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An activity-based cost analysis of the Honduras Community-Based, Integrated Child Care (AIN-C) programme

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The Honduras AIN-C programme is a preventive health and nutrition programme of the Honduras Ministry of Health (MOH) that relies on volunteers to help mothers monitor and maintain the adequate growth of young children. A quasi-experimental, design-based evaluation found that the programme achieved near-universal coverage and was effective in improving mothers' child-rearing knowledge, attitudes and practices, including feeding and appropriate care-giving and care-seeking practices for children with diarrhoea and acute respiratory illness. The programme is widely regarded as a model. This study was undertaken to provide the first comprehensive estimates of the cost of the AIN-C programme, with the goal of providing a programme and financial planning tool for Honduras. An additional comparison of study findings was also undertaken to determine the cost of the AIN-C programme's community-based services relative to a similar facility-based service. Expressed in mid-2005 US dollars, the study found that after the programme is phased-in: (1) the annual, recurrent cost per child under 2 years participating in the programme is $6.43; (2) the annual, incremental budget requirements per child under 2 years participating in the programme are $3.90; (3) the cost of an AIN-C monthly growth monitoring and counselling session per child is 11% of the cost of a traditional MOH, facility-based growth and development consultation per child; and (4) the effect of mothers substituting AIN-C monitor care for MOH facility-based care 'saves' 203 000 outpatient visits a year, with a potential cost saving of $1.66 million, the equivalent of 60% of the recurrent cost of the programme and roughly equal to the annual incremental budget requirements of the programme.

Sensitivity analysis of the cost estimates is performed to provide insight, for countries considering introducing a similar programme, into how modifications of key characteristics of the programme affect its costs.

Keywords Nutrition, community-based nutrition, cost analysis, health care financing, community participation, volunteer incentives

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KEY MESSAGES

- Honduras' AIN-C is a model for other countries interested in providing a community-based package of priority child care services.
- Once phased-in, the programme's long-term, annual recurrent cost (US$6.43) and incremental budget requirement (US$3.90) per participating child represent modest expenditures to provide monthly weighing and counselling sessions to children under the age of two as well as limited curative care services to children under five.
- The AIN-C programme model has the potential to increase service coverage at a cost per visit of 11% of a similar MOH facility-based service.
- Annually, mothers' substituting AIN-C monitor care for MOH facility-based care results in 204 000 fewer MOH facility visits with potential cost savings of US$1.66 million, equivalent to about 60% of the long-term recurrent cost of the AIN-C programme.

Introduction

The Community-Based, Integrated Child Care programme (Atención Integral a la Niñez-Comunitaria, AIN-C) is a preventive health and nutrition programme that relies primarily on volunteers to help mothers maintain adequate growth of their children under two, and to treat and refer children under five who are ill.

The antecedents of the AIN-C programme date from 1991, when the Ministry of Health (MOH) of Honduras began placing more emphasis on young child nutrition in response to the country's high rate of malnutrition. The AIN-C programme uses inadequate monthly weight gain to trigger a diagnostic decision-tree analysis to identify malnutrition and its causes. This tool identifies both the immediate and longer-term underlying causes of inadequate weight gain, and also suggests specific actions to ameliorate each contributing factor (Griffiths and de Alvarado 1999). Ministry officials soon came to realize that the programme's impact was constrained by the Ministry's limited coverage, and pilot tested transferring most programme operations to the community. To better ensure programme fidelity and to facilitate scale-up, standardized treatment and training protocols were developed to guide community implementers, particularly in counselling—the programme's critical component.

Starting in 1995, the MOH worked with the USAID Basic Support for Institutionalizing Child Survival (BASICS) Project to document and standardize the community-based AIN-C programme (Griffiths and de Alvarado 1999). A 2002 evaluation of the programme found that AIN-C child-caretakers were increasingly more likely to know that a child that does not eat well, does not grow well. They were also significantly more likely to:

- have had more frequent contact with a health worker in the previous 3 months,
- have a child growth card for their children and to know how to interpret it,
- have fully immunized their children,
- have exclusively breastfed their children less than 6 months of age,
- have not used a baby bottle,
- have offered food at an optimal frequency to children 12 months and older,
- have received iron supplementation for their children 4 months of age or older,
- know the danger signs of dehydration and acute respiratory infections,
- know how to stimulate a child's appetite to ensure that he/she eats well,
- have used oral rehydration therapy, and
- have both offered their children fluids and continued feeding them during a bout of diarrhoea (Van Roekel *et al*. 2002).

In 2006, the programme operated in roughly 1800 communities covering portions of 24 of Honduras' 42 health areas, and eight non-government organizations (NGOs) had adopted the programme (USAID 2005). More recently, a World Bank-funded initiative aims to increase the coverage of the programme to all villages in the four (of 18) departments where stunting is most highly concentrated (World Bank 2005). The Honduras AIN-C programme is widely regarded as a model programme. It is already being replicated or has inspired similar programmes in El Salvador, Guatemala, Nicaragua, Bolivia, Senegal, Uganda, Ghana, Madagascar, Eritrea and Zambia. Given the widely accepted view that the programme is highly effective, an important, unanswered question has been: how much does the AIN-C programme cost?

Methodology

The objectives of this paper are to fill the information void about the cost of AIN-C, and to provide a programme and financial planning tool for Honduras and other countries interested in implementing a similar programme. The study was designed to estimate total cumulative and average annual costs of phasing-in AIN-C within all the communities of one health area (district) of Honduras, including one-time start-up costs, incremental budget costs and the recurrent costs of maintaining the programme. The June 2005 exchange rate of 18.5 lempiras to US$1.00 is used throughout this report (Banco Central de Honduras 2006).

The general approach in this study was to identify and quantify the resources used to produce the AIN-C programme, regardless of who pays for them. Both MOH and donor costs were included, but costs incurred by households to participate in the programme were excluded. It was decided *a priori* that the direct costs and the incremental budget requirements of the

programme were more important to the needs of policy-makers, and that the resources that were to be devoted to analysing the MOH's indirect costs would be better spent on providing more precise direct costs. An activity-based, 'ingredients' approach was employed, building an estimate of the total programme cost with the quantities and unit costs of each programme input. To implement this approach the study first describes the AIN-C programme and identifies all of its outputs or activities. Next, the myriad inputs that are required to produce each of those activities are identified, quantified and costed.

Given the objectives of this study, the actual, historical cost of implementing the programme was regarded as less important than capturing the 'most likely' cost scenario. The methodology therefore seeks to determine the 'most likely' cost scenario, which provides an opportunity to better understand the cost drivers—factors that influence the level of costs (e.g. the number of trainees per training, or the frequency of supervision). The programme's highly standardized approach allows the construction of a number of costing algorithms as a means of operationalizing the ingredients approach (Tan-Torres *et al*. 2003). To apply activity-based costing (ABC), the study grouped specific activities into cost centres for analysis. The sum of the cost centres is comprehensive, thereby including all of the resources used to produce each and every activity of the programme, and together, the entire programme. In addition, each cost centre is mutually exclusive, thereby avoiding double counting of any of the resources used to produce the programme. Table 1 presents the 12 major activities of AIN-C.

Sources of data used in this study come from field visits, interviews, official MOH norms governing some of the activities in the AIN-C programme, and MOH service provision data.

Table 1 Activity-based cost centres of AIN-C

	Description of activity-based cost centre
1	TOT1: Training of MOH facilitators in preventive component of AIN-C
2	Initial community meeting and community baseline study
3	Training of health centre and community-level personnel in the preventive component of AIN-C
4	TOT2: Training of MOH facilitators in curative component of AIN-C
5	Training of health centre and community-level personnel in the curative component of AIN-C
6	AIN-C community meetings, including weighing of children (monthly)
	(a) With supervision by the health centre nurse auxiliary and health sector nurse
	(b) With supervision by the health centre nurse auxiliary (alone)
	(c) Without any supervision (the AIN-C monitor, alone)
7	Supervisory visits by health area staff
	(a) Visits to the health sector (directly and alone)
	(b) Visits to the health centre via the health sector (accompanied by the sector nurse)
	(c) Visits to the health centre (directly and alone)
8	Supervisory visits to the health centre by the sector nurse (independent of Activity #7b, i.e. the visit in which the sector nurse is accompanied by health area staff)
9	Meetings in the health centre with other volunteers, including the re-supply of AIN-C monitors (monthly)
10	Meetings with the community (once every 4 months)
	(a) The first AIN-C meeting with the community after initiation of the programme
	(b) The second AIN-C meeting after initiation of the programme
	(c) All such meetings subsequent to the second
11	Other activities of the AIN-C monitors, i.e. home visits and curative care treatment (monthly)
12	Incentives provided to the AIN-C monitors
	(a) The first year of the programme
	(b) The second and subsequent years of the programme

Results

Before proceeding to a description of costs, the discussion turns to a description of the activities of the community-based, volunteer monitor[1]—the linchpin of the programme—as a means of providing an overview of the programme as it functions in the community.

An overview of the AIN-C programme: the monitor's perspective

The typical AIN-C programme structure in Honduras is organized around two primary activities within a given community: a single monthly weighing and counselling session, and home visits that are conducted by monitors. There are three monitors for every 25 children in a community (Griffiths and de Alvarado 1999). Most monitors in the programme are women aged between 25 and 40. Most have their own children, and many were volunteer community health workers before being asked by leaders of their communities to volunteer in the AIN-C programme.

Monthly weighing and counselling sessions (Activity #6)

A community's monthly session is always held on the same day of the week, usually in the morning. Each of the three monitors contributes 4.5 hours of time to the monthly weighing and counselling session. Monitors usually arrive 30 minutes prior to the start of the monthly session in order to organize and set up, then spend 3.5 hours conducting the session. In addition, they generally spend about 30 minutes after the session to complete programme forms and documents, to establish a follow-up schedule for home visits to those children whose growth was inadequate or who did not attend the session, and to more generally discuss the results of the session.

Home visits (Activity #11)

The other major component of the programme is home visits. Monitors provide home visits to follow-up on: (1) no-shows, (2) selected children who have sought curative care from them, (3) mothers with breastfeeding problems, (4) children who are less than 6 months old who are not being breastfed, and (5) newborns and their mothers to encourage them to enrol in the programme.

According to the mid-term evaluation, a remarkably high 92% of all children under the age of two in a community are

Table 2 Monthly time contribution of AIN-C monitors

Activity of the monitor	Average no. per community per month	Average time per month per monitor (hours)	% of monitor's time
1) Monthly weighing sessions		4.5	30%
2) Monthly home visits (follow-up)			
a) Children with inadequate growth	9		
b) Children who did not attend the last AIN-C session	3		
c) Sick children, newborns, breastfeeding counselling	3		
Subtotal	15	5	34%
3) Curative care visits	9	1.5	10%
4) Quarterly meetings with the community		0.4	3%
5) Monthly all-volunteers health centre meeting		3.5	24%
Total		14.9	100%

enrolled in the AIN-C. In the 3-month period prior to the survey, 70% of *all* children under two (not only those who were enrolled) had full participation in the programme (i.e. they attended all three of the monthly sessions). The survey by Van Roekel *et al*. (2002) asks specific questions that enable calculation of the monthly time contributions of monitors as presented in Table 2; it is estimated that a monitor devotes roughly 15 hours per month to AIN-C.

An activity-based description of the cost of the AIN-C programme

The discussion of the cost of the AIN-C programme will follow the structure of Table 1 and will track the introduction of the programme into a health area and its subsequent phasing-in over the course of 6 years to reach what is regarded as 'full-scale' within the health area. In this analysis it is assumed that in a given health area, the fully implemented AIN-C programme will cover 10 communities of each health centre, a total of 300 communities in each health area. The discussion will be divided into four sub-sections:

1. one-time start-up activities, which consist of training and community baseline studies;
2. the monthly AIN weighing and counselling sessions and follow-up/supervision;
3. other activities of the monitors, comprised of (a) monthly meetings of all community volunteers in the local health centre, (b) other, not elsewhere accounted for, monthly activities of the monitors in the community (house calls and curative care advising), (c) tri-annual meetings with the community; and
4. the cost of incentives that are provided to monitors.

One-time start-up activities: training and community base-line studies (Activities #1 to #5)

The Ministry of Health structure: The Ministry is organized into nine health regions, and each region is divided into health areas. There are 42 health areas (districts) nationwide, an average of four to five per region. Each health area comprises an average of five health sectors, and within each health sector there are about six health centres.

The health sector office is located in a county seat, and is generally located in a relatively large health centre.[2] The health sector office constitutes the hub of a network comprised of the health centre itself and about six smaller, rural health centres (called Centros de Salud Rurales, or CESARs). Generally, there are to 10 to 20 communities per health centre (Fiedler and Suazo 2002). Figure 1 depicts the relationship between only one of each upper-level unit of the Ministry with its subordinate units. For instance, although the national office oversees nine health regions, Figure 1 shows only one regional office.

The training-of-trainers sessions: The MOH has followed a training-of-trainers (TOT) approach in implementing AIN-C (Activities #1 and #4). There are two TOT sessions on different topics, but comprised of the same trainers and trainees. The initial TOT session covers concepts of child health prevention and promotion, focusing on growth and development, and on how to teach health facility and community-level personnel to provide these services. The second TOT session covers topics in curative care. It focuses on acute respiratory illness (particularly pneumonia), diarrhoeal diseases, the danger signs of a seriously ill child, and when and how to refer a sick child. TOT implementation is designed around the structure of the MOH.

Relating the TOT sessions to Figure 1, personnel at the level of the national office train staff from one regional office, together with personnel from two health area offices in the region in question, and all of the health sectors associated with each of the two health area offices. These five-day training sessions generally involve about 16 trainees and two facilitators and are usually held in rented sites in the city in which the regional office hosting the session is located (usually a departmental capital).

Training-of-trainers—prevention and promotion component: Chronologically, Activity #1 is the first TOT session, which focuses on topics of prevention and promotion, as well as teaching techniques. After this, health sector nurses return to their posts and select two communities for each health centre in their domains in which to begin implementing AIN-C, a total of 12 communities. MOH criteria give priority to the poorest communities. The average cost of the prevention and promotion TOTs for two health areas is 98 440 lempiras (US$5321). Table 3 shows the number and type of resources required to produce this activity and each of the major activities of AIN-C.

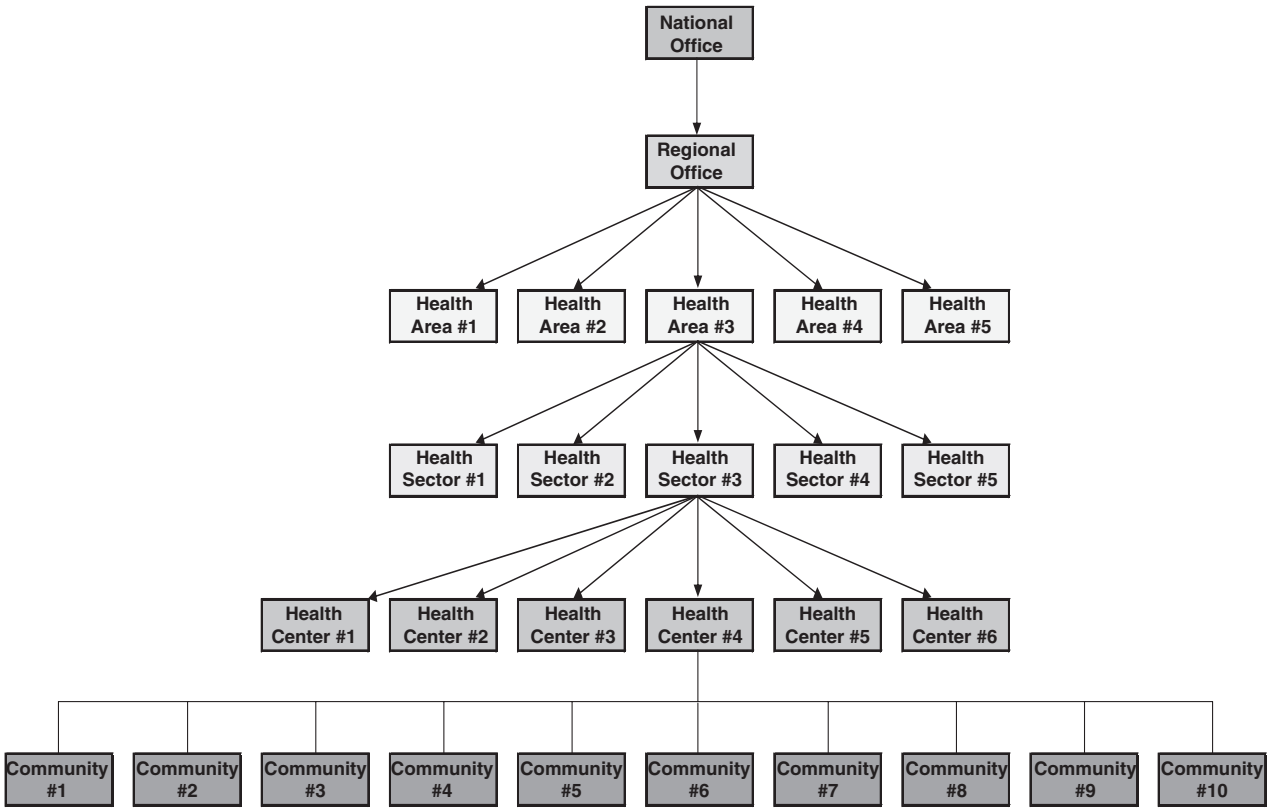

Figure 1 The implementation structure of the AIN-C programme

The baseline studies: Activity #2 is referred to as the baseline study. It comprises two sets of activities. In the first component the health sector nurse visits each of the five health centres in her/his domain and trains the nurse auxiliary and either the health promoter or the environmental health technician.[3] As part of this activity, these persons meet with leaders of the selected communities to determine if they are interested in their community having an AIN-C programme, and whether they will be supportive of it. If community leaders pledge their support, a community meeting is held and the community selects three persons to serve as volunteer AIN-C monitors.

The community meetings are designed primarily to achieve two ends:

- to give formal recognition to, and to confirm the importance of, the AIN-C programme and the role of the monitor, thereby periodically reaffirming and reinvigorating the motivation of the monitors;
- to provide a regular public forum to identify, discuss and address the roots of common community health problems, in particular, those plaguing children (e.g. polluted water supplies, inadequate waste disposal, problematic food preparation practices or other inadequate child-rearing practices), and to shape the community's response and support to the AIN-C programme.

This activity is more significant than might first appear to be the case for several, somewhat subtle reasons that are important to explicitly note. Meeting with the community leaders is also intended to get these leaders vested in the programme. The fact that the community makes this selection, coupled with the commitment that the community leaders must make to support the programme—by agreeing to meet with the monitors and interested community members once every 4 months—serves to empower the monitors.

In the second component of Activity #2 the health sector nurse works with the health centre personnel—the nurse auxiliary, the health promoter and the three monitors—to undertake the baseline study. The team develops a map of the community to identify every house and the characteristics of the geographical environment (e.g. roads, rivers, etc.) and the population. The baseline study collects 26 information items on each family, and includes modules on housing/family members, child growth, sickness, feeding, family planning and pregnancy. The homes of children under the age of two and pregnant women are highlighted.

After conducting this survey—in essence, a census of the community—the team analyses the results and presents them to the community. The focus of this analysis and presentation is the nutritional status of the community's children. Implementing Activity #2 generally requires 2½ days and costs about 4749 lempiras (US$257) per community[4] (see Table 3 for its complete resource requirements).

Training of health facility and community personnel—preventive component: Activity #3 consists of the second tier of prevention and promotion training in which the TOT facilitators, in turn, train health facility and community personnel. The TOT

Table 3 The unit cost of the AIN-C programme activities (Costs in Lempiras)

Activity	Number & type of participants (both trainers & trainees)	Duration (days)	Personnel costs	Per diems			Transport	Materials & supplies	Refresh-ments	Rental of site	Equipment	Total cost
				No.	Cost/ person	Total cost						
1. Institutional level training of facilitators – preventive component	2 Central Office facilitators											
No. of health areas participating = 2	1 physician	5	5526	4.5	270	1215	2276		200			9217
	1 nurse	5	2729	4.5	270	1215			200			4144
	1 driver	5	1296	4.5	220	990			200			2486
	2 Regional Office personnel											
	1 mother-child specialist	5	3429	4.5	220	990	495		200			5113
	1 nurse auxiliary	5	1507	4.5	220	990			200			2697
	1 driver	5	1296	4.5	220	990			200			2486
	4 Health Area personnel (2 per area)											
	2 health area nurses	5	5459	4.5	270	2430	297		400			8586
	2 nutrition auxiliaries	5	3014	4.5	220	1980			400			5394
	9 health sector nurses (4-5 per area)	5	24 565	4.5	270	10 935			1800			37 300
	15 total no. of participants											
			48 820			**21 735**	**3067**	**17 388**	**3800**	**2750**	**880**	**98 440**
2. Baseline study	1 facilitator – health sector nurse	2.5	1365	2	270	540						
	Health facility personnel											
	1 nurse auxiliary	2.5	791	2	220	440						
	1 promoter or environmental health technician	2.5	788	2	220	440						
	3 AIN-C monitors	2	0	2	60	360						
			2944			**1780**		**25**				**4749**
3. Training health facility and community level personnel – preventive component	2 facilitators											
	1 health area or sector nurse	5	2729	4.5	270	1215			200			4144
	1 health sector nurse	5	2729	4.5	270	1215			200			4144
No. of health centres participating = 2	3 health centre personnel (2 centres)											
No. of communities per health centre = 2	2 nurse auxiliaries	5	3014	4.5	220	1980			400			5394
	1 health promoter or educator	5	1545	4.5	220	990			200			2735

	12 monitors	5	0	5	60	3600			2400			6000
	15 total no. of participants											
			10 017			**9000**	**0**	**5475**	**3400**	**0**	**1360**	**29 252**
4. Institutional level training of facilitators – curative component No. of health areas participating = 2	2 Central Office level facilitators											
	1 physician	2	2210	1.5	270	405	2276		80			4971
	1 nurse	2	1092	1.5	270	405			80			1577
	1 driver	2	518	1.5	220	330			80			928
	2 Regional Office personnel											
	1 mother-child specialist	2	1371	1.5	220	330	495		80			2276
	1 nurse/nutrition specialist	2	1092	1.5	270	405			80			1577
	1 driver	2	518	1.5	220	330			80			928
	4 health area personnel (2 per area)											
	2 health area nurses	2	2184	1.5	270	810	297		160			3450
	2 physicians or nurses	2	3302	1.5	270	810			160			4272
	10 health sector nurses (5 per area)	2	10 918	1.5	270	4050			800			15 768
	16 total no. of participants											
			23 205			**7875**	**3067**	**0**	**1600**	**2750**	**0**	**38 497**
5. Training health facility and community level personnel – curative component No. of health centres participating = 2 No. of communities per health centre = 2 4 communities participating	2 facilitators											
	1 health area or sector nurse	4	2184	4	270	1080			160			3424
	1 sector nurse	4	2184	4	270	1080			160			3424
	3 health facility personnel											
	2 nurse auxiliaries	4	2411	4	220	1760			320			4491
	1 health promoter or educator	4	1236	4	220	880			160			2276
	12 monitors	4	0	4	60	2880			1920			4800
	15 total no. of participants											
			8014			**7680**	**0**	**855**	**2720**	**1590**	**0**	**20 859**
6a. Monthly AIN-C meeting: with follow-up by nurse auxiliary and health sector nurse	1 sector nurse: 1/2 day for AIN-C	0.5	273	0.5	270	135						
	1 nurse auxiliary: 1/2 day for AIN-C	0.5	158	0.5	220	110						
	1 driver: 1/2 day for AIN-C	0.5	130	0.5	220	110						
	3 monitors	0.56	0									
			561			**355**	**297**	**4**	**0**	**0**	**0**	**1216**

(continued)

Table 3 Continued

Activity	Number & type of participants (both trainers & trainees)	Duration (days)	Personnel costs	Per diems			Transport	Materials & supplies	Refresh-ments	Rental of site	Equipment	Total cost
				No.	Cost/ person	Total cost						
6b. Monthly AIN-C meeting: with follow-up by nurse auxiliary (only)	1 nurse auxiliary	0.5	158	0.5	220	110						
	3 monitors	0.56	0									
			158			**110**	**0**	**2**	**0**	**0**	**0**	**270**
6c. Monthly AIN-C meeting: with no follow-up	3 monitors	0.56	0									
						0	**0**	**0**	**0**	**0**	**0**	**0**
7a. Supervision by health area personnel: 2 visits/year to the sector (only) AIN-C share = 25%	1 health area nurse	1.5	819	1.5	270	405						1224
	1 nutrition aide	1.5	452	1.5	220	330						782
	1 driver	1.5	389	1.5	220	330						719
			1660			**1065**	**792**	**2**	**Pro-rated at:**		**25%**	**879**
7b. Supervision by area and sector: 1 visit/year to the centre with the sector nurse AIN-C share = 25%	1 health area nurse	1.5	819	1.5	270	405						1224
	1 nurse auxiliary	1.5	452	1.5	220	330						782
	1 driver	1.5	389	1.5	220	330						719
	1 health sector nurse	1.5	819	1.5	270	405						
			2478			**1470**	**495**	**2**	**Pro-rated at:**		**25%**	**1111**
7c. Supervision by area: 1 visit/year to centre AIN-C share = 25%	1 health area nurse	1.5	819	1.5	270	405						1224
	1 nurse auxiliary	1.5	452	1.5	220	330						782
	1 driver	1.5	389	1.5	220	330						719
			1660			**1065**	**445**	**2**	**Pro-rated at:**		**25%**	**793**
8. Supervision by sector nurse: 2 visits/year to health centre (only) AIN-C share = 33%	1 health sector nurse	0.5	273	1	270	270						
	1 driver	0.5	130	1	220	220						
			403			**490**	**198**	**0**	**Pro-rated at:**		**33%**	**360**
9a. Monthly meetings at the health centre with other volunteers and resupplying the monitor: the first cohort	1 nurse auxiliary	0.5	158									
	1 promoter	0.5	154									
	1 environmental health technician	0.5	161									
	6 monitors	0.5	0									
			473			**0**	**20**	**207**	**0**	**0**	**0**	**700**

9b. Monthly meetings at the health centre with all volunteers & resupplying the monitor: all subsequent cohorts	6 monitors	0.5	0									
			0			**0**	**20**	**207**	**0**	**0**	**0**	**227**
10a. Quarterly meeting with the community: first meeting	1 health sector nurse	0.5	273	0.5	270	135						
	1 driver	0.5	130	0.5	220	110						
	1 nurse auxiliary	0.25	79									
	3 monitors	0.25	0									
			482			**245**	**297**	**0**	**0**	**0**	**0**	**1023**
10b. Quarterly meeting with the community: second meeting	1 nurse auxiliary	0.1875	59									
	3 monitors	0.1875	0									
			59			**0**	**0**	**0**	**0**	**0**	**0**	**59**
10c. Quarterly meeting with the community: all subsequent meetings	3 monitors	1.0	0									
			0			**0**	**0**	**0**	**0**	**0**	**0**	**0**
11. Other monthly activities of the monitor: home & curative care visits	3 monitors	0.183	0									
			0			**0**	**0**	**0**	**0**	**0**	**0**	**0**
12a. Incentives given to the monitors each year: the first year	3 monitors											
			0			**0**	**0**	**0**	**0**	**0**	**0**	**891**
12b. Incentives given to the monitors each year: after the first year	3 monitors											
			0		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**618**

facilitators are the health area nurse and the health sector nurse, who train the personnel of two health centres. Generally the trainees are the nurse auxiliaries (staff of the CESARs), as well as the monitors and either the health promoter or the environmental health technician. This training entails a five-day session that is generally conducted in a town conveniently situated among the health centres and communities from which the trainees are drawn. The facilitators and the 16 trainees all receive per diems for participating in this training. Regular MOH staff do not receive any special compensation for this training. The cost of their participation is the value of the time they spend in this activity (the regular average total hourly remuneration), their per diem and the cost of transportation to and from the training site. Other costs include materials and supplies, refreshments, equipment and the rental cost of the training site or facility. As Table 3 shows, the average cost of Activity #3 is 29 252 lempiras (US$1581) per training for two health centres, or about 7313 lempiras (US$395) per community.

The TOTs and training of health facility and community personnel—curative component: The training sessions in curative care mirror the model of the prevention and promotion sessions described above. They involve the same facilitators and trainees as Activities #1 and #3. The institutional-level TOT session (Activity #4) is a two-day affair focusing on teaching techniques. The community-level training (Activity #5) is a four-day session in which the Activity #4-trained facilitators, in turn, train the health centre and community-level staff in curative care topics, described previously.

MOH norms call for implementing Activity #5 as soon as all of the monitors associated with a particular health centre are deemed proficient in carrying out the monthly weighing and counselling sessions. However, personnel, time and financial constraints generally preclude Activity #6 from being implemented until the local AIN-C programme has been in operation for at least 1 year. The estimated cost for curative trainings—Activities #4 and #5—are 38 497 lempiras (US$2081) and 20 859 lempiras (US$1128), respectively. Table 3 shows the complete composition of these costs.

Monthly weighing and counselling sessions and follow-up/supervision (Activities #6 to #8)

The heart of the AIN-C programme is the monthly weighing and counselling sessions. For purposes of the cost analysis, the monthly sessions have been differentiated by the type of follow-up and supervision, if any, that accompanies them. AIN-C programme guidelines call for the first monthly session to be attended by *both* the health *sector* nurse and the health *centre* nurse auxiliary. The health centre nurse auxiliary is supposed to attend the first four sessions (Griffiths and de Alvarado 1999). The relatively heavy dose of supervision and follow-up during these first sessions is intended to better ensure that the programme gets off to a good start and that the monitors quickly develop sound routines. The major difference between the first and subsequent years is the reduced intensity of the follow-up visit schedule during the first four months of the programme. In Year 2 (and thereafter) there are two fewer visits by the nurse auxiliary and two more sessions when the monitor is unsupervised.

Supervision by MOH health centre staff members: On average, the nurse auxiliary makes a half-day visit to each of roughly 10 communities in her domain once every other month. The nurse auxiliary makes every effort for her/his visit to coincide with the monthly AIN-C weighing and counselling session. These visits (Activity #6b) cost an average of 270 lempiras (US$15) per community.

Supervision by MOH health sector staff members: As described above, about once a year the *sector* nurse supervisor visits a health centre and accompanies the health *centre* nurse auxiliary to one of the centre's communities (Activity #6a). Similar efforts are made to coordinate this community visit so that it coincides with the weighing and counselling session. There are usually six such visits to communities in each health *sector* in a year. Hence, the health sector nurse supervisor makes this type of supervisory visit to only a fraction (roughly 5%) of all of the communities in her/his domain in a given year. These visits cost an average of 1216 lempiras (US$66) per community.

Each sector nurse supervisor visits each of the six health centres in her domain once every 4 months (Activity #8). These visits are from half to 1 full day in duration, and cost an average of 972 lempiras. Roughly one-third of these visits are dedicated to AIN-C-related activities, making the AIN-C programme share of the cost of these supervisory visits 360 lempiras (US$19) per health centre.

Figure 2 shows the average numbers of visits and estimated travel distances involved in each type of supervisory and follow-up visit.

Supervision by MOH health area staff members: As Figure 2 illustrates, the professional staff of the health area office also participate in supervising the programme. The health *area* staff generally set aside one week of each month to conduct field supervision, and make a supervisory visit to each health *sector office* (Activity #7a) about once every 4 months. These visits generally require an average of 1.5 days. With, on average, five health sectors per health area, one health area staff-person annually makes 15 health sector visits, devoting roughly 20 days a year to this activity. These visits cost an average of 3516 lempiras, and roughly one-quarter of the total time devoted to them is spent on AIN-C. Thus the AIN-C portion of the cost of one of these visits is 879 lempiras (US$48).

In about one-third of these visits to the health sector, the health *area* staff first visit the health *sector office* and then proceed, accompanied by the health *sector* nurse supervisor, to a *health centre*, usually one which has been experiencing some type of special need or problem (Activity #7b). Annually, roughly five such visits are made; only about one in every six health centres in the health area receives this type of supervisory visit. These visits cost an average of 4444 lempiras, of which one-quarter or 1111 lempiras (US$60) is the AIN-C programme's share, the remainder of the time being devoted to other programmatic themes and activities.

The remainder of the health area staff supervisory visits is devoted to direct supervision of the health centres. These visits (Activity #7c) consist of the health *area* staff going directly to the *health centre*. These trips average 1 day per health centre, and, on average, each health centre in the health area receives one such supervisory visit per year. These visits cost an average of 3172 lempiras. About one-quarter of the time spent in these

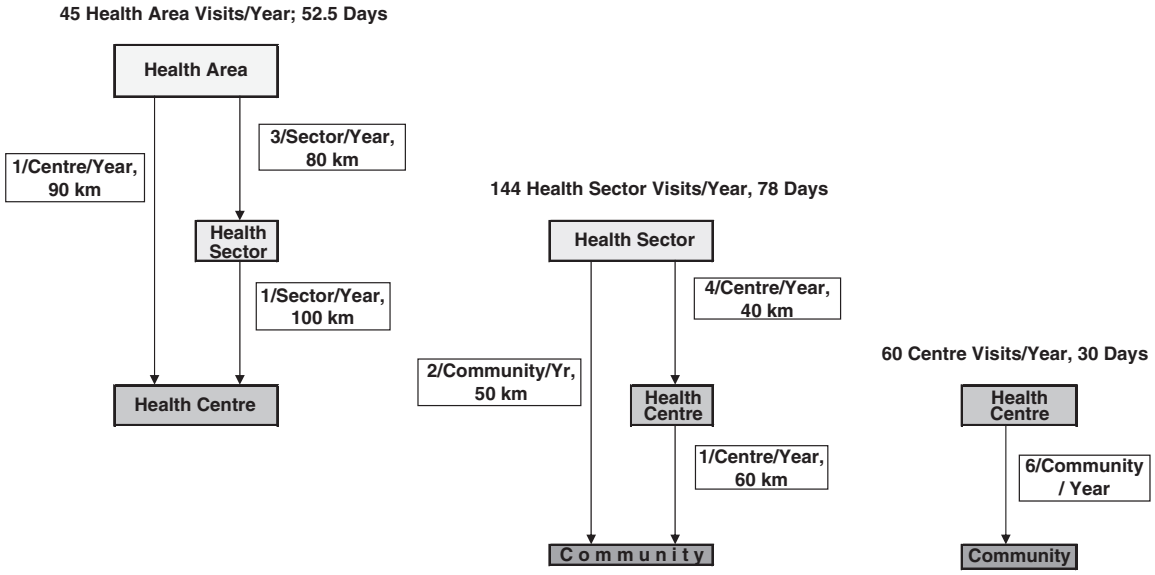

Figure 2 Follow-up and supervision in the AIN-C programme; numbers of visits and travel distances per visit by type of supervisor

visits is devoted to AIN-C. Thus AIN-C's share of the cost of each visit is 793 lempiras (US$43).

With about 30 health centres per health area, there are approximately 30 supervisory trips directly to a health centre, unaccompanied. One health area staff-person devotes about 30 days annually to this activity. The total amount of time that health area staff spend supervising, therefore, is roughly 50 days a year; 20 days visiting the health sectors (Activity #7a, one-third of which involve #7b) and 30 days visiting the health centres. The health area staff's supervisory visits to both the health sectors and the health centres are multi-purpose visits. They are used to review records and for reporting, as well as to provide counsel, technical assistance and general support, and to trouble-shoot any particular problems or issues the health sector or centres may be confronting. About 25% of the health area staff's supervisory visits to both health sectors and health centres is devoted to AIN-C. Given that AIN-C is only one of nine MOH programmes, the fact that a disproportionate amount of time is dedicated to it reveals the relatively greater importance attributed by the Ministry to the AIN-C programme.

Community meetings, volunteer meetings and other monitor activities (Activities #9 to #11)

Monthly community volunteer meetings: Activity #9 consists of the monthly meeting of all community volunteers that takes place in the health centre and is used to re-supply the AIN-C monitors. In the first year, the monthly meeting (Activity #9a) in each health centre costs 700 lempiras (US$38) per month. Each subsequent year, as additional groups of communities and monitors are brought into the programme, the costs of the health *centre* personnel devoted to these monthly meetings do not change. The amount of time devoted to AIN-C, overall, reportedly remains about constant and the amount of time spent on each community's AIN-C programme is reduced in order to be able to accommodate all AIN-C programme activities in the same half-day that is devoted to the programme. Accordingly, with the subsequent introduction of the programme into new communities, the only change is in the costs related to the two communities in which the programme is newly started each year. The only additional recurrent monthly cost associated with the introduction of the programme into new communities is the relatively minor cost of additional transportation and supplies for monitors. These costs (Activity #9b in Table 3) amount to a monthly average of 227 lempiras (US$12) per pair of communities.

Tri-annual meetings of the larger community: Activity #10 is composed of the three annual AIN-C programme meetings with the community. The composition of attendees varies, depending upon whether or not the programme is in its first year of operation in the community. The first such meeting held in a community is attended by the health *sector* nurse supervisor and the local health *centre* nurse auxiliary, together with the three monitors, so as to better ensure that it is structured and managed appropriately, and the meeting addresses community health and nutrition issues (Activity #10a). This first meeting is intended to serve as a model, establishing the general structure and setting the tone for subsequent AIN-C meetings with the community. The only MOH representatives attending the second community meeting are the nurse auxiliary and the monitors. This meeting (Activity #10b) is intended to be transitional in nature. All subsequent AIN-C meetings with the community are attended and managed by the monitors alone (Activity #10c). The average costs of these three different community meetings are 1023, 59 and 0 lempiras (US$55, 3 and 0), respectively.

Other monthly monitor activities: Activity #11 is a residual category. It captures the time that monitors spend on activities that are not included in some other, already-identified activity, and consists of the time the monitors spend each month on house visits and curative care consultations. These activities average about 6.5 hours per monitor per month, or 19.5 hours per community per month. As the monitors volunteer their time, there is no cost other than the incentives discussed below.

Table 4 Incentives provided to the AIN-C programme monitors

Type of incentive	Frequency with which monitors receive them	Cost (lempiras)
Identification card	Only once	30
Free MOH health care	Annually	50
Diploma	Only once	3
Carrying bag	Only once	50
Letter or recognition from MOH Regional Office	Annually	2
Party at end of the year	80% receive it annually	80
Piñata on International Children's Day	33% receive it annually	28
Average annual cost per monitor		
First year		243
All subsequent years		160
Average hourly cost of a monitor		
First year		1.36
All subsequent years		0.90

Monitor incentives (Activity #12)

The AIN-C monitors are motivated primarily by non-material incentives. They are interested in contributing to their community, being regarded as a community health resource, and in the stature and respect that their position as a monitor earns them in the community. The MOH, as well as many local community leaders, mayors and municipal governments, provide monitors with some incentives for their services. Table 4 presents the various types of incentives that AIN-C monitors receive, the frequency with which they receive them and their estimated costs. The identification card entitles the volunteer to receive MOH services free of charge. Annually, the average total value of free MOH care that a monitor receives is 76 lempiras (US$4) (Fiedler and Suazo 2002).

The one-time nature of several of these incentives makes the cost of incentives relatively greater in the first year of the AIN-C programme. Dividing the annual value of these incentives by the number of hours that monitors work annually on AIN-C-related activities, we obtain the average hourly cost of a monitor. During the first year of a community's AIN-C programme, this cost is 1.66 lempiras (US$0.09) per monitor hour. In subsequent years, it falls to 1.15 lempiras per monitor hour (US$0.06).

The cost of implementing the AIN-C programme in one health area

To facilitate explaining the structure and costs of the programme as it is phased-in over space and time, it is useful to refer to the regular, routine activities that are involved in each of the years of the phasing-in cycle as Year 1, Year 2 and Year 3.

The cost of implementing the AIN-C programme in one cohort

To fully implement the programme in any given community requires 2 years because the curative care training does not occur until the second year of the programme. As the first cohort enters what will be referred to as Year 2 activities of the programme, a new cohort (Cohort #2) is introduced for the first time into the programme and receives its prevention/promotion training, and so on with Cohorts #3, #4 and #5. As each new cohort is introduced in one health area, the programme expands. On average, each cohort includes a total of 60 communities anchored to 30 health centres in five sectors.

The cost of the full set of Year 1 and Year 2 activities in one cohort is presented in Tables 5 and 6, respectively. Beginning with a community's third year in the programme, the cohort has entered the long-term permanent programme structure, and costs thereafter become constant at their long-term annual recurrent cost level. These costs are presented in Table 7.

The cost of implementing the AIN-C programme in one health area (five cohorts)

The fully implemented AIN-C programme phases-in five cohorts in one health area. Table 8 presents the total costs of implementing AIN-C in one health area, breaking-down the costs by year and by cohort. The phase-in of the programme throughout all of the communities in one health area requires 6 years and costs 12.0 million lempiras (US$650 083). The overall AIN-C programme completes its start-up phase at the start of programme Year 7, when its annual costs—which will be its long-term annual recurrent costs—are 1 319 751 lempiras (US$71 338).

Figures 3 and 4 present different views of the composition of costs of the AIN-C programme in one health area. Figure 3 shows that 43% of the total cumulative costs of implementing the programme in one health area over its 6-year phase-in period is comprised of three start-up activities—the preventive and curative training and the baseline study. When those start-up activities are completed, there remain just three activities. Figure 4 shows the relative magnitude of the long-term annual recurrent costs of these three activities in one health area after the phase-in is completed.

The total annual AIN-C programme costs

As the programme is phased into *one* health area, its annual costs increase each year until Year 6 when they fall due to the end of all prevention/promotion training and all baseline studies. The following year they fall again, this time due to the ending of all curative care training. The average total annual cost over the 6-year start-up period is 2 004 424 lempiras per year (US$108 347). Starting in Year 7, all one-time (or start-up) activities have been completed. Thereafter, annual costs remain constant at their Year 7 level of 1 319 751 lempiras per year (US$71 338). Table 9 presents the year-by-year annual and cumulative total costs and the average annual cost over the 6-year phase-in period, in both lempiras (top) and US dollars of mid-2005.

The average annual cost per child and per child-year of participation

In contrast, both the annual and the cumulative costs per child and per child-year of participation fall each year that the programme is in operation throughout the period analysed here. This is due to the spreading of fixed costs over an increasing number of children. These fixed costs include the supervisory

Table 5 Total cost of implementing the AIN-C programme in one health area by cohort and activity: first year of the programme (in lempiras)

	No. of times per year	Cost per community	No. of communities per health centre	Cost per health centre	No. of centres per sector	Cost per sector	No. of sectors per area	Cost per area
Activity 1: Institutional level training of facilitators – preventive component = > 2 health areas participating	1/health area	164	2	328	6	9844	5	49 220
Activity 2: Baseline study - training of the health centre personnel already trained in the preventive component (including meeting with the community and selection of the monitors)	60/area = 1/community	4749	2	9497	6	56 983	5	284 915
Activity 3: Training health centre and community-level personnel – preventive component	15/area	7313	2	14 626	6	87 757	5	438 783
Activity 6: Monthly AIN-C meetings	Per community:							
6a: Monthly AIN-C meeting: with follow-up by the nurse auxiliary and the health sector nurse	1	1216	2	2432	6	14 593	5	72 964
6b: Monthly AIN-C meeting: with follow-up by the health centre's nurse auxiliary (alone)	9	270	2	4855	6	29 130	5	145 649
6c: Monthly AIN-C meeting: without follow-up	2	0	2	0	6	0	5	0
Activity 7: Supervision by health area staff (each pro-rated at 25%)								
7a: Supervision by the area: 2 visits annually to each health sector (only)	2	147	2	293	6	1759	5	8795
7b: Supervision by the area: 1 visit annually to each sector then (with the health sector nurse) to a health centre	1	93	2	185	6	1111	5	5556
7c: Supervision by the area: 1 visit annually to each health centre (alone)	1	396	2	793	6	4757	5	23 787
Activity 8: Supervision by the sector nurse: 3 visits annually to the health centre (only) (pro-rated at 33%)	3	540	2	1080	6	6479	5	32 395
Activity 9: Monthly meetings in the health centre with other volunteers and resupply of the monitors	Per health centre:							
9a: The first cohort of 2 health centres and their 4 communities	12	350	2	8399	6	50 397	5	251 984
9b: All subsequent cohorts (each adding 2 communities, 6 monitors per health centre)	12	113	2	2719	6	16 317	5	81 584

(continued)

Table 5 Continued

	No. of times per year	Cost per community	No. of communities per health centre	Cost per health centre	No. of centres per sector	Cost per sector	No. of sectors per area	Cost per area
Activity 10: Meetings with the community once every 4 months	Per community:							
10a: The first	1	1023	2	2047	6	12 281	5	61 407
10b: The second	1	59	2	119	6	712	5	3560
10c: Those subsequent to the second	1	0	2	0	6	0	5	0
Activity 11: The other monthly activities of the monitors (home visits and curative care treatments)	12/community	0	2	0	6	0	5	0
Activity 12: Incentives that each community's monitors receive – first year of the programme	3 per community	891	2	1782	6	10 692	5	53 460
Total annual costs: first year of cohort #1		17 211		46 437		286 495		1 432 475
Total annual costs: first year of cohorts #2–#5		15 635		38 077		228 465		1 142 323

costs discussed, as well as the fixed costs of the one-time training sessions and baseline study. These are relatively expensive endeavours that are undertaken early on in the 6-year implementation cycle of the programme, thereby front-loading the programme's costs. Table 9 presents the annual and cumulative total cost per child, as well as cost per child-year of participation.

The AIN-C programme's *cumulative* average total cost per child during the programme's 6-year phase-in period in a given health area is 271 lempiras (US$14.65). Its *annual* average total cost per child during this 6-year phase-in period is 340 lempiras (US$18.38). Beginning in Year 7, the programme's *long-term*, *annual* total cost per participating child is 119 lempiras (US$6.43).

The annual, incremental budget requirements of the AIN-C programme

For practical purposes, it is useful to identify the additional budgetary requirements the MOH needs to receive from the Ministry of Finance to implement the programme. A significant proportion of the costs of AIN-C are fixed costs of the MOH: they are costs that are already being incurred and would continue to be incurred by the MOH whether or not AIN-C were implemented. The most important of these are the costs of MOH personnel.

Supervision and follow-up are part of the regular activities of the health sectors and the centres. These visits include, but are not limited to, the AIN-C programme. Therefore, though a portion of their content is different, where there is no AIN-C programme these same levels of activities are still undertaken. The costs to the MOH of these supervision and follow-up activities do not change with the introduction of AIN-C. Activities #7 and #8 are therefore dropped from this analysis. Conversely, the health sector supervisory costs in which the health sector supervisory nurse is directly involved in community-level AIN-C activities—Activities #6a, 6b and #10a—are variable costs, and are therefore retained in calculating the programme's incremental budget requirements.

The AIN-C programme's *cumulative* average variable cost per child during the programme's 6-year phase-in period in a given health area is 151 lempiras (US$8.16). Its *annual* average variable cost per child during this 6-year phase-in period is 182 lempiras (US$9.84). Beginning in Year 7, the programme's *long-term, annual incremental* budget requirements are 72 lempiras (US$3.90) per participating child. These estimates are similar to the US$5–10 per child per year that have been generally found to characterize community-based nutrition programmes (Mason *et al*. 2006; World Bank 2006).

Sensitivity analyses

The scenario that has thus far been discussed is what we will label the Base Scenario. It is considered the single best set of estimates of the total cumulative and average annual costs of phasing-in the AIN-C programme in a health area, and of the long term, annual recurrent costs of maintaining the programme in a health area. Table 10 presents various cost measures of the total cost and the incremental budget requirements of the Base Scenario and of each of the six alternative scenarios.

Table 6 Total cost of implementing the AIN-C programme in one health area by cohort and activity: second year of the programme (in lempiras)

	No. of times per year	Cost per community	No. of communities per health centre	Cost per health centre	No. of centres per sector	Cost per sector	No. of sectors per area	Cost per area
Activity 4: Institutional-level training of facilitators – curative component	1/health area	321	2	642	6	3850	5	19 249
Activity 5: Training health centre and community level personnel – curative component	15/health area	5215	2	10 429	6	62 576	5	312 882
Activity 6: Monthly AIN-C meetings	Per community:							
6b: Monthly AIN-C meeting: with follow-up by the health centre's nurse auxiliary (alone)	6	270	2	3237	6	19 420	5	97 100
6c: Monthly AIN-C meeting: without follow-up	6	0	2	0	6	0	5	0
Activity 7: Supervision by health area staff (each pro-rated at 25%)								
7a: Supervision by the area: 2 visits annually to each health sector (only)	2	147	2	293	6	1759	5	8795
7b: Supervision by the area: 1 visit annually to each sector then (with the health sector nurse) to a health centre	1	93	2	185	6	1111	5	5556
7c: Supervision by the area: 1 visit annually to each health centre (alone)	1	396	2	793	6	4757	5	23 787
Activity 8: Supervision by the sector nurse: 3 visits annually to the health centre (only) (pro-rated at 33%)	3	540	2	1080	6	6479	5	32 395
Activity 9: Monthly meetings in the health centre with all volunteers and resupply of the monitors	Per health centre:							
9a: Two health centres and their first 2 cohorts and 8 communities	12	350	2	8399	6	50 397	5	251 984
9b: All subsequent cohorts (each adding 2 communities, 6 monitors per health centre)	12	113	2	2719	6	16 317	5	81 584
Activity 10: Meetings with the community once every 4 months	Per community:							
10c: Those subsequent to the second	2	0	2	0	6	0	5	0
Activity 11: The other monthly activities of the monitors (home visits and curative care treatments)	12/community	0	2	0	6	0	5	0
Activity 12b: Incentives that each community's monitors receive – after the first year of the programme	Per community	618	2	1236	6	7416	5	37 080
Total annual costs: second year of cohort #1		**7949**		**26 294**		**157 765**		**788 826**
Total annual costs: second year of cohorts #2–#5		**6216**		**17 622**		**105 729**		**528 646**

Table 7 Total cost of implementing the AIN-C programme in one health area by cohort and activity: third and subsequent years of the programme (in lempiras)

	No. of times per year	Cost per community	No. of communities per health centre	Cost per health centre	No. of centres per sector	Cost per sector	No. of sectors per area	Cost per area
Activity 6: Monthly AIN-C meetings	Per community:							
6b: Monthly AIN-C meeting: with follow-up by the health centre's nurse auxiliary (alone)	6	270	2	3237	6	19 420	5	97 100
6c: Monthly AIN-C meeting: without follow-up	6	0	2	0	6	0	5	0
Activity 7: Supervision by health area staff (each pro-rated at 25%)								
7a: Supervision by the area: 2 visits annually to each health sector (only)	2	147	2	293	6	1759	5	8795
7b: Supervision by the area: 1 visit annually to each sector then (with the health sector nurse) to a health centre	1	93	2	185	6	1111	5	5556
7c: Supervision by the area: 1 visit annually to each health centre (alone)	1	396	2	793	6	4757	5	23 787
Activity 8: Supervision by the sector nurse: 3 visits annually to the health centre (only) (pro-rated at 33%)	3	540	2	1080	6	6479	5	32 395
Activity 9: Monthly meetings in the health centre with all volunteers and resupply of the monitors	Per health centre:							
9a: Two health centres and their first 3 cohorts of 2 health centres and their 4 communities	12	350	2	8399	6	50 397	5	251 984
9b: All subsequent cohorts (each adding 2 communities, 6 monitors per health centre)	12	113	2	2719	6	16 317	5	81 584
Activity 10: Meetings with the community once every 4 months	Per community:							
10c: Those subsequent to the second	2	0	2	0	6	0	5	0
Activity 11: The other monthly activities of the monitors (home visits and curative care treatments)	12/community	0	2	0	6	0	5	0
Activity 12b: Incentives that each community's monitors receive – after the first year of the programme	Per community	618	2	1236	6	7416	5	37 080
Total annual costs: third and subsequent years of cohort #1		**2527**		**17 943**		**107 656**		**456 696**
Total annual costs: third and subsequent years of cohorts #2–#5		**1114**		**9912**		**59 470**		**215 764**

Table 8 The cost of phasing-in AIN-C in one health area (in lempiras)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Cohort #1[a]	1 432 475	788 826	456 696	456 696	456 696	456 696	456 696
Cohort #2		1 142 323	528 646	215 764	215 764	215 764	215 764
Cohort #3			1 142 323	528 646	215 764	215 764	215 764
Cohort #4				1 142 323	528 646	215 764	215 764
Cohort #5					1 142 323	528 646	215 764
Total	1 432 475	1 931 149	2 127 665	2 343 429	2 559 193	1 632 634	1 319 752

[a]Each cohort consists of 5 sectors, 30 facilities and 60 'new' communities.

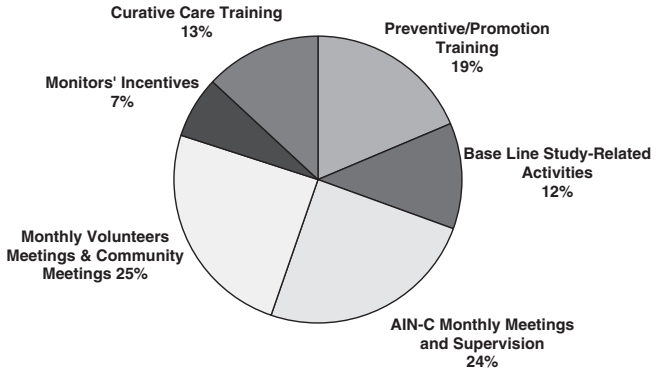

Figure 3 Composition of the total costs of implementing the AIN-C/Honduras programme in one health area, by activity (cumulative costs of Years 1 to 6)

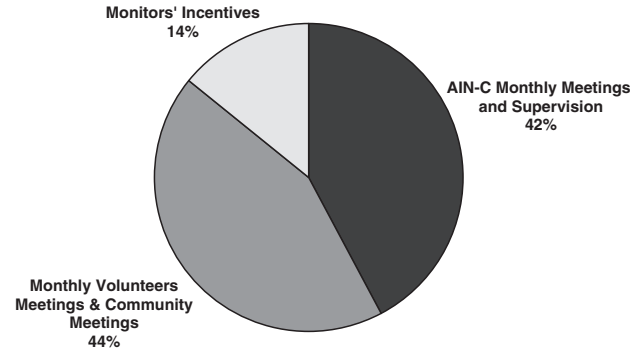

Figure 4 Composition of the long-term, annual recurrent costs of the AIN-C/Honduras programme in one health area, by activity (30 health facilities, 300 communities, 7500 children under 2 years old)

Scenarios #1 and #2 are designed to facilitate examination of the impact of changes in the number of children enrolled on the average cost of the programme per child. While the recommended number of children per team of three monitors is 25, the actual number varies over time and space. Scenario #1 assumes that there are 15 children, and #2 assumes there are 35 children per monitor team. Both Scenarios #1 and #2 have exactly the same total costs as the Base Scenario. The average total cost per child and per child-year of participation, however, are higher (Scenario #1) or lower (Scenario #2) than in the Base Scenario, owing to the fact that the numerators (total costs) have not changed, while denominators have all decreased (Scenario #1) or increased (Scenario #2). Thus the efficiency of the programme may be increased by increasing the number of children participating—at least up to the recommended number of 25, after which the quality of interactions begins to be compromised. Monitors should be encouraged, therefore, to recruit all eligible children (if possible, perhaps by extending the geographic coverage of the programme, in rural areas).

In Scenario #3 it is assumed that there are two, rather than three, monitors per community. Most of the Scenario #3 activities' costs are very similar to those of the Base Scenario (varying by 10% or less), demonstrating that there are few cost savings that might be realized by reducing the number of monitors. Moreover, trying to reap the relatively minor savings that such a cost-cutting strategy might generate could jeopardize the effectiveness of the programme, by reducing the *esprit de corps* that AIN-C/Honduras personnel claim is generated by having what they regard as the ideal number of programme personnel.

Scenario #4 is intended to provide to other countries that may be considering introducing the AIN-C programme greater insight about the cost impact of the curative care component of the programme. Dropping the curative care training sessions and medicines results in cost savings of 25% in all costs.

In Scenario #5, dropping medicines results in a 27% reduction in the long-term, annual recurrent cost of the programme.

Scenario #6 explores the issue of incentives and what it would cost to pay the monitors. The linchpin of the AIN-C programme is the monitor, a volunteer. Honduras' rich tradition of voluntarism in the health sector is an important element of the AIN-C programme that may not be characteristic of other countries, or that might exist but may be less ardent and less effective. In countries that are less blessed than Honduras in this regard, it is likely that the AIN-C programme may have to provide more material incentives to maintain adequate interest in the programme in order to maintain its effectiveness and perhaps even its viability. The implication, of course, is that AIN-C may cost more in other countries where voluntarism is less common and/or is a lesser motivating force.

In Scenario #6, it is assumed monitors are paid the equivalent of the lowest paid workers in Honduras, agricultural day-labourers, who are legally mandated to receive 43.6 lempiras daily. If monitors were paid the equivalent—5.45 lempiras (US$0.33) per hour—it would increase both cumulative total costs and average annual costs during the 6-year phase-in period by 20%. Long-term, annual recurrent costs would be increased by 35%.

Table 9 Annual and cumulative costs of the AIN-C programme: total, per child and per child-year costs (in lempiras)

Year of the programme	No. of children under-2 participating	No. of children-years of participation	Annual cost			Cumulative cost		
			Total	Per child	Per child-year	Total	Per child	Per child-year
1	2220	1500	1 432 475	645	955	1 432 475	645	955
2	4440	3000	1 931 149	435	644	3 363 624	505	747
3	6660	4500	2 127 665	319	473	5 491 289	412	610
4	8880	6000	2 343 429	264	391	7 834 718	353	522
5	11 100	7500	2 559 193	231	341	10 393 911	312	462
6	11 100	7500	1 632 634	147	218	12 026 545	271	401
7	11 100	7500	1 319 752	119	176	13 346 297	240	356
Average annual cost during the first 6 years:			**2 004 424**	**340**	**503**			

Notes: 'Per child' calculations include all children participating in the programme during the course of the year, regardless of the duration of any given child's participation. As explained in the text, if it is assumed that after the initial year of the programme there are 25 children in the programme and they enter and (due to the age restrictions of the programme) exit the programme at a regular interval of roughly one child per month (or, more precisely, one every 1.042 months), the average child's participation in any given calendar year is 8.1 months. A 'child-year' consists of 12 months of programme participation.

Discussion and conclusions

AIN-C versus MOH costs

At US$6.43 per child per year, the long-term, annual total cost of the AIN-C programme is relatively low. But 'low' compared with what? A cost study conducted in 2000 provides a reasonable comparison with a similar MOH facility-based service (Bitrán *et al*. 2000). The Bitrán study provides detailed breakdowns of the estimated cost of specific types of services, including the one that most closely approximates the content of the key AIN-C service—the MOH child growth and development visit—which is a facility-based weighing and counselling session. By adjusting the projected cost in the Bitrán study for differences in methodologies and inflation, it is estimated that the cost of one (in-facility) child growth and development consultation provided by MOH staff was 105.1 lempiras (in mid-2005).[5]

In contrast, the community-based AIN-C programme's long-term, average total cost per child-year of participation is 176 lempiras, and consists of 12 monthly weighing and counselling sessions (plus any follow-up home visits or curative care visits). Dividing the 176 lempiras by 12 results in a first approximation of the cost of an AIN-C weighing and counselling session—14.67 lempiras.

There remain two limitations to this comparison. First, the content of these visits is not directly comparable. On the one hand, an MOH staff-provided visit involves a more highly trained person, usually a nurse or nurse auxiliary, as compared with an AIN-C monitor. This suggests the MOH visit is of higher quality. On the other hand, the AIN-C intervention is a more highly standardized, structured and personalized approach, suggesting that the AIN-C visit is of higher quality. Unfortunately, there is no empirical information about the differences in the quality and content of care of these different providers with which to definitively assess the significance of these differences. Secondly, it should be noted that the cost of an AIN-C 'monthly visit' includes more than just a child's growth monitoring and counselling session. The session also includes curative care treatment and the provision of free-of-charge medicines.

Medicines alone account for 20% of the average direct cost per child of a weighing and counselling session. If the cost of these medicines (3.4 lempiras) and the cost of the AIN-C monitors' follow-up home visits and curative care visits (0.2 lempiras per child per month) are subtracted, then the cost of an AIN-C weighing and counselling session falls to 11.1 lempiras (US$0.60), just 11% of the direct cost of a single MOH staff-provided, facility-based, child growth and development consultation.

Given that AIN-C services are provided by volunteers, it is hardly surprising that they are less expensive. But what is striking is the magnitude of the cost differential; an MOH-provided service costs nine times more. This is particularly noteworthy given AIN-C's higher level of coverage, the near-universal participation rates in the AIN-C communities and the quality (as measured by the effectiveness of the behavioural change services it provides, as discussed in the introduction). The low cost and low turnover in the key personnel—the community volunteers—and the Honduran communities' continued enthusiastic participation all portend well for the programme's sustainability.

MOH cost savings: the substitution of AIN-C for MOH services

During the course of the interviews conducted for this study, many health post nurse auxiliaries reported that when the AIN-C programme was first introduced, their initial reaction was negative: they regarded AIN-C as simply one more new idea that would further add to their already too numerous responsibilities. They soon came to realize, however, that AIN-C has helped to lighten their load. The BASICS evaluation (Plowman *et al*. 2004) found empirical evidence of this impact of AIN-C. It found that mothers who participated in AIN-C substituted their local monitors' care and consultations for visits to MOH facilities at high rates. For respiratory illnesses the evaluation found a 30% reduction in the number of MOH outpatient consultations due to the substitution of monitors for MOH providers. For diarrhoeal disease treatment, there was a

Table 10 Sensitivity analysis of the estimated costs of the AIN-C/Honduras programme: estimated costs of alternative scenarios, in mid-2005 US$

Costing scenario	Total cost	Average total cost per child[a]	Average total cost per child-year of participation[a]
The Base Scenario: Total costs			
a) Phased-in implementation (6 years)			
1) Cumulative total cost	650 084	14.6	21.7
2) Average annual cost	108 347	18.4	27.2
b) Long-term, annual recurrent costs	71 338	6.4	9.5
Base Scenario: Incremental budget requirements[b]			
a) Phased-in implementation (6 years)			
1) Cumulative total incremental budget requirements	324 289	7.3	10.8
2) Average annual incremental budget requirements	54 048	8.2	13.0
b) Long-term, annual incremental budget requirements	39 712	3.6	5.3
Alternative Total Cost Scenarios			
#1: 15 children per community, rather than 25			
a) Phased-in implementation (6 years)			
1) Cumulative total cost	610 279	22.6	33.9
2) Average annual cost	101 713	28.4	42.6
b) Long-term, annual recurrent costs	67 785	10.1	15.1
#2: 35 children per community, rather than 25			
a) Phased-in implementation (6 years)			
1) Cumulative total cost	610 279	9.7	14.5
2) Average annual cost	101 713	12.2	18.3
b) Long-term, annual recurrent costs	67 785	4.3	6.4
#3: 2 monitors per community, rather than 3			
a) Phased-in implementation (6 years)			
1) Cumulative total cost	575 121	12.8	19.2
2) Average annual cost	95 853	16.1	24.1
b) Long-term, annual recurrent costs	64 547	5.7	8.6
#4: Without curative care training or medicines			
a) Phased-in implementation (6 years)			
1) Cumulative total cost	460 677	10.2	15.4
2) Average annual cost	76 779	13.7	20.5
b) Long-term, annual recurrent costs	49 842	4.4	6.6
#5: Without medicines			
a) Phased-in implementation (6 years)			
1) Cumulative total cost	538 510	11.9	17.9
2) Average annual cost	89 752	15.5	23.1
b) Long-term, annual recurrent costs	49 842	4.4	6.6
#6: Monitors are paid 5.45 Lps. (US$0.33) per hour, rather than nothing			
a) Phased-in implementation (6 years)			
1) Cumulative total cost	734 230	16.3	24.5
2) Average annual cost	122 372	20.0	30.1
b) Long-term, annual recurrent costs	91 514	8.1	12.2

49% reduction in the number of MOH outpatient consultations. In addition, with the introduction of AIN-C in a community, nearly all of the child growth and development visits that an MOH facility would otherwise have provided would now be provided by AIN-C monitors. (No information was collected on this impact in the AIN-C evaluation. It is assumed here that there would be a reduction of 90% in these MOH visits in AIN-C communities.)

Multiplying these proportions by the total number of children currently covered by AIN-C, and the 'type of visit' and 'type of facility' specific MOH utilization rates of the AIN-C regions, provides an estimate of the number of MOH outpatient consultations 'saved' by AIN-C. Then multiplying the resulting 'saved' outpatient visits specific to a type of facility by the average cost of an MOH outpatient visit at that type of facility, and adding together, provides the total annual cost savings to the MOH due to the substitution effect of AIN-C. The annual savings come to 204 000 visits with a value of US$1.66 million.[6] This is equivalent to about 60% of the long-term, annual cost of AIN-C and roughly the equivalent of the programme's long-term, annual incremental budget requirements. Clearly, this is a sound investment in the children of Honduras.

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Endnotes

[1] Hereafter, the community-based volunteer monitors will be referred to as 'monitors'.

[2] These large, sector-level health centres are referred to as CESAMOs (Centro de Salud con Médico y Otros or health centre with physician and others).

[3] Health Posts (CESARs) are usually staffed by one nurse auxiliary, as well as a health promoter or an environmental health technician or both. While the latter two positions are generally itinerant, these staff do participate in some CESAR activities.

[4] Thereafter, the community census is updated by the monitors in an informal manner in their everyday interaction with other members of the community, at the monthly weighing session, in their home visits to newborns and in the monthly volunteers' meeting at the health centre. There are no specific time or costs estimates for these subsequent censuses.

[5] Bitrán *et al*. (2000) use a different, more inclusive, costing methodology. Their estimates include both direct and indirect costs, as opposed to the current study's estimation of only direct costs. In order to make the methodologies comparable in estimating the cost of a child growth and development visit, the indirect costs and the initial required investment costs were subtracted from the total cost. Disaggregating the input costs and adjusting personnel costs for the average increase in MOH salaries from 1999 to mid-2005 and adjusting the value of all other inputs with the GDP resulted in the estimate of 105.1 lempiras.

[6] This is a simplification that assumes that all of the inputs used to produce an MOH outpatient visit are variable and could be reduced in response to this reduction in demand. These are minimal estimates that do not include savings in hospitalization from respiratory or diarrhoeal disease that surely have resulted from the introduction of the AIN-C programme. Nor do these savings include estimates of the impact of AIN-C on MOH services utilization rates that results from the programme's reducing the prevalence of stunting, which is associated with a 28% greater utilization rate of MOH services. An unpublished, multivariate analysis by the authors of the 2001 Family Health Survey (Secretaría de Salud, ASONPLAFA, USAID/Honduras and CDC 2002) found that stunted children less than 5 years old in Honduras have a 28% greater likelihood of using MOH services, holding constant the child's age, sex, mother's reported health status of the child, mother's education status, household socio-economic status, family size and region.

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