reported that they received no food or other liquids were categorized as exclusively breastfed. The percentage of infants younger than three months who were exclusively breastfeeding was 68.3 percent in the AIN-C group compared to 56.7 percent in the "No-GMP" group, but this difference was not statistically significant. For infants under six months of age, the difference in proportion exclusively breastfed between the AIN-C and the "No-GMP" groups was statistically significant; 55.8 percent compared to 40.0 percent respectively (see Figure 8.1).

Figure 8.1 Infants < 3 and < 6 Months Exclusively Breastfed by Participation



The median duration of exclusive breastfeeding and of any breastfeeding were calculated following the method used for the Demographic and Health Surveys (DHS). Three-group moving averages were calculated for numerators and denominators, with ages grouped into months. Starting from the youngest age, the value of the median was determined by linear interpolation of the percentage of breastfeeding children (or exclusively breastfeeding) in the first age group where the percentage was less than 50 percent and the percentage of breastfeeding children in the next youngest age group. The median durations of exclusive breastfeeding and of any breastfeeding were both 1.5 months longer among AIN-C participants than in the "No-GMP" group, although the duration of any breastfeeding was high in both groups.

Table 8.1 Median Duration of Exclusive and Any Breastfeeding by Participation

	AIN-C		No GMP	
	Age in Months	Number of Children	Age in Months	Number of Children
Median duration (months) of exclusive breastfeeding*	4	120	2.4	135
Median duration (months) of any breastfeeding*	20.9	535	19.5	543
* Source for methodology: Rutstein, SO and G Rojas. "Guide to DHS Statistics". Calverton, MD: ORC MACRO, 2003.				

Although the median duration of breastfeeding (and of exclusive breastfeeding) is one of the most commonly used breastfeeding indicators, it has specific limitations. First, for ease of calculation, the percentage breastfeeding (or exclusive breastfeeding) is assumed to decrease monotonically from birth. This assumption is unlikely to be true, especially for exclusive breastfeeding: the rate at which infants in the population cease exclusive breastfeeding is slower during the first few months of life than it is as six months approaches. Furthermore, if breastfeeding (or exclusive breastfeeding) does not decline monotonically, the shape of the "decay curve" may be different among different population groups, confusing direct comparisons of "median duration."

For this reason, breastfeeding outcomes in the AIN-C and "No-GMP" groups also were compared using Kaplan-Meier survival analysis (Table 8.2), considering cessation of breastfeeding (and exclusive breastfeeding) as "events," and continued exclusive breastfeeding and breastfeeding, respectively, as "survival." This procedure estimates survival time for the group by taking into account both the rate at which "death" occurs (cessation of exclusive breastfeeding or cessation of breastfeeding) and the age at which surviving (still exclusively breastfeeding or still breastfeeding) individuals in the group are lost to follow-up (their age at the survey). Survival curves (Figure 8.2 and 8.3) allow visual comparison of the rates at which breastfeeding decreases in the groups, and the variability of these rates over time. Procedures associated with survival analysis allow statistical comparisons of these rates to be made.

Table 8.2 Estimated Months Breastfeeding (Kaplan-Meier Survival Analysis)

	Exclusive breastfeeding †				Any breastfeeding††			
	AIN-C		No-GMP		AIN-C		No-GMP	
	Age in Months	Number of Children	Age in Months	Number of Children	Age in Months	Number of Children	Age in Months	Number of Children
75% continue	4.1	120	2.8	135	18.8	535	18.0	543
50% cease	5.2		4.4		21.6		21.4	
25% continue	5.8		5.2		22.9		22.9	
Mean	4.8		4.0		20.3		19.4	

Note: Maximum age of child is 23 months

† Log-rank statistic = 15.94 (p=0.0001); Breslow's Test = 12.90 (p=0.0001); analysis limited to infants < 6 months;

†† Log-rank statistic = 4.22 (p=0.0399); Breslow's Test = 9.43 (p=0.0021)

Figure 8.2 Survival Function for Time to Cessation of Exclusive Breastfeeding

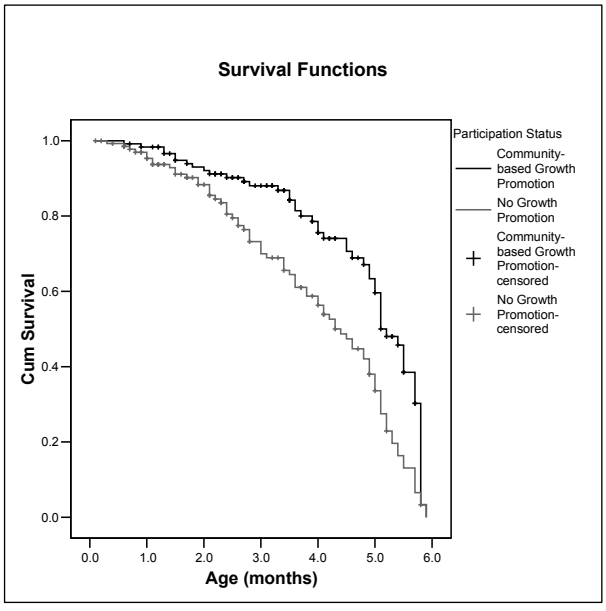
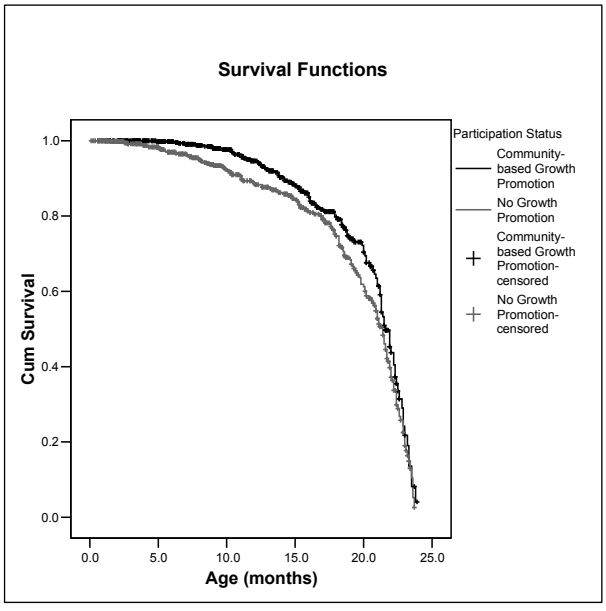


Figure 8.3 Survival Function for Time to Cessation of any Breastfeeding



As can be seen in Figure 8.2, the rate at which infants in the "No-GMP" group cease exclusive breastfeeding is relatively constant up to 6 months. Among AIN-C participants, the rate of cessation is slower in the early months and more rapid as 6 months nears. Thus, before 3 months of age, 25 percent of "No-GMP" infants cease exclusive breastfeeding (75 percent continue), but at 4 months of age less than 25 percent of the AIN-C group infants cease exclusive breastfeeding (Table 8.2). This difference between the groups in the rate of "survival", or continued exclusive breastfeeding, is highly significant.

Similarly, even though the median age of breastfeeding is approximately two years in both groups, the rate at which breastfeeding ceases is slower in the AIN-C group. Figure 8.3 illustrates that, at any given age, a larger proportion of infants in the AIN-C group continue to breastfeed, and the difference between the groups is greatest at early ages (the much higher significance of the Breslow's test, which gives more weight to early events, in comparison with the log-rank test, emphasizes this difference).

8.2 Infant and Young-Child Feeding 6–23 Months

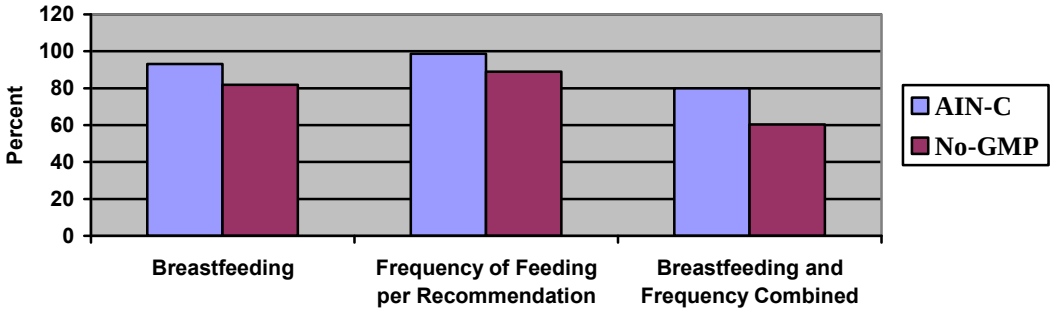
Adequacy of feeding was determined by age group, as food requirements change rapidly during the first two years of life. For each age group, appropriate feeding was defined as continued breastfeeding, plus the frequency and quantity of feeding recommended for that age group in the AIN-C counseling materials as follows:

- Infants 6–8 months of age: 2 or more meals daily
- Infants and children 9–11 months of age: 3 or more daily meals, with 4 or more tablespoons of food at each meal
- Children 12–23 months of age: 5 or more daily meals, with 5 or more tablespoons of food at each meal

8.2.1 Breastfeeding and Frequency of Feeding in Children Under 12 Months

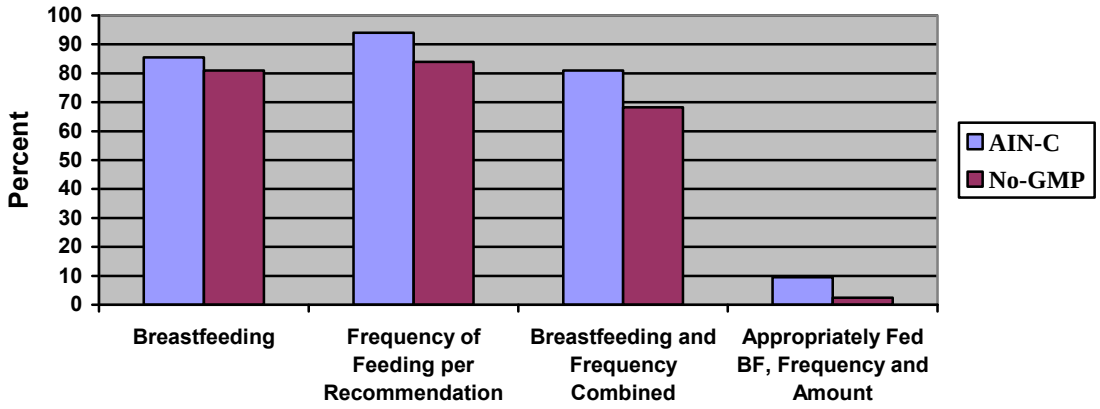
AIN-C and "No-GMP" groups differ significantly in their breastfeeding and frequency of feeding practices among children 6–11 months of age. For children 6–8 months old, 80 percent of AIN-C children were appropriately fed, compared to 60.3 percent of "No-GMP" children. The differences were apparent and significant in both the proportion of children who were breastfed and the frequency of feeding solid/semi-solid foods (see Figure 8.4).

Figure 8.4 Feeding According to Recommendations among Children 6–8 Months



Likewise for children 9–11 months of age, the AIN-C group compared to the "No-GMP" group had higher rates of breastfeeding (85.5 percent compared to 81 percent), better frequency of feeding rates (94 percent compared to 84 percent), and overall, a higher proportion of children who met the recommendation for both breastfeeding and frequency of feeding for this age group (81 percent compared to 68.3 percent). These differences were also statistically significant (see Figure 8.5).

Figure 8.5 Feeding According to Recommendations among Children 9–11 Months



An important element of appropriate feeding is the amount of food. Caregivers who described their food intake as normal in the day previous to the survey were asked questions regarding the amount of food the child received. Among all children, including AIN-C participants, the proportion of children who received the appropriate amount of food was extremely low, however the proportion of children 9–11 months who received the recommended amount of food was almost double in the AIN-C group; 15.6 percent (AIN-C) compared to 7.9 percent ("No-GMP").

Table 8.3 Amount of Food Received among Children 9–11 Months

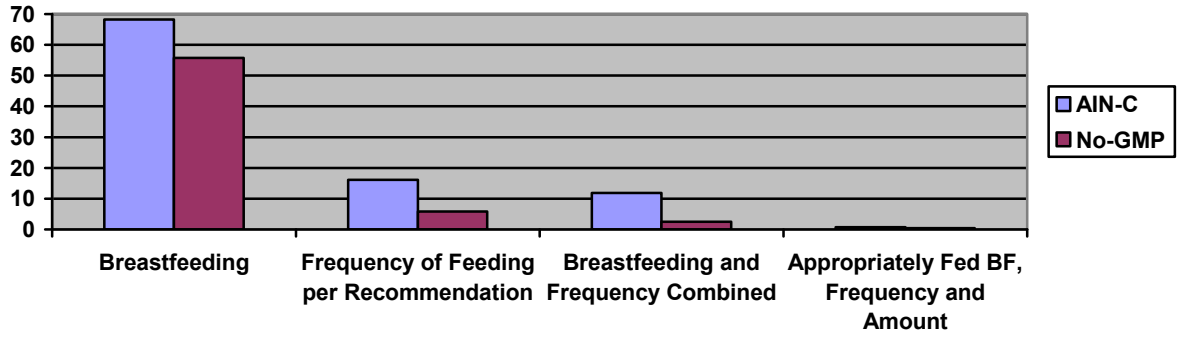
Amount of Feeding*	AIN-C		NO-GMP		TOTAL	
	# of Tbs	Number of Children	# of Tbs	Number of Children	# of Tbs	Number of Children
Mean Tablespoons food per meal	2.8	64	2.7	63	2.7	127
Median Tablespoons food per meal	2.0		2.0		2.0	
4+ Tablespoons food per meal (%)	15.6		7.9		11.8	

* Children whose caregiver described the previous day's food intake as normal

8.2.2 Breastfeeding and Frequency of Feeding among Children 12–23 Months

AIN-C and "No-GMP" groups also differed significantly in feeding practices among children 12–23 months of age; AIN-C participants had significantly better practices related to breastfeeding and the frequency of feeding. Although the difference in the frequency of feeding was highly significant ($p < 0.001$), the proportion of children who received the recommended number of feedings was very low for both groups: 16.1 percent for AIN-C participants and 5.8 percent for the "No-GMP" group (see Figure 8.6).

Figure 8.6 Appropriate Feeding among Children 12–23 Months



As was the case for younger children, the proportion of children 12–23 months in both groups AIN-C participants (5.8 percent) and the "No-GMP" group (6.3 percent) who provided the recommended amount of food was extremely low; there was no statistical difference between the groups in this indicator (Table 8.4).

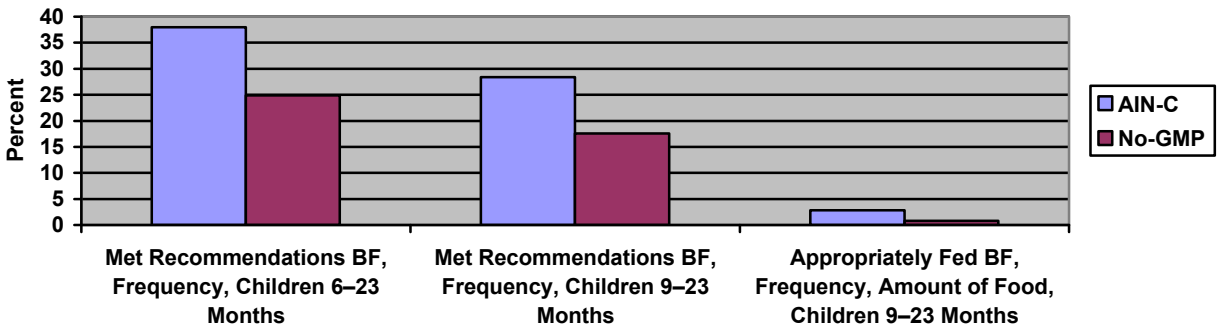
Table 8.4 Amount of Food Received among Children 12–23 Months

Amount of Feeding*	AIN-C		NO-GMP		TOTAL	
	# of Tbs	Number of Children	# of Tbs	Number of Children	# of Tbs	Number of Children
Mean Tablespoons food per meal	2.6	208	2.7	224	2.7	432
Median Tablespoons food per meal	2.0		2.0		2.0	
5+ Tablespoons food per meal (%)	5.8		6.3		6.0	

8.2.3 Appropriate Feeding of Children 6–23 Months

Comparing the results of the AIN-C and the "No-GMP" groups across the period of 6–23 and 9–23 months, the AIN-C participants have a greater proportion of children who met the recommendations for breastfeeding and the frequency of feeding. For children 6–23 months, 38 percent of AIN-C children met both recommendations (breastfed and frequency of feeding) compared to 24.9 percent of the "No-GMP" group. This difference is highly statistically significant ($p < 0.001$). Likewise for children 9–23 months, more AIN-C children were fed according to the recommendations (breastfeeding and the frequency of feeding) compared to "No-GMP" children: 28.4 percent and 17.6 percent, respectively. This difference is statistically significant ($p<0.01$). When the amount of food per feeding is included, which reflects a complete assessment of appropriate feeding practices, the proportion of children who are fed appropriately drops to very low levels (2.8 percent for AIN-C participants and 0.8 percent of "No-GMP") however, this difference remains statistically significant ($p<0.05$).

Figure 8.7 Appropriate Feeding of Children 6–23 and 9–23 months



8.3 Feeding Practices during Childhood Illnesses

Respondents who reported that their children were sick in the two weeks prior to the survey with either diarrhea or acute respiratory infection were asked about the quantity and frequency of breastfeeding and complementary feeding during the child's illness. Analysis of these feeding practices was restricted to those infants and children aged six months or older who had been introduced to solid foods by the time of the illness. Results are presented separately for the illnesses of diarrhea and acute respiratory infection.

8.3.1 Feeding during Diarrheal Illness

A greater percentage of AIN-C participants increased both the quantity and frequency of feeding during diarrheal illness (Table 8.5). The percentage that maintained, decreased, or stopped feeding, or maintained or decreased feeding frequency, was not statistically different between the two groups. In both groups, practices were split 50–50: roughly half of caregivers increased or maintained the quantity of food, and half decreased it or stopped feeding.

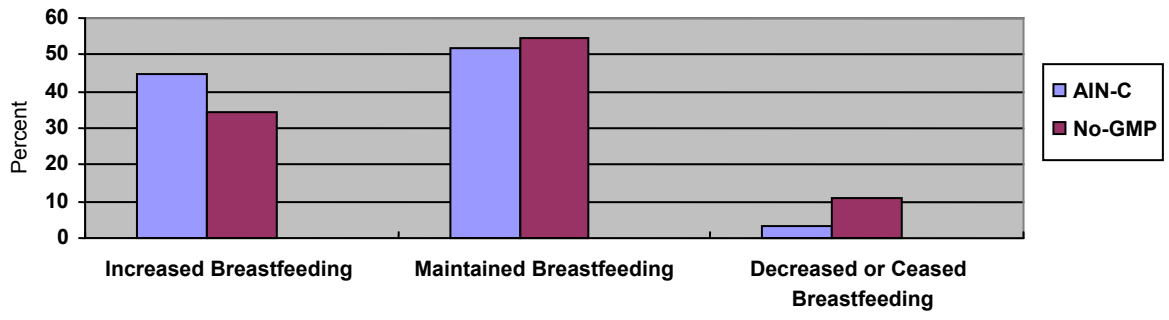
Table 8.5 Feeding Practices during Diarrheal Illness for Children 6 Months or Older

	AIN-C		NO-GMP		TOTAL	
	%	Number of Children	%	Number of Children	%	Number of Children
Quantity of food per feeding†						
Increased††	10.6	246	3.9	229	7.4	475
Maintained	41.1		48.0		44.4	
Decreased	38.6		38.0		38.3	
Stopped feeding	9.8		10.0		9.9	
Frequency of feeding† **						
Increased††	12.7	221	4.9	206	8.9	427
Maintained	54.8		59.7		57.1	
Decreased	32.6		35.4		34.0	

* Refers to the number of children with diarrhea who were eating solid foods at the time of the episode.
** Only mothers who did not stop feeding.
† $p < 0.05$; †† $p < 0.01$

If the child was still breastfeeding, the respondent was asked about the frequency of breastfeeding during the diarrhea episode. Women whose children were enrolled in AIN-C were more likely to have increased breastfeeding (45 percent) during the recent diarrhea episode compared to women whose children were not enrolled in CBGP (34.6 percent). This difference was statistically significant ($p<0.05$). Also, a highly significantly ($p<0.01$) greater percentage of "No-GMP" participants decreased or ceased breastfeeding (10.9 percent) compared to AIN-C participants (3.3 percent).

Figure 8.8 Breastfeeding Practice during Diarrheal Illness



8.3.2 Feeding During Acute Respiratory Infection

Respondents whose children were six months of age or older and had an episode of acute respiratory infection (ARI) in the two weeks prior to the survey were asked about the quantity of food fed during this illness and the frequency of those feedings. The proportion of mothers who increased the quantity and frequency of feeding during ARI was greater in the AIN-C group (4.9 percent and 8.5 percent, respectively) than in the "No-GMP" group (0.7 percent for both). This difference was statistically significant (see Table 8.6). However, it is important to note that the percentage of AIN-C participants who maintained feeding was lower than the percentage of "No-GMP" mothers who did so; the combined percentage who increased or maintained feeding was higher in the "No-GMP" group, although this difference was not statistically significant.

Also, as was the case for feeding during diarrhea, roughly half of the caregivers in both groups increased or maintained the quantity of food they fed during the ARI episode. For the frequency of feeding, roughly 60 percent of caregivers in both groups increased or maintained the frequency of feeding during the ARI episode.

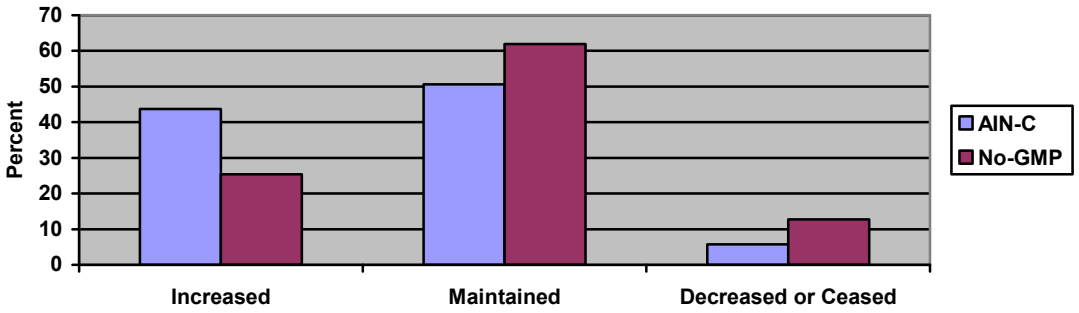
Table 8.6 Feeding Practices during ARI: Children 6 Months or Older

	AIN-C		NO-GMP		TOTAL	
	%	Number of Children	%	Number of Children	%	Number of Children
Quantity of food per feeding†						
Increased††	4.9	162	0.7	153	2.9	315
Maintained	42.6		51.0		46.7	
Increased or Maintained	47.5		51.7		49.6	
Decreased	46.9		41.8		44.4	
Stopped feeding	5.6		6.5		6.0	
Frequency of feeding†† **						
Increased†††	8.5	153	0.7	142	4.7	295
Maintained	53.6		57.7		55.6	
Increased or Maintained	62.1		58.4		60.3	
Decreased	37.9		41.5		39.7	

** Only mothers who did not stop feeding;† $p < 0.10$; †† $p < 0.05$; ††† $p < 0.01$

Among caregivers who were breastfeeding, those participating in AIN-C were highly significantly ($p<0.01$) likely to increase breastfeeding during the ARI episode, and significantly ($p<0.05$) less likely to decrease or cease breastfeeding (See figure 8.9).

Figure 8.9 Breastfeeding Practices during ARI Illness



8.4 Discussion of Findings

The conceptual framework for the impact of the AIN-C program on malnutrition shows the pathway to improved nutrition and health being mediated by improved practices. Infant and young child breastfeeding and complementary feeding practices among healthy children and also among children who are ill have a major impact on nutritional status. The results of this evaluation show that the AIN-C program significantly improved practices related to breastfeeding and frequency and quantity of meals for children 6–23 months, as well as feeding practices during illness when compared to practices in the “No-GMP” group. The results also show a major gap in appropriate feeding practices specifically related to the amount of food provided to children 6–23 months that was not adequately addressed in the AIN-C program.

Exclusive breastfeeding is recommended for all children from birth to six months of age. Several different analyses of breastfeeding practices conducted for this evaluation support the conclusion that the AIN-C program had a positive impact on breastfeeding practices. Mothers practiced exclusive breastfeeding longer, as shown both in terms of the percentage of mothers who were practicing exclusive breastfeeding at six months (55.8 percent of AIN-C mothers compared to 40 percent of “No-GMP” mothers) and in terms of the median duration of exclusive breastfeeding. Among AIN-C mothers, the median duration was 1.5 months longer than among “No-GMP” mothers. Furthermore, the rate at which mothers cease exclusive breastfeeding is much slower in the early months and more rapid as six months nears; while true for both groups, a greater proportion of AIN-C mothers ceased exclusive breastfeeding closer to six months that the “No-GMP” mothers.

The AIN-C program also effectively improved some practices related to complementary feeding of children 6–23 months compared to the “No-GMP” group, but the results show that much more attention needs to be paid to the amount of food that children are provided. Overall, the AIN-C program had a positive impact on the frequency of complementary feeding for children 6–8 months and 9–11 months: 98.7 and 94 percent, respectively, in AIN-C met the recommendation, compared to 88.9 and 84 percent, respectively, in the “No-GMP” group. However, even among the AIN-C group, where more than 90 percent of children 9–11 months met the recommendation for frequency of feeding, only 15.6 percent met the recommendation for the amount of food needed. Although almost double the proportion of children in the “No-GMP” group, this reflects very few children being fed adequately. Among children 12–23 months of age, the AIN-C group showed some improvement in the frequency of providing food compared to the “No-GMP” group; 16.1 percent compared to 5.8 percent,

respectively, however this shows a dramatic decline in the proportion of children who are meeting the recommendation for frequency of feeding compared to the 9–11 month age group. The percentage of children who received the appropriate quantity of food dropped in the AIN-C group; there was no difference in meeting this recommendation between the AIN-C and "No-GMP" children for this age group.

The AIN-C program also provided counseling to caregivers regarding feeding when their child was ill. The evaluation shows significant differences in breastfeeding and provision of food to children with diarrhea or ARI. AIN-C participants are much more likely to increase breastfeeding and increase the frequency of feeding when their children have diarrhea or ARI. However, when looking at those who at least maintained the quantity of food provided and the frequency of feeding, the results show that about half of both the AIN-C and "No-GMP" caregivers either maintained or increased the quantity and the frequency of feeding their children during diarrhea and ARI. Overall, the impact of AIN-C on feeding practices during illness at the time of this evaluation is uncertain.

Summary of Key Findings: Infant and Young Child Feeding Practices

- Exclusive breastfeeding rates among infants younger than six months of age were significantly higher in AIN-C children compared to "No-GMP" children.
- Median duration of exclusive and any breastfeeding was higher in the AIN-C group.
- The rates at which exclusive and any breastfeeding were discontinued were significantly different in the AIN-C and "No-GMP" groups: In the AIN-C group, mothers ceased exclusive breastfeeding much more slowly—75 percent of mothers were continuing to breastfeed exclusively their 4.1 month old infants. In the "No-GMP" group, 75 percent were continuing exclusive breastfeeding only to 2.8 months of age.
- The proportion of children under 12 months who were fed appropriately, according to recommendations both in terms of breastfeeding and frequency of feeding complementary foods was significantly higher for AIN-C than "No-GMP."
- The proportion of mothers who met the recommendations for the amount of food to provide children between 6 and 23 months was extremely low for both groups. However, the percentage that did meet the recommendation was significantly greater in the AIN-C group than in the "No-GMP" group for children 9–11 months. There was no significant difference in meeting the recommendation for 12–23 month old children.
- AIN-C mothers were more likely to increase the quantity and frequency of feeding during diarrheal illness and an episode of ARI, and less likely to decrease or cease breastfeeding than mothers in the "No-GMP" group.
- About half of both the AIN-C and "No-GMP" mothers either increased or maintained the quantity and frequency of food provided to their children during a diarrhea disease or ARI.

9. Care Seeking and Treatment for Common Childhood Illnesses

Caregivers were asked whether the child had an episode of diarrhea or an acute respiratory infection (ARI) in the two weeks prior to the survey interview. For those children who had been ill, caregivers were asked about care seeking, home care, and feeding practices related to that episode of illness. Caregivers were also asked about their perceptions of danger signs for these illnesses. This chapter will present data collected on diarrheal and ARI. Feeding during illness episodes was covered in the previous chapter.

9.1 Prevalence of Diarrhea

Children enrolled in the AIN-C group were more likely to have had an episode of diarrhea (49.1 percent) compared to those in the non-participant group (46.4 percent). The survey also determined if the diarrhea varied on two measures of severity: the presence of blood in the stool and the duration of the episode. The prevalence of blood in the stool was similar in the two groups. Persistent diarrhea was more common among "No-GMP" than AIN-C children, however the difference was not statistically significant.

Table 9.1 Prevalence of Diarrhea in Children by Program Type

	AIN-C		No GMP	
	Percent	Number of Children	Percent	Number of Children
Any Diarrhea†	49.1	591	43.1	622
Bloody Diarrhea (percent among those who had diarrhea)	4.5		5.2	
Persistent Diarrhea – 14+ days (percent among those who had diarrhea)	5.2		6.0	

† ($p < 0.05$)

9.2 Use of Oral Rehydration Therapy

Caregivers whose children had diarrhea were asked about the use of rehydrating fluids to treat it. Three types of rehydration fluids are reported in Table 9.2: breastfeeding; Oral Rehydration Solution (ORS); and a combination of ORS and any home fluid. Children enrolled in AIN-C were significantly more likely to receive each of these fluids in comparison with "No-GMP" children.

Half of children (51 percent) enrolled in AIN-C were given increased fluids, including breastfeeding, during the episode of diarrhea, compared with 38.4 percent of non-enrolled children. Caregivers were asked if they gave the child ORS (known locally by its product name, Litrosol). One of every two children (49.7 percent) enrolled in AIN-C were given ORS compared to only 22.2 percent of children in the "No-GMP" group. Finally, caregivers were

asked about a range of home fluids promoted by the MOH for use during diarrhea (teas from medicinal plants, coconut water, rice water, and natural juices). Sixty-two percent of children enrolled in AIN-C received either ORS or a home fluid, compared to 50.8 percent of the "No-GMP" children.

Table 9.2 Use of ORS or other Fluids for Diarrheal Disease

Type of fluid provided	AIN-C		No GMP	
	Percent	Number of Children	Percent	Number of Children
Increased fluids including breastfeeding†	51.0	148	38.4	103
ORS (Litrosol) ††	49.7	144	22.0	59
ORS or any home fluid††	62.1	180	37.7	101

† ($p < 0.01$); †† ($p < 0.001$)

For those children who received ORS, 42.0 percent of children in AIN-C programs started their ORS on the first day of their diarrhea episode compared to 33.3 percent of "No-GMP" children. This difference was not statistically significant.

9.3 Care-Seeking for Diarrhea

Caregivers were asked whether they sought care for their child with diarrhea and if so, where they sought care and the type of advice they received. Caregivers of children participating in AIN-C were significantly more likely to seek care from an AIN *monitora,* other trained volunteer, or health professional than were "No-GMP" children. This difference between groups is attributable to the presence of the *monitora*. The proportion of care-seeking from a CESAR/CESAMO was similar among children enrolled in AIN-C (18.3 percent) and those in the "No-GMP" group (16.0 percent).

Table 9.3 Source of Care for Diarrhea (responses are not mutually exclusive)

	AIN-C		No GMP	
	Percent	Number of Children	Percent	Number of Children
Did not seek care	55.2	290	66.8	268
Sought care from any source†††	44.8		33.2	
Sought care from *monitora*, other trained volunteer, or health provider*††	82.3	129	69.7	89
Sought care from *monitora*††††	39.5		2.2	
Sought care from CESAR/CESAMO†	41.1		48.3	
Sought care from private doctor or clinic	14.0		16.8	

* *Monitora*, CESAR/CESAMO, doctor or private clinic, hospital, or health worker other than *monitora*.
† ($p \leq .10$; χ^2 test); †† ($p \leq .05$; χ^2 test); ††† ($p \leq .01$; χ^2 test); †††† ($p \leq .001$; χ^2 test)

The leading types of advice provided by the *CESAR/CESAMO* nurses and the *monitoras* for diarrhea are presented in Table 9.4. Because care-seeking for diarrhea is relatively infrequent (care for common diarrhea can be effectively provided in the home), the figures presented in Table 9.4 are based on a small number of cases. Both the *CESAR/CESAMO* staff and the *monitora* consistently recommend Litrosol for the child's diarrhea. For both sources of care, the second leading type of advice is to give medication to a child with diarrhea. Staff at the *CESAR/CESAMO* rarely advise caregivers to provide increased fluids, continue breastfeeding, or continue feeding.

Table 9.4 Leading Types of Advice Received by Caretakers of Children with Diarrhea

	AIN-C				No-GMP	
	By AIN-C *Monitora*		By Health Providers		By Health providers	
Advice Given	**%**	**Number of caretakers consulting this provider**	**%**	**Number of caretakers consulting this provider**	**%**	**Number of caretakers consulting this provider**
Give Litrosol	80.4	51	74.5	53	62.8	43
Give medication	39.2		52.9*		69.8*	
Continue giving food	15.7		11.8		4.7	
Continue breastfeeding	13.7		11.8		2.3	
Give boiled/treated water	9.8		23.5		26.3	
Give more liquids	13.7		3.9		2.3	

*Gave the medication (not advice)

9.4 Caregivers' Knowledge Concerning Danger Signs in Children with Diarrhea

All caregivers, regardless of whether their child had a recent episode of diarrhea, were asked about signs of severe diarrhea. Table 9.5 below presents responses that are related to dehydration caused by diarrhea (as opposed to general danger signs) that were spontaneously cited by the caregivers. Four of the five signs (sunken eyes, irritability/crying, excessive thirst, and wrinkled, dry skin [skin pinch]) were significantly more likely to be spontaneously cited by caregivers with AIN-C-enrolled children compared to caregivers in the "No-GMP" group (Figure 9.1). The AIN-C group (28.2 percent) also mentioned lack of appetite and not eating as signs of severe diarrhea, compared to 21.2 percent among the "No-GMP" group. The "No-GMP" group mentioned persistent diarrhea (lasting longer than 14 days) as a sign of severe diarrhea more frequently than the AIN-C group, 13.8 and 10.5 percent, respectively.

Figure 9.1 Caregiver Knowledge, Signs of Severe Diarrhea

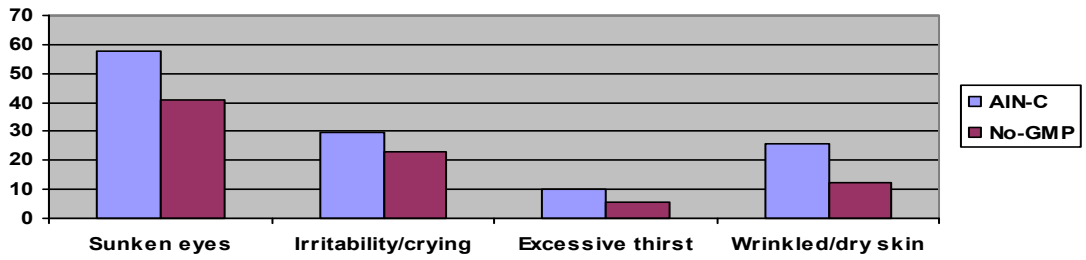


Table 9.5 Caregivers' Perceptions Concerning Danger Signs of Severe Diarrhea

	AIN-C		No GMP	
	% who know sign	Number of Caregivers	% who know sign	Number of Caregivers
Individual danger signs cited spontaneously:				
Sunken eyes††††	57.6	588	40.8	622
Irritability/crying†††	29.9		22.7	
Excessive thirst††	9.8		5.8	
Lethargy/unconsciousness	19.9		20.1	
Wrinkled and dry skin (skin pinch) ††††	25.5		12.1	
Caregivers mentioning any 2 or more of the above signs of dehydration	46.9	591	29.1	622
Caregivers mentioning blood in the stool as sign of severe diarrhea	1.2	7	1.0	6
Caregivers mentioning persistent diarrhea (> 14 days) as a sign of severe diarrhea††	10.5	62	13.8	86
Caregivers mentioned lack of appetite or not eating as a sign of severe diarrhea†††	28.2	166	21.2	132

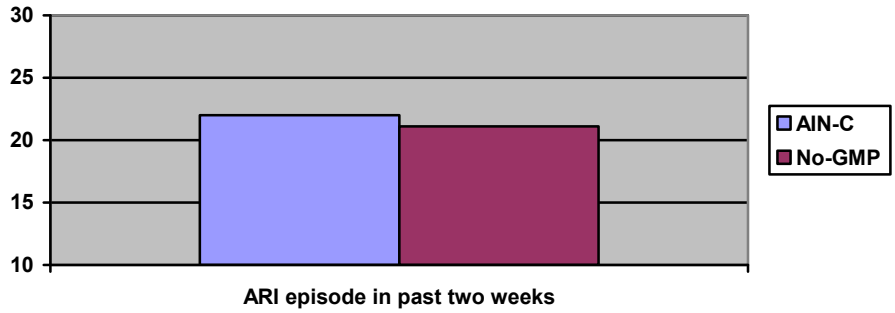
†† ($p<.05$; x^2 test); ††† ($p<.01$; x^2 test); †††† ($p<.001$; x^2 test)

9.5 Prevalence of Acute Respiratory Infections

Caregivers were asked if their children had experienced cough or difficulty breathing in the two weeks prior to the survey interview. Those women who responded affirmatively were then asked about a set of additional symptoms. For the purposes of this analysis, caregivers who reported that their child experienced rapid breathing in addition to cough or difficulty breathing were considered to have an ARI.

The prevalence of ARI was similar in the AIN-C and the "No-GMP" groups (Figure 9.2): among AIN-C children, the prevalence was 22 percent compared to 21.1 percent in the "No-GMP" group.

Figure 9.2 Prevalence of Acute Respiratory Infection (ARI) in children



9.6 Care-Seeking for Acute Respiratory Infection (ARI)

Of those who sought care from an appropriate provider for an ARI episode, the results were analyzed by type of provider: (1) AIN *monitoras* trained in the disease management module, (2) *CESAR/CESAMO* staff, and (3) medical personnel outside the *CESAR/CESAMO* including doctors, clinics, and hospitals.

Forty-four percent of children sampled with ARI were taken to a trained provider for treatment. The percentage seeking care from a trained source was similar among children enrolled in AIN-C (44.6 percent) and "No-GMP" children (41.2 percent). *Monitoras* were mentioned as a source of care only for those enrolled in CBGP. Twelve percent of children participating in AIN-C who had ARI were taken to a *monitora*. *CESAR/CESAMO* staff was most frequently mentioned as a source of care for both AIN-C participants (25 percent) and "No-GMP" participants (25.2%). Other medical providers were consulted less frequently by AIN-C participants (13.1 %) compared to "No-GMP" participants (16.8 %). There were no significant differences by type of program participation in care-seeking for ARI at a *CESAR/CESAMO* or from other medical providers.

Table 9.6 Care-Seeking for ARI

Source of Care	AIN-C		No-GMP	
	%	Number of caretakers	%	Number of caretakers
Did not seek care from any trained source	55.4	131	58.8	130
Sought care from a pneumonia volunteer, *monitora* or professional health provider[18]	44.6		41.2	
Sought care from an AIN-C *monitora*	12.3		0.0	
Sought care from *CESAR/CESAMO*	25.4		25.2	
Sought care from private doctor/clinic	13.1		16.8	

The mean number of days after the beginning of the ARI episode before children were taken for care was 2.6 days for AIN-C compared to 3.0 days for "No-GMP" children.

9.7 Caregivers' Knowledge Concerning Danger Signs in Children with ARI

All women surveyed (regardless of whether their child had a recent episode of ARI) were asked about signs of severe respiratory illness. Results from this set of questions appear in Table 9.7. The responses focus specifically on signs of ARI and exclude general danger signs associated with childhood illnesses. Compared to the caregivers of "No-GMP" children, caregivers of children enrolled in AIN-C were more likely to spontaneously cite the three signs most commonly associated with ARI in Honduras: rapid or labored breathing; chest in-drawing when breathing, and stridor (making strange sounds when breathing).

[18] Two cases of caregivers who sought care from a pneumonia volunteer were also included in this group as another trained, community-based source of care.

Table 9.7 Caregivers' Perceptions of Danger Signs in Children with ARI

Danger signs mentioned spontaneously	AIN-C		NO-GMP		TOTAL	
	%	Number of Women	%	Number of Women	%	Number of Women
Rapid breathing (labored breathing)†	69.5	408	63.8	397	66.6	805
Chest in-drawing when breathing†††	27.6	162	12.4	77	19.8	239
Stridor (strange noises when breathing) ††	28.8	169	21.6	134	25.1	303

† ($p \leq .05$; χ^2 test); †† ($p \leq .01$; χ^2 test); ††† ($p \leq .001$; χ^2 test)

9.8 Discussion of Findings

The difference in the prevalence of illness between AIN-C and "No-GMP" children was minimal, although AIN-C children did experience more diarrhea than "No-GMP" children—likely a reflection of socio-economic status. Through AIN-C, some efforts have been made to improve hygiene practices, and efforts to increase breastfeeding have already been noted (see chapter eight), but overall the program did not intervene to reduce the prevalence of diarrhea or ARI. AIN-C efforts concentrated on reducing the impact of an episode of illness on the growth and development of a child. The results of this evaluation show that AIN-C participants did receive better care during illness compared to "No-GMP" children.

The better home care of children with diarrhea in the AIN-C group compared to the "No-GMP" group reflects the fact that appropriate treatment at home—increasing fluid, especially breastfeeding, during a diarrheal episode occurred among 62.1 percent of AIN-C caregivers compared to 37.7 percent of "No-GMP" caregivers—was promoted in the initial AIN-C program materials. The complete disease management module, which addressed issues related to seeking care outside of the home, was introduced later in the program. Notably, however, the MOH also has conducted repeat campaigns about home fluids and the use of ORS for dehydration with diarrhea on a national basis. The significant difference between the groups appears to reflect the added value of the personal contact offered by the AIN-C program.

Although caregivers need not seek assistance for every episode of diarrhea, knowing when support from a trained health care provider is needed can save many lives. A significantly higher proportion of AIN-C caregivers than "No-GMP" caregivers knew most of the danger signs of severe diarrhea. The exception was that neither group knew that blood in the stool nor prolonged diarrhea needed immediate attention. When care was sought, the advice provided most often by health providers for both groups was "give Litrosol." Only 15.7 percent of the *monitoras* provided the advice to continue feeding and more than one-third suggested giving medication.

The results for care-seeking related to ARI show that AIN-C participants had comparable low rates of care-seeking for ARI to the "No-GMP" group: 55.4 percent and 58.8 percent, respectively. The groups differ, however, in the length of time they waited before seeking care from a trained health provider and in the knowledge of danger signs. AIN-C participants took the child for care 2.6 days after the beginning of the illness compared to 3.0 days for the "No-GMP" group. Also notable is that only 12.3 percent of caregivers sought support from the *monitora* when their child had an ARI episode. One explanation for the lack of appropriate responses to ARI episodes among the AIN-C participants is that the illness management

module was introduced only a few months before this evaluation survey was conducted. Furthermore, four of the health areas surveyed had had the extra-budgetary support from USAID and the supervisory support from the BASICS project suspended. Also, perhaps because of the severity of ARI, when the child has difficulty breathing families tend to go directly to the health center, particularly since a process review of the AIN-C program showed that the *monitoras* do not always have the antibiotics needed to treat ARI.

Summary of Key Findings: Care-Seeking and Treatment for Common Childhood Illnesses

- Diarrhea is more common among AIN-C participants than among non-participants. Economic status likely influences this prevalence.
- AIN-C-enrolled children are significantly more likely to receive rehydrating fluids for their diarrhea, whether it is increased fluids including breastmilk; Litrosol (ORS), or a combination of ORS and home fluids.
- Among AIN-C children with diarrhea, the AIN *monitora* is sought for care/advice with equal frequency as the *CESAR/CESAMO*.
- Whether care is sought from the *CESAR/CESAMO* or the AIN-C *monitora*, few mothers remember advice on continued feeding during diarrhea, and a significant portion are told to give some type of medication.
- Prevalence of ARI is similar among children in AIN-C and "No-GMP" groups.
- AIN-C caregivers are significantly more knowledgeable on danger signs associated with diarrhea and ARI.
- AIN-C children with ARI are not more likely to be taken to a trained provider for care than "No-GMP" children. However when care is sought, AIN-C caregivers take their children for care significantly sooner than do caregivers in the "No-GMP" group.

10. Delivery and Postpartum Care

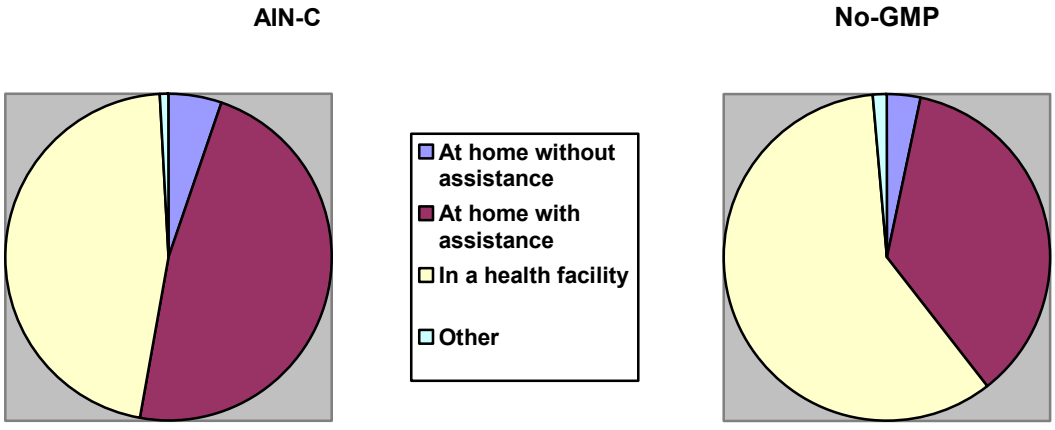
10.1 Delivery

Data collected on the location of delivery showed that 47 percent of the children in the AIN-C households and 35.7 percent of children in the “No-GMP” households were delivered by midwives at home. About 45 percent of AIN-C children were delivered in a hospital or private clinic compared to almost 59 percent of the “No-GMP” group.

Table 10.1 Place of Delivery by Program Participation

Place of Delivery	AIN-C		No-GMP	
	%	Number of children	%	Number of children
Home without specialized assistance	5.4	591	3.2	622
Home with a midwife	47.2		35.7	
Home with doctor or nurse	.2		.5	
At CESAR or CESAMO	.7		.8	
At a hospital or private clinic	45.7		58.5	
Other	.8		1.3	

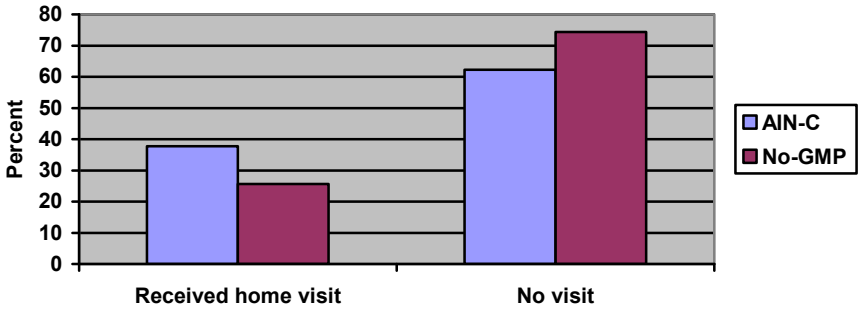
Figure 10.1: Place of Delivery by program participation: Home with assistance, Home without assistance, Health Facility, or other



10.2 Postpartum Home Visits

When asked whether anyone from the community had visited the mother after delivery to check on her health and that of her child, AIN-C respondents were significantly more likely to have received a visit (37.7 percent) than “No-GMP” mothers (25.6 percent). This difference was statistically significant (p<=.001).

Figure 10.2 Postpartum Home Visits by Program Participation



When asked who had made the postpartum visit, 30.9 percent of respondents in the AIN-C program who had received a visit reported that the *monitora* was the only person who had visited, 54 percent had received a visit from a traditional birth attendant (TBA), and only 5.4 percent received a visit from the *CESAR/CESAMO* nurse. An additional 3.6 percent reported receiving a visit from both the *monitora* and a TBA. Few respondents reported receiving a visit from private doctors or nurses or other individuals.

Although TBAs were the most common postpartum visitor, they were the only significant visitor for homes not enrolled in AIN-C. Among “No-GMP” women, 85.5 percent reported that they received a visit from a TBA, and 6.3 percent reported receiving a visit from a *CESAR/CESAMO* staff person. Again, few respondents reported receiving a visit from private doctors or nurses or other individuals.

Table 10.2 Personnel Making Postpartum Home Visits

Type of Personnel	AIN-C		No-GMP	
	%	Number of mothers	%	Number of mothers
AIN *monitora*	30.9	223	0.6	159
Birth attendant (*partera*)	54.3		85.5	
Staff from *CESAR* or *CESAMO*	5.4		6.3	
Private doctor/nurse	0.9		3.1	
Other (including combinations of personnel listed above)	8.5		4.4	

Respondents who reported receiving a postpartum visit from a *monitora* or a TBA were asked what was done during the visit.[19] For those AIN-C participants who were visited by the *monitora*, 64.3 percent reported that the *monitora* gave the child a physical examination and 25.7 percent reported that the *monitora* examined the mother. Just over half the caregivers reported that the *monitora* enrolled the child in AIN-C or invited the mother to participate in the program. More than eight percent received a referral to the health center from the *monitora* during the postpartum visit.

Table 10.3 Activities during *Monitora's* Postpartum Visit to AIN-C Participants

Activity*	Percent	Total Number of Women
Made physical exam of the mother	25.7	18
Made physical exam of the child	64.3	45
Registered the child in the AIN-C program	41.4	29
Gave the mother a child health card	11.4	8
Gave the mother a vaccination card for the child	1.4	1
Asked mother to bring the child to monthly AIN-C weighing sessions	25.7	18
Gave referral to higher level of care	8.6	6

* These responses are not mutually exclusive.

Of the respondents that were visited by a TBA, the main activities were examining the mother and the baby: 74 percent of AIN-C and "No-GMP" participants reported a maternal physical exam during the postpartum visit by the TBA, and 88.1 percent of AIN-C and 94.9 percent of "No-GMP" mothers reported that the TBA conducted a physical examination of the child. The TBAs did not actively encourage participation in the AIN-C program.

10.3 Discussion of Findings

These results show fewer AIN-C mothers use facilities for delivery of infants. This is likely a reflection of the targeting of the AIN-C program toward communities with greater socio-economic needs. At the time of this evaluation, a relatively small amount (not quite 40 percent) of AIN-C participants received post-delivery visits, although the percentage was even smaller for "No-GMP" mothers (26 percent). Given the higher proportion of home births among AIN-C mothers, these postpartum follow-up visits are very important. Visits by the *monitoras* accounted for the higher percentage of AIN-C women receiving postpartum visits. This may be in part due to the fact that these *monitoras* are TBAs or have had midwifery training. The tasks carried out at the postpartum visit are those expected of TBAs—examination of the mother and the child. Only half of the mothers who received post-delivery visits registered the child in the AIN-C program or were encouraged to bring the child to weighing sessions. This is a missed opportunity to begin promotion of appropriate newborn care and to discuss danger signs for the mother and newborn and for referral of problems. Another missed opportunity is reaching out to the TBAs (who are not *monitoras*) to encourage them to promote the enrollment of newborns in the AIN-C program and to make referrals to the *monitora*.[20]

[19] Data were unavailable for 8 respondents visited by a *monitora* and 5 respondents visited by a TBA.
[20] A newborn component for the AIN-C program was developed and introduced in 2003-2004.

Summary of Key Findings: Delivery and Postpartum Care

- AIN-C women are more likely to deliver their babies at home than "No-GMP" women, who are more likely to deliver at a hospital or private clinic.
- AIN-C households were visited significantly more often in the postpartum period than non-participant households.
- A TBA is the predominant person visiting homes; the higher visitation rate for AIN-C households is due primarily to postpartum visits made by *monitoras*.
- The main postpartum activities for all who received postpartum visits, including from the *monitoras,* were examination of the mother and baby. Enrollment in AIN-C occurred at fewer than half of the postpartum visits to participating mothers.

11. Vaccinations and Micronutrients

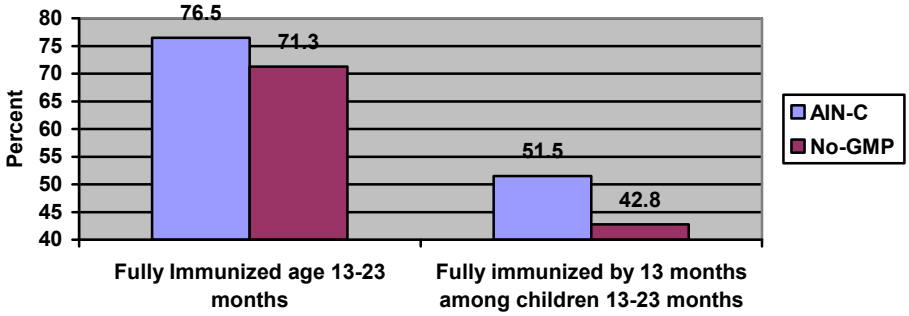
11.1 Vaccinations

Respondents were asked if they had a vaccination card for their child. If the respondent presented a card, the interviewer recorded information from the card on the antigens and doses received and the month of each immunization. If the caregiver had no vaccination card, she was asked a series of questions about the types of vaccines that her child received and the number of doses. Respondents with children enrolled in AIN-C were more likely to have their child's vaccination card (93.1 percent) than were caregivers of "No-GMP" children (85.5 percent). The difference in card ownership was significant (p=.002). Information from both of these sources (card and mother's recall) was used to calculate the proportion of children 13 through 23 months who were fully immunized. "Fully immunized" refers to those children who have received BCG vaccine, three doses of diphtheria, pertussis and tetanus vaccine (DPT), three doses of polio vaccine, and a measles vaccination.

It should be noted that the 13 through 23 month age construct is a slight departure from international norms for the calculation of vaccination coverage rates, which typically measure coverage from 12 months of age. This modification was made to recognize that the current immunization schedule in Honduras calls for application of measles at, but not before, 12 months of age. Thus, all children 13 through 23 months have had one month in which to receive their immunization with measles to complete the childhood vaccination schedule.

Results presented in Table 11.1 show no significant differences in the percent of children fully immunized at 23 months of age: 76.5 percent of children participating in AIN-C were fully immunized, compared to 71.3 percent of "No-GMP" children. The difference between groups was not statistically significant (p=.168). However, AIN-C children were much more likely to have received all necessary immunizations by 13 months in accordance with the GOH policy: 51.5 percent of AIN-C participants were fully immunized by 13 months, as opposed to 42.8 percent of "No-GMP" children.

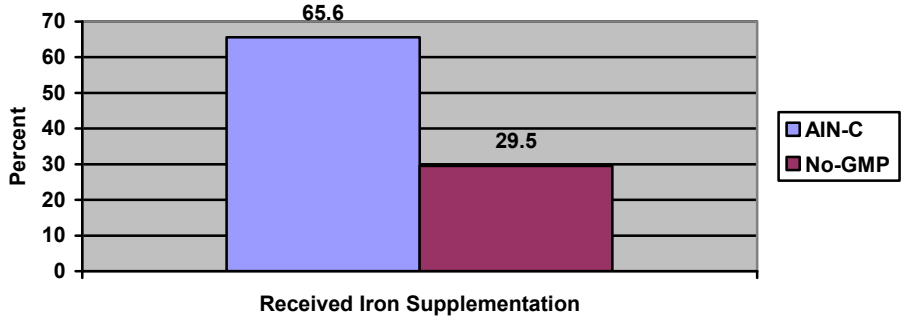
Figure 11.1 Immunization Coverage through 23 Months by Program Participation



11.2 Vitamin A and Iron Supplementation

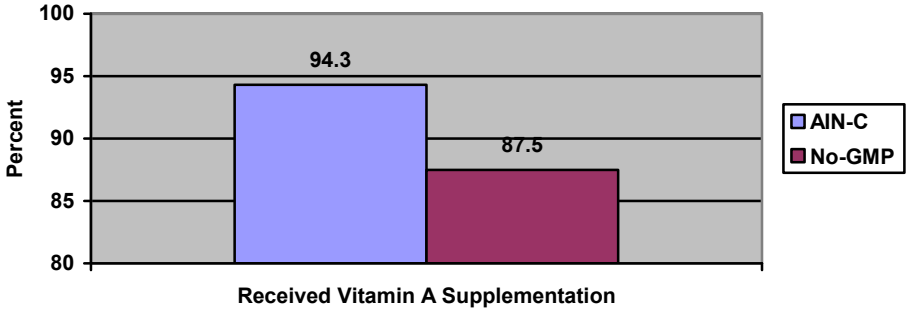
Interviewers were instructed to record information from the vaccination card on the status of iron and vitamin A supplementation. If iron supplementation was not noted on the card or if no card was presented, then the interviewer asked the caregiver whether the child had received iron and, if so, how many times. Data presented in Figure 11.2 reflect the percentage of children who received iron, based either on the information extracted from the health card or the caregiver's recall. As iron is to be given to children four months of age and older, these questions represent the results for children 4 months or older. Children enrolled in AIN-C were far more likely to receive iron supplementation (65.6 percent) than were children in the "No-GMP" group (29.5 percent). The difference is highly statistically significant ($p<.001$).

Figure 11.2 Iron Supplementation among Children 4 through 23 Months of Age by Program Participation



Data on vitamin A supplementation were handled in a manner similar to that of iron, with coverage estimates based on both health card data, when available, and caregiver's recall. Among children enrolled in AIN-C, 94 percent received vitamin A compared to 87.5 percent of "No-GMP" children. This difference between AIN-C-enrolled and "No-GMP" children was also highly significant; $p<.001$ (Figure 11.3).

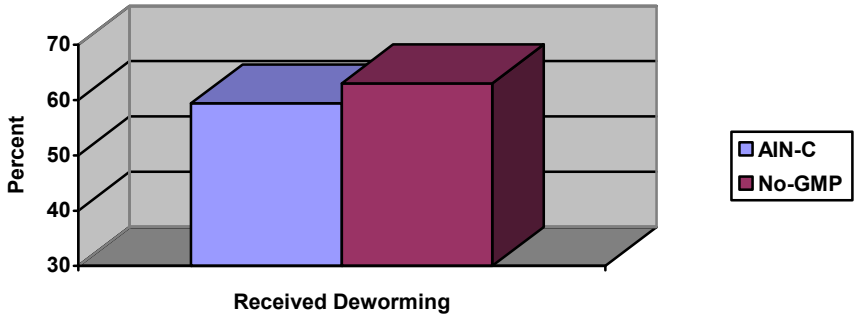
Figure 11.3 Vitamin A Supplementation among Children 6 through 23 Months of Age, by Program Participation



11.3 Deworming

All respondents were asked if their child was dewormed (*un deparasitante*). There were no significant differences in the rate of deworming between children in AIN-C and those in the "No-GMP" group; 59.4 percent compared to 63 percent, respectively.

Figure 11.4 Deworming in Children, by Program Participation



11.4 Discussion of Findings

The GOH has had an ambitious national effort to ensure that children receive vitamin A supplementation; note the high coverage (87.5 percent) in the "No-GMP" group. The benefit of a community-based program is shown by the substantial additional coverage achieved through AIN-C for both vitamin A and iron supplementation. Furthermore, the higher proportion of children who are fully immunized by 13 months shows another significant benefit of the AIN-C program. The fact that there is no difference in deworming coverage is not surprising, as deworming has not been a part of the AIN-C program. Deworming is offered only at the health center.

Summary of Key Findings: Vaccinations and Micronutrients

- Significantly more AIN-C children have a record of their immunizations than "No-GMP" children.
- A greater proportion of AIN-C children were fully immunized by 13 months than "No-GMP" children.
- Children enrolled in AIN-C were far more likely to receive iron and vitamin A supplementation than were "No-GMP" children.

12. Nutritional Status and AIN-C Participation

All children 0 through 23 months of age were measured using standard anthropometric procedures. Weight was measured using hanging scales similar to those used by AIN-C program staff and volunteers. Recumbent length was measured using boards created for this purpose. Anthropometrists worked as part of each interview team and carried out all weight and height measurements. Weight and height data were recorded onto the completed questionnaire of each individual child. Weight and height measures were available for all children surveyed (1343), although a few outlying z-score values were excluded from the analysis.

12.1 Assessment of Anthropometric Outcomes: Bivariate Analysis

Descriptive results (mean and median z-scores) for weight-for-height, height-for-age, and weight-for-age are presented by age group in Table 12.1. AIN-C participants did not differ from the "No-GMP" group in terms of weight-for-height (wasting). Nutrition status as measured by height-for-age and weight-for-age show that AIN-C participants had poorer nutrition status than the "No-GMP" group in the less than 6 month age group and in the combined 0–23 month age group.

Table 12.1 Mean and Median Values for Anthropometric Measures of Nutritional Status among AIN-C and "No-GMP" Children

Anthropometric Measurement	AIN-C			No GMP		
	Mean (SD)	Median	# of children	Mean (SD)	Median	# of children
Weight-for-height						
< 6 months	0.61 (0.82)	0.54	115	0.48 (0.80)	0.40	132
6–11 months	0.11 (0.93)	0.10	171	0.18 (0.96)	0.11	164
12–23 months	-0.32 (0.87)	-0.37	289	-0.34 (0.92)	-0.42	315
0–23 months	-0.00 (0.95)	-0.03	575	-0.02 (0.97)	-0.05	611
Height-for-age						
< 6 months †††	-0.53 (0.88)	-0.53	115	-0.20 (0.85)	-0.19	132
6–11 months	-1.09 (1.01)	-1.03	171	-0.93 (1.11)	-0.94	164
12–23 months	-1.55 (1.09)	-1.59	289	-1.47 (1.10)	-1.47	315
0–23 months ††	-1.21 (1.10)	-1.16	575	-1.05 (1.16)	-1.04	611
Weight-for-age						
< 6 months †	0.10 (0.82)	0.15	115	0.28 (0.82)	0.26	132
6–11 months	-0.76 (1.07)	-0.83	171	-0.60 (1.13)	-0.61	164
12–23 months	-1.15 (1.00)	-1.19	289	-1.10 (1.04)	-1.14	315
0–23 months †	-0.78 (1.10)	-0.86	575	-0.67 (1.16)	-0.73	611

† $p < 0.10$; †† $p < 0.05$; ††† $p < 0.01$

To interpret the differences in this cross-sectional comparison of these two groups, several factors need to be taken into account:

- As discussed in Chapter 4 of this report, these two groups (AIN-C and "No-GMP") are not equivalent. The AIN-C group is poorer and lives further from the health center. Therefore, the two groups differ on factors other than participation in AIN-C that are also related to nutritional status.

- The major difference in nutritional status is in height-for-age under six months. Prior to six months of age, height-for-age largely reflects birth weight.[21] Many factors influence birth weight, including maternal nutritional status at conception, maternal weight gain during pregnancy, and maternal height. Each of these maternal factors is in turn associated with economic status, and the "No-GMP" group is better-off economically than the AIN-C participant group (see Chapter 4).

- Height is a component of weight, and weight-for-age thus also reflects height-for-age.

- Height-for-age falters globally from birth through approximately 24 months of age.[22] Therefore, differences between groups in mean height-for-age would be constant as age increases, as long as the rate of faltering is constant for both. Since mean height-for-age among 0–5 month-olds is statistically lower in the AIN-C group compared to the non-participant group, mean height-for-age would be expected to be statistically lower among AIN-C participants in the 6–11 and 12–23 month-old groups. However, the data show that this is not the case: There are no differences in nutritional status between AIN-C and the "No-GMP" groups in the 6–11 and 12–23 month age groups. The lack of a difference in mean height-for-age in these age groups may suggest that AIN-C participation protects against height-for-age faltering. In other words, AIN-C participant infants may begin life shorter-for-age than the "No-GMP" group (perhaps due to higher rates of low birth weight births), but they "catch-up" to the "No-GMP" children by the age of 6–11 months, indicating more rapid height gain among AIN-C participants. However, this conclusion is not definitive, since a pre-and post-intervention comparison of height-for-age status of these two groups was not possible.

12.2 Assessment of Anthropometric Outcomes: Controlling for Confounding Factors

12.2.1 Differences in Socio-Economic Status

As mentioned in Chapter 4, the AIN-C and "No-GMP" groups varied in terms of economic status; AIN-C participants have lower economic status. Because of the many associations between economic and nutritional status, analysis of these outcome data which controls for these economic differences, through statistical procedures, may provide additional insights into the impact of the AIN-C program.

No simple and universally effective means exists for controlling economic status. However, a number of factors related to economic status were assessed in the caregiver interviews and provided the data for creating a socio-economic assets score. Factors were coded so that values ascended with higher socioeconomic status (see Table 12.2), and then used to create

[21] Some have argued that even at 2 years of age, much of height-for-age is determined by factors related to birth weight and maternal nutritional status.
[22] See Shrimpton et al. Worldwide timing of growth faltering: implications for nutritional interventions. *Pediatrics* 2001:107(5).

a standardized assets index score. This score was created by scoring the first component from a principal components analysis of all individual records (i.e., both groups combined).

Table 12.2: Factors Assessed in the Creation of an Asset Score and their Coding

Factor	Low Socio-Economic Status (SES)	Higher SES
Scale Factors (continuum)		
Location/type of water source	Natural source (river, pond), purchased water /water truck), or "other" → Well water → Supply water, distant from homestead → Supply water, on homestead	
Number of rooms in dwelling	1 room → 2 rooms → 3 rooms → 4 rooms → 5 rooms → 6+ rooms	
Distance (in time) to health facility	3+ hours → 2 to 3 hours → 1 to 2 hours → ½ to 1 hour → < ½ hour	
Categorical Factors		
Sanitation type	Non-improved toilet (open pit latrine, open air, none, other)	Improved toilet (indoor toilet, water-sealed latrine)
Cooking fuel	Firewood	"Modern" (kerosene, propane, electricity)
Dwelling floor type	Dirt floor, "other"	Wood floor
	Dirt floor, "other"	Cement floor
	Dirt floor, "other"	Tile floor
Maternal education	No formal education	Any formal education
Maternal employment status	Not employed	Employed
Dwelling electrified	No	Yes
Possessing radio	No	Yes
Possessing television	No	Yes
Possessing refrigerator	No	Yes
Possessing telephone	No	Yes
Possessing motor vehicle	No	Yes

There are highly significant differences between AIN-C and "No-GMP" groups in terms of asset score, a reasonable proxy for economic status (Table 12.3).

Table 12.3 Mean and Median Values of the Asset Score Factor used for Estimating Economic Status, by Participation Status

Statistic	AIN-C		No-GMP		All	
	Asset Score	Number of Households	Asset Score	Number of Households	Asset Score	Number of Households
Mean † (standard deviation)	-0.1637 (0.9429)	557	0.1600 (1.0287)	570	0.0000 (1.0000)	1127
Median	-0.3136		0.2009		-0.1026	

Note: The score is standardized with mean and standard deviation for both groups combined equal to 0 and 1, respectively; †$p < 0.001$

12.2.2 Differences in Age Distribution

Additionally, the two groups differ in the distribution of ages of the children. Having groups that are comparable in the age distribution is important because of the strong relationship between nutritional status and age among children younger than 24 months. Globally, infant/child weight-for-length/height deteriorates from approximately 3 months of age through approximately 18 months, height-for-age deteriorates from birth through 24 months, and weight-for-height deteriorates from 3 months through 12 months. Differences in the age distribution of the groups thus can create inherent differences in nutritional status. Table 12.4 shows the differences between the AIN-C and the "No-GMP" groups in the distribution of infant/child age, and the statistically significant association between age and participation status. Note that these results suggest that AIN-C participation is more common for younger infants/children than for older ones.

Table 12.4 Age Distribution of Infants/Children according to Participation Status

Age group	AIN-C		No-GMP		All	
	Number of Children	%	Number of Children	%	Number of Children	%
0–5 months	115	19.8	132	21.6	247	20.7
6–11 months	173	29.8	164	26.8	337	28.3
12-17 months	157	27.1	135	22.1	292	24.5
18-23 months	135	23.3	180	29.5	315	26.4
All ages	580	100.0	611	100.0	1191	100.0

$\chi 2$ for association between age and participation status = 8.324, p=0.040.

12.2.3 Accounting for Differences

Two steps were taken to address these differences between the AIN-C and the "No-GMP" groups in terms of economic status and the distribution of infant/child ages: To address economic status, the analysis was restricted to infants/children from either group whose household asset score was equal to or lower than the median value for both groups combined—the poorer half of all households. To address differences in age distribution, comparisons between groups were controlled for infant/child age by including age in a multiple linear regression predicting nutritional status.

The results of linear regression analysis on the poorest half of households are shown in Table 12.5. Infant/child age was highly and negatively associated with all measures of nutritional status: with each additional month of age weight-for-height, height-for-age, and weight-for-age decreased 0.057, 0.073, and 0.072 Z-score, respectively. AIN-C participation was not associated with height-for-age or weight-for-age. No negative association between AIN-C participation and height-for-age and weight-for-age is seen in the controlled, restricted analysis (uncontrolled analysis had shown such a relationship). A positive and marginally significant ($p<0.10$) effect of AIN-C participation on weight-for-height was observed in the controlled, restricted analysis (participation was negatively associated with weight-for-height in uncontrolled comparisons). The mean weight-for-height Z score is 0.122 higher among AIN-C participants, holding age constant and excluding wealthier households.

Table 12.5 Regression Analysis of Nutritional Status in Relation to AIN-C Participation, Controlled for Infant/Child Age (Analysis limited to households with asset scores less than or equal to the median asset score)

Factor	n	Adj. R^2	β	Std. Error	t value	P
Weight-for-height (F=53.377, p<0.001)	564	0.157				
Intercept			0.555	0.090		
Infant/child age (months)			-0.057	0.006	-10.130	0.000
Participation (AIN-C *vs*. no GMP)			0.122	0.074	1.659	0.098
Height-for-age (F=65.593, p<0.001)	564	0.187				
Intercept			-0.612	0.102		
Infant/child age (months)			-0.073	0.006	-11.449	0.000
Participation (AIN-C *vs*. no GMP)			-0.009	0.083	-0.106	0.916
Weight-for-age (F=69.304, p<0.001)	564	0.195				
Intercept			-0.204	0.099		
Infant/child age (months)			-0.072	0.006	-11.672	0.000
Participation (AIN-C *vs*. no GMP)			0.090	0.081	1.110	0.268

12.3 Participation Intensity and Nutritional Status.

An additional analysis was conducted on the AIN-C participant group to determine whether the intensity of program participation was associated with nutritional status, controlling for household assets and the infant/child's age. Participation intensity was defined as the percentage of possible weighings that the infant/child had attended. That is, a child whose number of lifetime weighings was equal to her/his age in completed months would have 100% participation intensity, a child whose number of lifetime weighings was half of her/his age would have 50% participation intensity. The total number of times that a child was weighed was taken from the child's growth cards shown to the interviewers. Children without growth cards were assigned a value of zero for participation intensity.

Household assets and infant/child's age were controlled for in this analysis because they are associated both with nutritional status and with participation and thus are, by definition, confounding factors. Both are negatively associated with participation (i.e., participation rates decline with increasing household assets and increasing infant/child age), but this negative correlation was weaker for asset score than for age, which would be expected since the AIN-C group is poorer than the No-GMP group. The Pearson's correlation coefficients for household assets and age with participation intensity were -0.083 (p=0.069) and -0.237 (p=0.000), respectively.

With these controls in place, the intensity of participation was positively associated with nutritional status for all measures of nutritional status (Table 12.6). The association was

strongest for weight-for-age (p=0.004), less strong but still highly significantly so for weight-for-height (p=0.011), and marginally significant for height-for-age (p=0.083). The effect of participation was greatest for weight-for-age and weight-for-height, at 0.005 and 0.004 Z-score, respectively. That is, holding infant/child age and asset score constant, for every 1 percent increase in participation intensity, weight-for-age increased 0.005 Z-score, and weight-for-height increased 0.004 Z-score. The model containing participation intensity, age, and asset score also explained more than 20 percent of the variability in height-for-age and weight-for-age.

Table 12.6 Results of Multiple Linear Regression Analysis Predicting Nutritional Status on the Basis of Participation Intensity, Infant/Child Age and Household Asset Score

Factor	n	Adj. R^2	β	Std. Error	t value	P
Weight-for-height (F=25.956, p<0.001)	482	0.135				
Intercept			0.333	0.153		
Infant/child age (months)			-0.050	0.007	-7.581	0.000
Asset score ($\overline{X}$ = 0.000 ; SD=1.000)			0.037	0.043	0.863	0.389
Participation intensity (%)			0.004	0.002	2.566	0.011
Height-for-age (F=42.696, p<0.001)	482	0.236				
Intercept			-0.613	0.170		
Infant/child age (months)			-0.061	0.007	-8.318	0.000
Asset score ($\overline{X}$ = 0.000 ; SD=1.000)			0.397	0.047	8.368	0.000
Participation intensity (%)			0.003	0.002	1.735	0.083
Weight-for-age (F=69.304, p<0.001)	482	0.206				
Intercept			-0.333	0.171		
Infant/child age (months)			-0.063	0.007	-8.458	0.000
Asset score ($\overline{X}$ = 0.000 ; SD=1.000)			0.280	0.048	5.858	0.000
Participation intensity (%)			0.005	0.002	2.890	0.004

The interaction of asset score and participation was tested in the models shown in Table 12.6, and it was statistically significant for weight-for-height (p=0.047) only. Omission of this interaction is not strictly proper, because the interaction affects the values and meaning of main effects in the regression model. However, inclusion of the interaction makes the interpretation of main effects difficult, so the interaction issue is dealt with below by stratifying for asset score (Table 12.7).

Several aspects of the results from stratified analysis are notable: First, age and participation intensity explain a much greater proportion of the variability in nutritional status among poorer households than they do among more wealthy households. Second, the size of the positive effect of participation intensity is 2–3 times greater among poorer households than it is among more wealthy households. Finally, the association between participation intensity and nutritional status is highly significant for weight-for-height and for weight-for-age among

poorer households, while no association exists between participation intensity and nutritional status among more wealthy households.

Table 12.7 Linear Regression Results for the Prediction of Nutritional Status by Participation Intensity and Infant/Child Age, by Asset Score Categories

Factor	Adjusted R^2		β (Std Error)		P	
	Asset score ≤ median (n=283)	Asset score > median (n=218)	Asset score ≤ median	Asset score > median	Asset score ≤ median	Asset score > median
Weight-for-height	**0.185**	**0.075**				
Intercept			0.250 (0.193)	0.424 (0.239)		
Infant/child age (months)			-0.054 (0.008)	-0.043 (0.010)	0.000	0.000
Participation intensity (%)			0.005 (0.002)	0.002 (0.002)	0.005	0.476
Height-for-age	**0.211**	**0.057**				
Intercept			-0.708 (0.225)	-0.400 (0.265)		
Infant/child age (months)			-0.078 (0.010)	-0.043 (0.011)	0.000	0.000
Participation intensity (%)			0.003 (0.002)	0.001 (0.003)	0.220	0.610
Weight-for-age	**0.237**	**0.081**				
Intercept			-0.510 (0.214)	-0.065 (0.273)		
Infant/child age (months)			-0.072 (0.009)	-0.051 (0.012)	0.000	0.000
Participation intensity (%)			0.006 (0.002)	0.002 (0.003)	0.005	0.400

12.4 Discussion of Findings

As discussed in Chapters 2, 4, and 5, the AIN-C and "No-GMP" groups were not equivalent in terms of several measures of wealth and education of mothers. "No-GMP" households appeared to be significantly wealthier than "AIN-C" households and "No-GMP" mothers completed more years of education than "AIN-C" mothers. Further analyses based on an "asset score" summarized in this chapter confirm that AIN-C households are poorer than "No-GMP" households. Both lower socio-economic status and fewer years of maternal education are linked to lower nutrition status. In addition, the age distribution of the AIN-C and "No-GMP" samples was significantly different: the AIN-C group had more children 0–11 months compared to the "No-GMP" group, also related to nutrition status. Analyses of

anthropometric data collected for this evaluation that do not control or account for these factors at first glance suggest that AIN-C many not be having a positive impact on nutrition status. However, closer examination reveals that while AIN-C children have poorer nutrition status in the 0–6 month age-group compared to “No-GMP” children, this difference disappears as children get older. This is the opposite of what is expected, as age was highly and negatively correlated with all measures of nutritional status.

When socio-economic and age factors are controlled, the AIN-C program appears to result in a marginally positive impact on nutrition status as measured by weight-for-height: the mean Z-score was .122 higher among AIN-C children than “No-GMP” children. While the size of this overall impact is relatively small, additional analyses that examine the impact on households of varying levels of wealth and of intensity of participation in AIN-C show that the AIN-C program has a much greater positive impact on the nutritional status of children from poorer households, and among those children who have better participation in the program. When controlling for the interaction of participation and socio-economic status, the impact on nutrition status is two to three times greater among poorer households. The intensity of participation in the AIN-C program shows that for every additional month of participation in the program, there is a .085 increase in weight-for-age Z-score.

Summary of Key Findings: Nutritional Status

- Uncontrolled comparisons between AIN-C and "No-GMP" children for nutritional status show no positive effect of AIN-C. For some measures of nutritional status, the effect actually appears to be negative. However, the AIN-C and non-participant groups are not equivalent, and better nutritional status is expected to be higher in the wealthier "No-GMP" group.
- Cross–sectional analyses of the anthropometric data show that AIN-C infants may begin life shorter-for-age than the "No-GMP" group (perhaps due to higher rates of low birth weight births), but they "catch-up" to the "No-GMP" children by the age of 6–11 months, indicating more rapid height gain among AIN-C participants.
- Highly significant differences exist between AIN-C and "No-GMP" groups in terms of asset score, a reasonable proxy for economic status.
- AIN-C and "No-GMP" sample groups differed in the distribution of ages of children. A difference in the age distribution of the groups creates inherent differences in nutritional status. The AIN-C group included more infants/children in younger age categories.
- Analyses restricted to the poorest half of households show that infant/child age was highly and negatively associated with all measures of nutritional status: with each additional month of age weight-for-height, height-for-age, and weight-for-age decreased 0.057, 0.073, and 0.072 Z-score, respectively.
- In restricted analyses (controlling for socio-economic status and age) AIN-C participation had a marginally positive impact on weight-for-height; mean Z-score was 0.122 higher among AIN-C compared to "No-GMP" children.
- Among AIN-C participants, the intensity of participation is positively associated with nutritional status in terms of weight-for-height, height-for age, and weight-for age. The strongest impact was on weight-for-age: for every 1 month increase in participation there was a .085 increase in Z-score.
- Controlling for interaction of participation in AIN-C and socio-economic status shows that the size of the positive effect of AIN-C participation on nutritional status is two to three times greater among poorer than wealthier households.

13. Conclusions

The AIN-C program in Honduras is an example of a CBGP program taken to scale that endured despite a range of "real-life" challenges—reductions in funding, natural disasters, and changes in government—and made a significant, positive impact on under-nutrition in children 0–2 years of age. Furthermore, the commitment to the program at the community level—a by-product of its impact on nutrition in the community—is paralleled at the national level, as AIN-C became part of the National Strategy for Nutrition in Honduras.

This evaluation has pointed to a number of important general and specific design and implementation considerations and "lessons learned" for CBGP programs. First, AIN-C is a "pro-poor" strategy: the value and impact of the program was show to be significantly greater among poorer than more wealthy households. Therefore, the fact that AIN-C was targeted to lower socio-economic communities who most need support for nutrition was an important factor in its success. A second and related lesson learned is that consistency in participation in AIN-C activities is critical to maintaining nutrition status and preventing under-nutrition. Children from poor households with the best rates of participation benefited the most from AIN-C.

Beyond these overall program design conclusions—target the poor and ensure consistent participation and coverage—this evaluation also highlights a number of more specific "lessons learned." These include:

- AIN-C had a positive impact on breastfeeding and complementary feeding practices, and based on this evaluation appears to have contributed to the improvement in under-nutrition in children under two. However, the results show that additional efforts are needed to expand the reach of improved practices and to achieve more specific changes in breastfeeding, complementary feeding, and care practices.
- The improvement shown in exclusive breastfeeding is encouraging. However, according to this evaluation, almost half of AIN-C mothers are not practicing exclusive breastfeeding for the full six months. Additional work is needed to identify the barriers to continuing exclusive breastfeeding and more effectively support and encourage this practice.
- For complementary feeding practices, AIN-C made a significant impact on the frequency of feeding children age 6–11 months. The results of the evaluation also showed some improvement in the frequency of feeding in children 12–23 months, but only for about 15 percent of caregivers. Increasing the frequency of feeding after 11 months deserves additional attention in counseling. More notable, however, is that practices related to the quantity of food provided to children 6–23 are extremely inadequate. Increasing the impact on nutritional status will depend on effectively addressing this practice related to the amount of food provided to children in the second year of life. Strategies for both increasing skills of and tools for *monitoras* to more effectively communicate messages regarding the quantity of food required for adequate growth and approaches to addressing the constraints caregivers face in providing adequate food are needed.

- AIN-C effectively introduced improved care practices for children 0–2 years old suffering from diarrhea and ARI, although the evaluation results also indicated areas for improvement in home treatment as well as care delivered by health care providers. For example, more than half of health providers serving AIN-C participants and more than two-thirds of those treating the "No-GMP" children recommended medicine, and none promoted continued feeding. Addressing these practices would call for additional training to support the appropriate treatment of diarrhea.
- The evaluation also showed that, overall, the messages related to feeding and care practices received by caregivers were somewhat generic, indicating that additional skill-building in effective counseling techniques would further strengthen the quality of the AIN-C program.

Finally, after this evaluation was completed, a detailed cost-benefit analysis of AIN-C was conducted.[23] The cost study showed that AIN is a cost-efficient program and highlighted those activities that account for the majority of the costs. The long term, annual, recurrent cost of the program per child under 5 was estimated at $2.73. The fixed costs, which include personnel and non-personnel supervision costs, represent about 40 percent of the costs; the long-term, annual, incremental budget required was $4.00 per child under 2, and under $2.00 per child for children under 5. About 30 percent of the annual recurrent costs were in supplies and medicines and 70 percent for personnel and related personnel costs, per diem, and transportation. "The average direct cost per child of an AIN-C Program community-based weighing and counseling session is 10.9 *lempiras* (US$0.66), just 11 percent of the direct cost of a single MOH staff-provided, facility-based, child growth and development consultation." (Fiedler: 2003, p. 63.)

[23] Fiedler, J. *A Cost Analysis of the Honduras Community-Based Integrated Child Care Program*, The World Bank: Washington DC, 2003.