



Activity Report 143

Promoting Hygiene Behavior
Change within C-IMCI: The Peru
and Nicaragua Experience

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Acronyms

ACH	Action Against Hunger
ADP	Association for People's Development (Nicaraguan PVO)
ANASAM	Nicaraguan Association for Water and Environmental Health
CADEP J.M.A.	Center for Andean Development, Education and Promotion José María Arguedas
CHP	Community Health Promoter
C-IMCI	Integrated Management of Childhood Illness–community level
DISA	Health Directorate of Cusco
EHP	Environmental Health Project
IMCI	Integrated Management of Childhood Illness
MOH	Ministry of Health
NGO	Non-governmental Organization
PAHO	Pan American Health Organization
PVO	Private Voluntary Organization
SILAIS	Health District (Nicaragua)
USAID	United States Agency for International Development
WHO	World Health Organization

Acknowledgements

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About the Author

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Executive Summary

In 2002, the joint Environmental Health Project/Pan American Health Organization (EHP/PAHO) Hygiene Behavior Change Project initiated innovative projects in Cusco, Peru, and Chinandega, Nicaragua, to promote key hygiene behaviors within the programmatic framework of the Community Integrated Management of Childhood Illness (C-IMCI) strategy. Partner organizations in each country formed technical teams to carry out an intense process of training, formative research, strategy testing, development of communications materials, monitoring and evaluation.

The projects were implemented in five communities in the Sacred Valley (near Cusco) and in three communities in Chinandega (Puerto Morazán Health District) that were selected by the ministries of health and local partners. All communities suffered from a high incidence of diarrheal disease, yet had a relatively good infrastructure of latrines and piped water and the active presence of the NGO Plan International. The population of children under five for the intervention area was 298 in Peru and 292 in Nicaragua.

After one year of behavior-change counseling with families, evaluations were carried out in April 2004. In the initial appraisal in Peru, 22% of the 108 children under five included in the sample were reported to have had diarrhea within the previous two weeks. When the midterm survey was applied one year later to 114 children, reports of diarrhea fell to 9%. This constituted a highly significant change in diarrhea prevalence ($P\text{-value} < .001$). In Nicaragua, a diarrhea-causing virus that was circulating at the time of the follow-up survey skewed the overall results, causing a higher reported diarrhea incidence among under twos. However, there was almost no reported diarrhea among three year olds, and none in four or five year olds, and the local health facilities had reported virtually no diarrhea cases in the months previous to the survey. Therefore, it is highly likely that the Nicaragua midterm evaluation would have shown a marked reduction in diarrhea had it not been for the confounding virus.

Many of the hygiene behaviors promoted as part of the interventions in both countries showed statistically significant improvements from pre-intervention to midterm. In Peru, there was an increase from 46% to 94% for storing drinking water in a covered container. Safe water handling (correct management and use) also showed an increase from 36% to 84%. Similar movement toward improved hygiene behaviors occurred in Nicaragua; for example, there was an increase from 55% to 85% of families chlorinating their drinking water.

In Peru, handwashing at two critical moments showed statistically significant improvement. Washing after using the latrine increased from 29% to 51%, and before breastfeeding or feeding food to a child increased from 12% to 32%. There was no improvement seen for handwashing before eating, after cleaning a child who

defecated, or before preparing food. (In fact, in both countries during formative research, mothers explained that they normally washed their hands during food preparation, whenever they felt their hands got dirty from some action, so washing before preparing food was not a very useful indicator in these projects.) Evaluators in Peru observed significant gains in the three behaviors related to handwashing technique: use of soap (up from 37% to 92%), use of soap and rubs hands three times (from 22% to 61%), and drying hands safely (from 25% to 77%). The percentage of “ideal handwashers” (soap, rubs hands three times and dries) increased from 12% to 50%.

For latrine behaviors in Peru, significant gains were made for use of a covered wastepaper basket (11% to 43%), use of children’s potties (3% to 10%), and use of toilet paper to clean the youngest child (43% to 70%). Behaviors without notable changes included: last time latrine was cleaned, youngest child’s use of latrine, and use of field or patio to defecate.

Strong indicators of project activities were documented by the follow-up survey. 91% of families reported being visited by a volunteer community hygiene promoter at least once per month. 92% have project materials posted in the home, and 88% had purchased hygiene products in the community store.

In Nicaragua, the percentage of families that treat drinking water increased from 60.4% to 86.8%, specifically with chlorine from 55% to 85%. The percentage of families that stored drinking water in a container with a spigot increased from 35.4% to 55%. The percentage that washed their water container daily increased from 52% to 74.2%.

There were marked improvements in handwashing indicators: mothers/caretakers who washed after cleaning a child who had defecated increased from 31% to 74%; the percentage who washed before preparing and serving food, from 62% to 76%; before feeding children, from 19% to 49%.

The percentage of children who used a potty increased from 14% to 17.4%; the percentage of mothers who cleaned the child with toilet paper after defecation increased from 67% to 82%; and the percentage of children who defecated in a latrine increased from 10% to 60%.

Other important evaluation findings from Nicaragua were:

- Excellent coverage via home visits to negotiate and monitor improved behaviors
- Reminder materials posted as intended in and around almost all homes
- A high level of motivation and activity among the volunteer promoters, despite bad weather and problems in getting the revolving fund for hygiene products up and running
- A transformation of the volunteers from shy, anxious mothers into confident, effective counselors
- Increased community organization

- Widespread appreciation among families of the work of the promoters

The overall impact of the projects on important behaviors was very positive after only one year of implementation. Almost certainly, families' successful behavior change was due to the individualized counseling provided by community hygiene promoters as well as to the project facilitating access to key hygiene products.

1. Introduction

Diarrheal Disease and Children's Health. With approximately 1.3 million children under the age of five dying from diarrheal diseases each year, these diseases constitute a leading cause of child death in the world today – the second most important cause of child deaths in Latin America. This remains the case despite the fact that mortality from diarrhea has decreased substantially over the past two decades due mainly to the widespread use of oral rehydration therapy (ORT) and the increased ability of caretakers to identify danger signs and then to quickly get help for the sick child.

So while deaths caused by diarrhea have declined, the illness burden associated with diarrhea remains four to five episodes of diarrhea per year. Diarrhea adversely affects children's nutritional status, contributing to approximately half of all under-five deaths in less developed countries. Beyond these direct health effects, the millions of cases of child diarrhea have a significant impact on the way mothers spend their time and on household expenses for treatment (medicines, transport and health facility charges), as well as on lost work, wages and productivity by the working members of the household.

The World Health Organization estimates that 90% of all cases of diarrhea can be attributed to three major causes: inadequate sanitation, poor hygiene and unclean water. The excessive prevalence of diarrheal diseases and high child mortality rates, which are directly or indirectly linked to contaminated water and food sources, can only be reduced through larger and more effective investments in preventive and promotional measures to reduce and eliminate the causes of the illnesses.

Prevention of Diarrheal Disease. There are numerous paths by which the agents that cause diarrhea enter a person's body. These include:

- Fluids (through contaminated water)
- Fields (resulting from defecation outdoors)
- Flies (transmit disease)
- Fingers (contaminated fingers transmit disease)
- Food (infected by fluids, flies or fingers and then ingested)

It would be impractical for a health promotion program to address every one of the dozens of conditions and behaviors that affect these five major routes of transmission. Programs must prioritize their efforts by focusing on those positive hygiene practices that have demonstrated the greatest impact. While the specific behaviors most likely to have a health impact in a particular setting may vary, there are certain hygiene practices that have proven to have the greatest potential for preventing diarrhea. They are:

- Preventing contamination of food, water and fingers just before ingestion (with handwashing and by treating water for drinking and cooking)
- Facilitating clean hands, surfaces and containers (through actions to increase the quantity of water available for the family)
- Reducing contamination in the environment (particularly safe disposal of feces)

According to a recent paper from the International Water and Sanitation Centre (Appleton and van Wijk, Page 9), “*Improved water quality reduces childhood diarrhea by 15–20% BUT better hygiene through handwashing and safe food handling reduces it by 35% AND safe disposal of children’s feces leads to a reduction of nearly 40%.*”

Focusing on Behavior. This report describes two successful country experiences in hygiene improvement that focused on behaviors. The methodology followed is Behavior-Centered ProgrammingSM (BCP), a systematic approach for understanding behaviors and their context, developing comprehensive behavior-change strategies, and then converting those strategies into specific program activities that can be monitored, adjusted and evaluated over time. In BCP, planners and community members collaborate to learn about current behaviors as well as local knowledge and resources. Planners use these insights, as well as the scientific evidence of the health impact of various behaviors, to define the most efficacious and feasible behaviors possible in the context; and then lay out a strategy for how to best *promote* and *facilitate* those behaviors. It requires that planners make a series of *strategic decisions* on what the program and its local collaborators should do and how. (*Behavior-Centered ProgrammingSM is a service mark of The Manoff Group, a subcontractor on the USAID-funded Environmental Health Project (EHP II)*)

The EHP/PAHO Hygiene Behavior-Change Project. In 2001, the Pan American Health Organization (PAHO) and EHP II reached an agreement to collaborate on applying and assessing a methodology that could be used throughout the Americas to develop and implement activities to promote key hygiene behaviors for the prevention of childhood diarrhea. The partners agreed on the need for such an activity to stimulate more rapid progress in the preventive part of the Community Integrated Management of Childhood Illness strategy (C-IMCI).

Unusual or innovative aspects of this initiative included the intention not to transfer funds from one partner to another, to encourage joint public/private sector planning and implementation (ministries of health and PVOs), and to explore the possibility of utilizing the same methodology to address other health problems in addition to diarrheal disease.

With substantial technical support from EHP II subcontractor, The Manoff Group (primarily through the lead consultant), the partners initiated behavior-change activities in Peru and Nicaragua. The methodology followed was the same that EHP had applied in C-IMCI behavior-change activities in the Dominican Republic.

This report summarizes the methodology used, activities undertaken, and results measured in each of the two field sites. The principal objectives of the overall activity were to:

- *Reduce diarrheal disease* incidence in children under five by promoting behavior change, with community involvement, in selected communities in Nicaragua and Peru, within the framework of the C-IMCI strategy.
- *Build capacity among local partners*: Through technical assistance and training, transfer the techniques and skills required to use the behavior-change methodology to local teams composed of professionals from the ministry of health and PVOs.
- *Assess* the health and behavioral impact of the behavior-change activities.
- *Document* the entire process to facilitate replication of the experience.
- *Develop tools and communication materials* that other countries in the Americas could adapt and use in their own contexts.

The objective of developing adaptable tools and materials, agreed to by the main partners during project planning, was initially a major strategy to stimulate effective hygiene improvement projects throughout the Americas in a cost-efficient way. However, it eventually faded as an approach, at least in part due to staff turnover. The original concept was to select three project sites (including the initial site in the Dominican Republic) that would represent the main geographical, cultural, and institutional panorama of the Americas, and then to encourage other countries to adapt the best-fitting set of materials, training plans, and strategies used in the pilot projects.

A particular interest of EHP II was for a core group of Dominicans, who had gone through the planning and implementation process in their own country, to become more skilled and then train others in both the Dominican Republic, and potentially, elsewhere. Various members of the Dominican project team participated directly in training and field activities in Nicaragua and Peru.

This project intended to encourage people and families to adopt three hygienic practices that studies have shown to have an impact on diarrheal disease incidence:

- handwashing
- safe excreta disposal
- use of treated/uncontaminated water for drinking and cooking

The first two behaviors are among the 16 family practices of IMCI promoted by the World Health Organization (WHO) and UNICEF as key to preventing childhood illness, and the last behavior was added based on a need identified in the project areas.

The project was conceived to encompass three stages:

A. Preparation and Negotiations. In each country, the first activities focused on establishing the political conditions and marshalling the material and human resources to carry out a project. This involved the negotiation of verbal and written agreements among partners (NGOs, ministries of health, PAHO, USAID) that have been involved in implementation and designating a local project coordinator.

B. Project Implementation. This stage consisted of carrying out the entire process for defining, promoting, and facilitating changes in practices in the communities, while at the same time building the capacity of a multi-partner implementation team to carry out the major activities. Initial steps in the countries (team organization, training the team, and formative research) took place in the second half of 2002; preparation for implementation (materials design and testing, selection and training of community volunteers, setting up revolving funds for hygiene products) took place early in 2003; and actual implementation began in the spring of 2003.

Country implementation also included monitoring and evaluation, with two surveys to determine the incidence of diarrheal diseases and related behaviors, and the preparation of technical reports and methodological guidelines to orient the replication of these experiences in other areas. Repetition of the initial appraisal surveys took place approximately one year after implementation began.

C. Dissemination of Products and Results. This current stage consists of preparing and sharing the materials produced and the results obtained throughout the Hemisphere. PAHO will seek opportunities at regional and sub-regional meetings in which ministries of health participate, using these venues to present the methodology and the communication materials produced.

One major product is the methodological guide, *Improving Health through Behavior Change: A Process Guide on Hygiene Promotion*, published by EHP in English in August 2004 and soon to be published in Spanish by PAHO. This guide is accompanied by a CD (available through PAHO) that contains numerous resource documents as well as all of the materials developed by the Peru and Nicaragua pilot projects. There have also been eight issues of a newsletter on the three country projects (*Intercambio Newsletter*). Selected project documents are included in the references at the end of this report.

Field Activities in Nicaragua and Peru. Under this initiative, activities have been implemented in three communities in Chinandega Department, Nicaragua and in five communities in the northern Cusco health area, Peru. Project activities were conducted in a six-phase process, starting with a participant skills assessment and basic formative research and ending with a follow-up survey and analysis.

1. Forming and integrating the project team in each country, assessing team members' relevant skills

2. Formative research, including behavioral trials; planning and testing a behavior-change strategy and concepts
3. Materials design, pretesting, and finalization, with community participation; preparing and conducting an initial measurement of behaviors and diarrheal disease
4. Training community volunteers, preparing a monitoring plan, and planning the launch of project activities
5. Implementation of hygiene promotion, monitoring community activities, measuring changes through a repeat of the survey
6. Assessing community participation, behavior change, and health impact through a follow-up survey.

The entire six-phase process began approximately two years ago.

The first four phases, conducted in the first six to eight months, required intensive capacity-building of local teams. It concluded with the implementation of the initial survey and launch of country-specific activities. At present, both projects are continuing educational and other activities in communities to promote improved behaviors and have completed midterm assessments, the results of which are reported in detail in this report.

In both Peru and Nicaragua, Plan International is the lead implementing NGO partner; other PVOs participated in a much more limited way, primarily during training. Both projects attempted to make the ministries of health full partners, but the participation of ministry staff was limited by their multiple responsibilities. In both countries, project activities have generated a good deal of interest not only among partners directly involved in the process, but also among other NGOs and organizations. In Nicaragua, various PVOs have begun a broader application of the methodology in other areas of the countries, and with other key maternal and child health behaviors.

The remainder of this final report reviews each implementation phase in the two countries, then the evaluation findings. The report ends with a brief discussion of lessons learned and recommendations.

2. Background on Country Projects

Although diarrheal mortality among children has declined somewhat throughout the Americas, diarrheal disease prevalence among children has remained unacceptably high. This situation has persisted despite considerable investment in hygiene infrastructure. It was felt that effective hygiene promotion was the missing ingredient for achieving a significant reduction in cases of childhood diarrhea. Thus, EHP II and PAHO, along with ministries of health, Plan International, and other local collaborators, agreed to plan and implement hygiene promotion pilot projects in poor communities in Peru and Nicaragua with high diarrheal incidence along with a good level of water and sanitation infrastructure.

The partners shared the common objectives to:

- Implement a participatory behavior-change methodology
- Train a local team to design and manage the methodology
- Achieve positive hygiene behavior changes with the families with children under age five from the selected project communities.

At the onset, technical teams were formed with the partner institutions to carry out four intense phases of project preparation. During these phases, the teams conducted formative research, developed the project strategy, managed the coordination with families and community leaders, created communication materials, and trained a corps of community hygiene promoters.

These projects differ from other hygiene promotion projects in that trained community volunteers analyze each family's current behaviors and negotiate "small changes that make a great difference for child health" during regular home visits. The hygiene promoters do not simply offer information to families, but rather aim to achieve a supportive partnership. Together they identify the family's positive hygiene practices, those that need modification, and the potential barriers that make changes difficult. The projects provide the promoters with various educational materials, including reminder stickers for the home that cue the family to practice appropriate behaviors at the necessary time. Through the establishment of community outlets selling key hygiene products at low cost in Peru and distribution of selected products in Nicaragua, the projects have also worked to overcome the material obstacles that families encounter when they attempt new behaviors.

Although they do not follow a classic community mobilization or PRA approach, these projects are extremely participatory. They have provided several opportunities for community input during project development and implementation. In Peru, there

is also active community participation in the revolving funds that make hygiene products available.

Both projects promote the following essential hygiene practices (or “macro-behaviors”) related to hygiene:

1. Consumption of safe drinking water
2. Handwashing at key moments
3. Latrine use and elimination of human feces

In consultation with communities, the project teams identified the following micro-behaviors (related to the “macro-behaviors”) as essential supporting behaviors:

Table 1. Micro-behaviors in the two projects

Peru	Nicaragua
<i>Consumption of safe water</i>	<i>Consumption of safe water</i>
Storing drinking water in wide-mouthed covered containers with spigot	Store drinking water in clean, covered containers with a faucet, and wash them with soap, a cleaning rag, and chlorine each time the water runs out
Washing drinking water containers with soap or detergent and a soft cloth	Drink chlorinated water (the entire family)
Treating drinking water (chlorinating or boiling)	Wash, with soap, a cleaning rag, and chlorine, the large container with water used for cooking, washing dishes and hands, each time the water runs out.
<i>Handwashing</i>	<i>Handwashing</i>
Use of soap during handwashing	Handwashing after changing diapers, washing a potty, and before serving food.
Rubbing hands together at least three times during handwashing	Drying hands appropriately (with clean towel or air dry)
Drying hands appropriately (with clean towel or air dry)	Handwashing before eating, after using a latrine, and older family members helping children wash their hands
Handwashing after defecation	All families wash hands in a special washing area in the home, with chlorinated water from the large plastic, covered container and soap.
Handwashing after cleaning a child who defecated	<i>Latrine use/ elimination of human excreta</i>
Handwashing before breastfeeding or feeding food to a child	Throwing feces from cloth diapers into the latrine.
Handwashing before eating or serving food	Daily cleaning animal feces in and near the homes.
	All children under 3 use the latrine for defecation and younger children are trained to use a potty and the latrine.
<i>Latrine use/ elimination of human excreta</i>	Clean the potty with soap and water, brush and chlorine and throw the used water down the drain.
Disinfecting latrines by cleaning with chlorine or detergent	Have young children play on a ground covering in a “playpen”
Throwing feces from cloth diapers into the latrine, and soaking in water and chlorine	Keep the latrine hold covered.
Use of plastic potties, and throwing feces	Every week smooth out the feces in the composting

Peru	Nicaragua
from potty into latrine	latrines.
Using toilet paper to clean adults and children after defecating	In other latrines, throw paper used for cleaning in the hole
Disposing of toilet paper in a covered wastepaper basket (for flush latrines), and throwing it inside the pit latrines	In the dry composting latrines throw paper used for cleaning in a trash can that stays covered
	Families have at their disposal either a drainage ditch or drain for grey water
	Always throw in a bowl-full of lime each time they defecate in a composting latrine

3. Project Activities

Selection of Project Communities

In both countries participating communities met the criteria of high diarrhea incidence, infrastructure of latrines and piped water, and active presence of the partner NGO Plan International. The population of children under age five in the two countries was as follows:

Table 2. Project intervention populations

No.	Communities in Peru	No. of children <5 yrs	Communities in Nicaragua	No. of children <5 yrs
1	Patabamba	57	Guanacastillo	76
2	Kallarayan	57	Teresa Díaz	96
3	Ccorao	65	Paz Alí	120
4	San Salvador	77		
5	Taray	42		
Total children <5 years		298		292

In September 2002, the Peruvian Ministry of Health selected five intervention communities in the Sacred Valley region of Cusco for inclusion in the project. All of them communities are rural and poor, but three of them are predominantly Quechua-speaking, and two have a virtually bilingual Quechua/Spanish-speaking population. Ninety-two percent of homes visited during the midterm evaluation had a dirt floor. The distance from Cusco for the five communities ranges from 45 minutes to 2 hours.

Table 3. Variation in characteristics of project communities in Peru

No.	Community	% who speak Quechua better (than Spanish)	% who read fluently (observed)
1	Patabamba	96%	4%
2	Kallarayan	90%	10%
3	Ccorao	27%	54%
4	San Salvador	33%	46%
5	Taray	62%	67%

Characteristics of hygiene infrastructure in Peru. Ninety-two percent of respondents in the midterm survey reported access to piped water, either at home or a public access point, as compared with 72% in the initial assessment. This difference reflects the change in water access in one of the communities (Ccorao). At midterm, 88% of respondents reported that in the past two weeks there had always been water available in their main water collection place.

Fewer families (72% at midterm) had an improved sanitation facility, such as a pit or flush latrine. In the initial appraisal, only families with children who used the latrine were asked the questions pertaining to their latrine; therefore it is not possible to deduce the overall number of functioning latrines when the intervention started. However, no latrine infrastructure projects were undertaken in the intervention communities between the initial and midterm surveys. Ten percent of families with latrines indicate that their latrine was not functioning at midterm. The individual communities' hygiene infrastructure varies considerably, as shown in Table 4.

Table 4. Hygiene infrastructure of project communities

	Community	Initial Appraisal, 2003		Midterm Survey, 2004	
		% of families with latrines	% of families with piped water	% of families with latrines	% of families with piped water
1	Ccorao	--	9%	50%	100%
2	Kallarayan	--	80%	95%	65%
3	Patabamba	--	89%	44%	96%
4	San Salvador	--	95%	83%	96%
5	Taray	--	93%	95%	100%
	TOTAL	--	72%	72%	92%

Formation and Training of the Project Teams

In Peru, eight NGOs with health programs were invited to participate in the multi-disciplinary technical team. The final team was composed of staff members from the MOH (Northern Cusco Health Network), Plan International, World Vision and CADEP J.M.A. (Center for Andean Development, Education and Promotion José María Arguedas). The variety of professions represented by the team members added a valuable blend of experience and expertise. There were several nurses, a communication specialist, doctor, psychologist, nutritionist, and an expert in hygiene and sanitation. The experience among the team members ranged from one year to 25 years. Half of the team was bilingual (Quechua and Spanish), which facilitated fieldwork.

The table below shows the composition and affiliation of the project teams in both countries.

Table 5. Project technical teams

Organization/ institution and number of participants: Peru	Organization/ institution and number of participants: Nicaragua
Ministry of Health 3	Ministry of Health 2
Plan International 4	Plan International 2
CADEP J.M.A 2	NicaSalud PVO Network 1
World Vision 2	ANASAM 1
ADRA 2 (for a short time only)	ADP 1
	ACH 1

In both countries, the lead consultant provided intensive training in the skills of hygiene behavior change to each project team. Training consisted of four two-week phases, including one Saturday, for a total of 44 days. Between phases, the teams carried out the tasks in which they had just been trained. The training was planned on the basis of the experience in the earlier project in Hato Mayor, Dominican Republic. For some of the training events, the lead consultant was joined by trainers from the Dominican Republic who were key participants in the DR/Hato Mayor experience.

Training began with the project objectives and methodology. There was a review and discussion of known information on diarrheal disease and hygiene practices in the project area. Training included qualitative and quantitative research methods, and preparation and testing of question guides for in-depth interviews, focus group discussions, and home observations; how to conduct field research; non-verbal communication; and the use of counseling cards and other tools. Each trainee had two practice counseling sessions, followed by self- and group-critiques. Each country group developed a protocol for formative research, a field manual, and multiple

question/observation guides. The technical teams received some 400 hours of training.

The training approach consciously tried to eliminate such traditional activities as inaugurations and closing ceremonies, ice breakers, hugs and games, long explanations, in favor of maximum hands-on active participation in creating instruments, conducting research, doing analysis, visiting homes and observing, working with the artist, handling data bases, etc. This participatory methodology made it essential to limit the number of participants. The long hours were difficult for some participants, and some trainees had problems being available for all of the necessary hours and days.

Formative Research

Definition of the problem and feasible improved behaviors. The projects' initial steps involved an intense period of participatory research in the intervention communities in order to understand current practices, reasons for them, and barriers, motivations, and strategies for moving families from current to ideal hygiene behaviors. The technical teams conducted focus groups with mothers, fathers, and children, as well as key informant interviews with community leaders, school teachers, and others. The information collected was analyzed by the team to understand families' practices and perceptions related to handwashing, safe excreta disposal and treated drinking water, including barriers to and motivations for improved practices. The research allowed the team to define feasible hygiene behaviors that would have an important impact on diarrheal disease.

In the first phase of research in Nicaragua, there were 21 focus group discussion, 34 household observations, and 48 in-depth interviews. The research uncovered substantial barriers to the desired behaviors, including: bugs in latrines; latrines filling up; poor perceived quality of water from wells; long distances from homes to water sources; a correct perception that underground water was contaminated because of a very high water table; fear that one community's water was contaminated from a nearby cemetery; unreliable quantity and quality of chlorine available, ineffective water filters in use; and concern over disposal of dirty water from community clothes-washing area.

TIPs (Trials of Improved Practices). An important component of formative research involved the Trials of Improved Practices (TIPs), a methodology in which community members are invited to try out improved health behaviors, specifically relevant to their situation, that are under consideration as part of a project strategy. Willing families (75 in Peru, 78 in Nicaragua) had initial assessment interviews, discussed and agreed on a small number of specific new behaviors to try, and then received orientation and essential supplies (such as chlorine) to attempt these during the trial period of several weeks. Team members made a few visits to the families to motivate and monitor the attempted behaviors. In final interviews, families provided input to the team on which behaviors were feasible, acceptable and most apt to be

successfully promoted by the project. The most important and feasible of these behaviors became part of the developing project strategy.

In general during the trials, families were able to carry out most of the new behaviors they attempted (an average of 76% success in Nicaragua), although the results varied substantially by behavior and somewhat by community. Examples of difficult behaviors in Peru were washing hands with soap when in the fields and keeping animals outside the home (for fear of their being robbed). Major barriers in Nicaragua to carrying out the behaviors were serious problems with many existing latrines (water, bugs, worms, etc.) and the difficulty of obtaining necessary hygiene products (such as water containers and toilet paper).

Using the results of the TIPs, each project team agreed on its final list of feasible, improved behaviors that it would promote. These are listed above in Table 1.

Concept testing and strategy testing with communities. A final step in the project design and development involved a community dialogue (with leaders and the community in general) to understand the motivations and priorities of families relative to the health and hygiene of young children. In strategy testing, community leaders and assemblies were asked about the feasibility of a cadre of hygiene promoters conducting counseling sessions and about the ideal characteristics of hygiene promoters.

Behavior-change strategy formulation. On the basis of all of this community input, the project teams then formulated the strategy and key activities for promoting improved hygiene behaviors. Major activities were similar in the two projects, consisting of: training and supporting a cadre of community volunteer counselors who would primarily carry out regular home visits with families; developing an array of materials to support actions of both families and volunteers, as well as forms and procedures for monitoring, supervision, and support; and establishing and managing community hygiene stores to sell essential hygiene products, funded through revolving funds. For each behavior to be promoted, the strategy analyzed external barriers, internal resistances, and motivations; and then laid out what actions within four categories that would move families from their current to improved behaviors: communications, training, community mobilization, and development/promotion of products or technologies.

Once again the project teams' concepts were brought back to the communities for their input via individual and group interviews. In Nicaragua, some of the key tactical decisions on project strategy were:

Hygiene Products Strategy

Water:

- The project would sell water storage containers (covered and with spigots) of 5 and 20 gallons for household water use.

- The project would provide opaque bottles in which families could store chlorine and droppers to facilitate putting the correct amount of chlorine in water.
- Through community stores, the project would facilitate replacing faucets and parts for the water containers.
- Supported by printed instructions, the promoters would explain to each family how to construct a pit latrine and how to replace the faucets on water containers.

Handwashing:

- The project would recommend construction of a special handwashing place inside homes.
- Families would be asked to set aside a special clean cloth for drying hands.

Latrines:

- The project would buy lime for each community.
- Latrines with a serious worm problem were rebuilt.
- People would cover their waste paper container using materials existing in the community.

Community Mobilization Strategy

- Each community would select volunteer collaborators who would be closely tied with existing community structures.
- The project would help establish a revolving fund in each community to buy health and hygiene products at low cost, with each family paying a few dollars per month over time.
- Each community would form a committee to administer and oversee the revolving fund.

Communication Strategy

The strategy focused on interpersonal counseling and print materials to remind and support promoters and families.

Creation of Materials

Sketching sessions in communities. After modifying the project strategy based on the strategy testing, the project team determined the types of behavior-change communication materials needed. Local artists were contracted to conduct drafting sessions with community volunteers to guide their sketching. The sessions allowed the local artists to see the homes and dress of the communities and to dialogue with families about the images that were most attractive and understandable. The sketches became the basis for the semi-final art for the counseling cards, posters and reminder materials.

Pretesting of materials. The materials in their semi-final form underwent extensive pretesting in the communities for attractiveness, understanding, acceptance, and identification with the audience. A quantitative methodology was used and results tabulated by computer. Further adjustments were made to the text and visuals in order to produce the final versions.

Audio materials. In Peru, a series of four dramas in Quechua and Spanish were also pretested during February (see Table 6). Suggestions regarding word choice in both languages contributed to the improvement of the audio dramas and their effectiveness.

Table 6. Content of dramas in Peru

	Topic	Content
1	Handwashing	A husband considers himself too tough to care about handwashing until he himself gets very sick and wants to protect his little children from diarrhea.
2	Use of latrine	Humorous story of a man who doesn't have a latrine and who ends up in a "sticky" situation ... which motivates him to begin constructing his own latrine.
3	Safe water	Conversation about a child who became very sick and lost weight after drinking untreated water, and the commitment to change the risks for children
4	Hygiene promoter	Little girl in community accidentally overturns the hygiene promoter's bag of materials and then asks her to explain how she uses each material for her work.

Materials produced by the projects. The following print materials were produced in Peru:

- 3 diagnosis cards to help volunteer hygiene promoters assess families' current behaviors relevant to water, feces, and handwashing
- 7 counseling cards to facilitate negotiation of improved practices in these areas
- 1 large general reminder poster
- 3 smaller reminders
- 3 medium promotional posters
- 1 counseling guide for promoters
- 1 photo identification card for promoters
- 5 forms for follow-up and visits for promoters
- 1 leaflet for promoting the hygiene stores

Each hygiene promoter also received a bag for carrying project materials, a portable cassette player, a hat and jacket with the project logo, a hygiene kit for demonstrating target behaviors, and a full set of the project materials such as a cassette with recorded dramas, counseling cards and posters.

The Nicaragua materials included:

- 3 diagnosis cards to assess families' current behaviors relevant to water, feces, and handwashing
- 8 counseling cards to facilitate negotiation of improved practices in these areas
- 3 posters to support infrastructure improvements: how to repair faucets on the water containers, how to make a special handwashing area, and how to make a drain for water.
- 6 reminder materials (posters): a general one on all key practices, one for the handwashing area, 1 for the latrine door, 1 for the 20 gallon water container, one for the 5-gallon water container, and 1 for the composting latrine.
- Stickers to reinforce behaviors: for the latrine, the drinking water container, to indicate a "protected house," certificate of a "safe house"
- Manual for promoters on hygiene promotion
- Identification badges for promoters
- 3 registers to follow up on families agreements to try new behaviors
- An informational brochure for community leaders
- Instructions using the community hygiene store
- 6 dramas written (and recorded) by script writers on the basis of concepts, situations and characters suggested by extensive previous discussions with audience members.

Field Activities by Health Promoters

Selection of hygiene promoters. To provide hygiene behavior counseling to approximately 300 families with children under five years in Peru, 30 volunteer hygiene promoters were recruited from the five intervention communities, according to the ideal characteristics defined by the communities in focus group discussions. Mothers mentioned the following key criteria for hygiene promoters:

- *Gender*: female preferred, but a trusted and respected male could be chosen
- *Age*: 25-40 years old
- *Experience*: preferably a mother herself
- *Credible hygiene behaviors*: a person whose own family and home reflect good hygiene
- *Approachable*: easy to speak with, someone you want to invite into your home
- *Interested*: a person with the time and interest in being a health promoter
- *Support*: a person whose husband and family support their role as promoter

Community assemblies in the five communities discussed and elected their candidates. A similar process was followed in Nicaragua.

Other preparatory steps. These included planning the training of promoters, meeting with community leaders and water committees to discuss the revolving funds, and drafting the instruments for the initial appraisal.

Training event for community promoters. In April of 2003 in Peru, the 27 promoter candidates participated in a three-day training in the nearby town of Calca. Three MOH staff from the health posts covering the intervention communities attended a separate training event that focused on their role as supporters and supervisors of community-level activities. The training sessions for both the hygiene promoters and the MOH staff covered a broad range of subjects, including the scientific basis for the project interventions, as well as the programmatic steps to support behavior change at the household level.

Thirty-three promoters were trained for four days in Chinandega, Nicaragua, principally on use of the communication materials, interpersonal communication and counseling.

Significant effort went into detailed planning of promoter training. A training plan was prepared, discussed, and once each country team reached consensus on it, broken down into plans for individual sessions. Part of the plan was to have a video that showed good management of a counseling session in each of five major steps, as well as an example of a negative management. In both countries, the team members acted, filmed and edited the video using outside persons as “actors.” Other team members wrote different sections of a trainees’ manual that was used during the training in a draft form and later finalized and printed for promoters to use as a work reference. Both trainers and trainees worked extremely hard, but as shown by their impressive testimonies at the closing ceremony, felt extremely positive about the experience. Promoters received a certificate in a public ceremony to give them more credibility. The Nicaragua project also borrowed a strategy from the Dominican Republic project to include photos of all of the promoters on the cover of their manuals.

Pre-intervention Appraisal

The Nicaragua team carried out a pre-intervention appraisal survey of 145 interviews in three days. The Peru team used a similar instrument but modified it due to the different behaviors promoted in Peru. In April 2003, the Peru team conducted the appraisal survey with 109 households with children under the five.

Project Launch

During July 2003, each of the five intervention communities in Peru organized an official project launch ceremony with the support and participation of Plan International and the MOH. Community leaders, mothers of young children, schoolchildren, teachers, and invited guests took part in contests and a variety of other activities.

Activities at launch ceremonies included:

- Parades of schoolchildren with placards about diarrhea
- Drawing contest with water contamination as central topic

- Songs about why handwashing is necessary for everyone
- Skits about importance of drinking treated water
- Handwashing contest to evaluate technique
- Hair washing contest to evaluate speed
- Baby bathing contest to evaluate technique
- Cooking contest with hygiene as an essential criterion

At the launch ceremonies, project staff also took the opportunity to publicly present each promoter with a hygiene promoter kit and a diploma for graduating from the training course. The kit of materials included: (1) counseling cards on handwashing, safe water, and latrine/ excreta disposal; (2) a tape of the audio skits in Quechua and Spanish, and a tape player to play them during home visits; (3) a project hat and jacket; and (4) a set of the four small and four large graphic reminders of desirable hygiene behaviors.

The Nicaragua launch ceremonies in April 2003 were similar. Each community made its own plans to celebrate with recreational and cultural activities, recognize the hygiene promoters, and launch the activities. Many government and PVO officials attended the launch ceremonies.

Behavior-change Counseling

Census of families. In both countries, each hygiene promoter assumed responsibility for 7–10 families with children under five living near the health promoter’s home. In an initial visit to each family, the promoter recorded the family members’ names and ages, along with an evaluation of the home’s hygiene infrastructure.

Diagnostic survey. Next, promoters used the diagnostic cards to prompt a conversation about the family’s current hygiene behaviors related to water, handwashing and latrine use. Photocopies of the three diagnostic cards allowed the promoters to circle responses and take notes, therefore documenting a pre-intervention hygiene profile of each family.

Counseling and follow-up. According to which essential hygiene practice the family was interested in changing first, the health promoter used the counseling cards that detailed the relevant micro-behaviors. Each new behavior is negotiated, rather than imposed, depending on the family’s motivation and resources. The health promoter praises the family’s interest and intent to make hygiene behavior changes and tries to achieve at least one solid and specific commitment to change. Subsequent visits review the family’s progress and move to the next topics and counseling cards. At each visit, the health promoter notes what behaviors have been successfully adopted. The project’s definition of adoption is practicing the behavior consistently for three consecutive months.

Management and Monitoring of Implementation

In Nicaragua, each community's promoters meet two to four times per month to study their manual and divide up work tasks. The Plan International project manager frequently accompanies the promoters in their home visits, particularly if there has been a change in promoters. The promoters are reported over time to have made excellent gains in confidence and ability to assess and counsel effectively. The Plan manager and the local EHP coordinator meet monthly to review progress and problems. Every two to four months, all of the project partner organizations meet to review the projects and coordinate activities.

Each of the communities in Peru formed an independent hygiene promoter committee with elected officers and an official minutes book to document agreements and plans. The committees meet monthly to monitor the progress of their counseling visits and resolve problems. During these meetings, the promoters review their follow-up instruments for each family and hygiene supplies for the community store. The three communities that have a health post meet inside the post, and usually health staff participate. The two communities far from a health post hold their meetings with support from project staff, Plan International, and health staff whenever possible. Project staff members have attended virtually all meetings scheduled by the various committees and used the opportunity to monitor and motivate the health promoters' work. Project staff have accompanied the promoters on counseling sessions, visited families randomly, and made periodic bookkeeping checks of the revolving fund purchases.

Hygiene Funds

The revolving funds/"hygiene stores" in Peru developed more quickly and have run fairly smoothly. In contrast, despite apparent enthusiasm among community members and leaders in Nicaragua, the modest start-up funds for the revolving funds have not been forthcoming from any of the partner organizations. Thus, the following information refers only to Peru.

Agreements and functioning. Formative research at the onset of the project identified significant material barriers to the adoption of key hygiene behaviors. In many cases, essential hygiene supplies were simply not present in the intervention communities, either because they were not sold in the community or they were too expensive for most families. In response to these challenges, the project strategy was to establish a revolving hygiene fund for each community to reduce both access and availability barriers. Supplies are purchased economically in bulk quantities and are offered to families at or near cost (slightly above or below). The exception is the covered water tank with a spigot, an expensive product deemed an "essential" by the hygiene promoters, which is offered at a 50% discount to families with young

children. The list of essential hygiene supplies that families and hygiene promoters selected for the community hygiene store includes:

- Children's plastic potties
- Drinking water containers (with cover and spigot)
- Chlorine droppers
- Chlorine
- Hand soap
- Detergent
- Hand towels
- Plastic pitchers(for handwashing in homes without piped water)
- Wastepaper baskets (with swinging cover)
- Toilet paper
- Broom/ dust pan
- Measuring cup for chlorine

Training and mechanics. To learn skills for managing the hygiene fund, the treasurer of each health promoter committee attended a bookkeeping workshop sponsored by Plan International. Promoters learned important skills about basic banking operations and purchasing, as well as bookkeeping. Under the supervision of Plan International, the funds are held in a community account accessible by the treasurer and president of each hygiene promoter committee.

Promotion activities. Within the community, each health promoter took responsibility for publicizing the availability of the low-cost hygiene products to the families he or she visits regularly. Promoters also present the products at community assemblies, the health post, and during health fairs.

Sales and results. The community stores have helped generate interest in the hygiene behaviors promoted by the project, and sales are good. The fund has already "revolved" several times, as batches of products are sold and the money is reinvested in the next batch. Eighty-eight percent of families interviewed during the midterm survey reported making at least one purchase at their community store, indicating that a high percentage of families know about the store's existence and are motivated to make purchases.

4. Results

Qualitative Evaluation

In March 2004, the Peru project carried out a participatory evaluation during which representatives from NGOs and the MOH conducted field visits and gave feedback on project implementation. The objectives were to:

- Identify strengths and weakness related to the field implementation of the project
- Investigate families' experience with behavior-change counseling and their interest in continuing to receive visits by the hygiene promoter
- Share the field experience of the behavior-change methodology with decision-makers within the partner organizations, as well as external PVOs
- Define the changes needed to strengthen community activities

Evaluation team. Project partners as well as external organizations solicited a broad range of perspectives on the project's strengths and weaknesses. Each evaluation team was composed of external evaluators accompanied by members of the project technical team. The evaluation team included representatives from:

The Peruvian Ministry of Health:

- The Division of Health Promotion (Dirección de Promoción de la Salud, Lima)
- The Health Directorate of Cusco (Dirección Regional de Salud-DISA)
- The Health Network of Northern Cusco (Red Cusco Norte)
- Micro-network Pisac (Micro-Red Pisac)
- Micro-Network Wanchaq (Micro-Red Wanchaq)
- San Salvador Health Post (Puesto de Salud de San Salvador)
- Ccorao Health Post (Puesto de Salud de Ccorao)
- Taray Health Post (Puesto de Salud de Taray)

NGOs:

- Plan International (Cusco)
- Sanbasur (Water and sanitation program for southern Peru)
- UNICEF (Cusco)

Evaluation activities. The Peru evaluation involved the collection of three types of information:

- 1 Mothers' interviews and observations in homes (15): Home visits consisted of an interview with a mother of a child under five and observations to determine

whether the family received frequent home visits and had posted the project's behavioral reminders around the home. (Since this was an implementation evaluation, the observations did not attempt to verify behavior changes, but rather to establish whether the project activities have been properly implemented with the family).

- 2 *Interviews with hygiene promoters (9)*: Promoter interviews involved open-ended questions about their work (counseling visits, management of the hygiene products, satisfaction with his/her role as hygiene promoter, and the support of the partner institutions).
- 3 *Interviews with staff at MOH health posts (3)*: The interview consisted of questions about the health post's role in supporting the hygiene promoters' community activities and opportunities to improve coordination between the promoters and the MOH.

Indicators Measured During Qualitative Evaluation.

Table 7. Qualitative evaluation indicators (implementation indicators)

<p>Family</p> <ol style="list-style-type: none">1. Received counseling visits from the hygiene promoter, who employed the project's audio and visual materials2. Has behavioral reminders in the home (large and small stickers and posters that remind the family to practice the hygiene behavior at key moments)3. Has attempted behavior changes related to one or more of the macro-behaviors promoted by the project (handwashing, latrine use/elimination of human excreta, consumption of safe water)4. Is aware of the hygiene store and has made at least one purchase5. Shows interest in receiving further visits by the hygiene promoter and the will to attempt new hygiene behaviors <p>Hygiene promoter</p> <ol style="list-style-type: none">6. Has sufficient knowledge and skills to carry out activities as hygiene promoter (training workshop and support meetings have been adequate)7. Demonstrates good handling of project teaching materials such as counseling cards, reminders and radio dramas8. Receives technical and moral support during monthly meetings from partners (Project, Plan International, MOH)9. Shows interest in continuing counseling visits and other responsibilities as hygiene promoter <p>Health staff</p> <ol style="list-style-type: none">10. Participate in monthly meetings of the Hygiene Promoter Committee11. Feel that the work of the hygiene promoters is a help for following cases of Acute Diarrhea Disease12. Provide follow-up for hygiene promoters' activities
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Presentation of results and recommendations. Upon returning to Cusco after the community visits, each evaluation team met to summarize their experiences. The evaluation team members not previously involved in the project were chosen to present observations from the field visits and to make recommendations for improvement. The MOH and Plan International pledged to carry out specific steps to support changes at the field level. Key findings presented by the qualitative evaluation team included:

Successes:

- Families have a good level of *knowledge* about: key project messages, the importance of the hygiene behaviors, consequences of diarrhea, and benefits of the behaviors.
- Families, promoters and health staff show *interest and motivation* for their activities to promote hygiene.
- Health promoters effectively manage the *monitoring* instrument to see their families' progress.
- Through the hygiene fund, most families have acquired *hygiene supplies* to carry out the new behaviors.
- Most families had made *behavior changes*.

Difficulties:

- *Cultural practices and poverty* are obstacles to new hygiene behaviors.
- Some families still do not have basic hygiene infrastructure (*latrines*).
- Water treatment behavior may promote *unsafe levels of chlorine*.
- Families share living area with animals and have not accepted proposals to cordon off areas or maintain *animal feces* away from the home.
- Some families have not been exposed to *radio dramas or visual materials*.

Recommendations:

- Provide *technical help* to assure that water treatment behaviors meet MOH standards.
- Provide *ongoing training* to hygiene promoters and health post staff.
- Involve more *family members* in the counseling sessions (instead of current focus on the mother of the young child).
- *Integrate hygiene promoter training* and events with that of MOH health promoters.
- Establish the firm commitment from Plan International and MOH health staff to provide ongoing support and supervision for hygiene promoters.

Quantitative Evaluation

The objectives of the quantitative evaluations in both countries were to:

1. Obtain measures of the behaviors identified as programmatic priorities during the formative research
2. Contrast pre-intervention and midterm indicators which the project has attempted to modify
3. Obtain information to guide adjustments and improvements in project activities
4. Provide feedback to community hygiene promoters and partner organizations (MOH, Plan, PAHO, EHP) about level of success of behavior-change counseling

Evaluation team. The pre-intervention appraisal survey in Peru was conducted by seven members of the Cusco technical team who had participated in all previous phases of the project implementation. To assure the greatest objectivity for the midterm survey, six external interviewers were hired to conduct the field interviews. All evaluators were experienced bilingual professionals who received a one-day training workshop in the management of the questionnaire.

Evaluation activities. In both countries the study universe was comprised of mothers and other primary caregivers of children under five who live in the intervention communities. For the midterm survey, only families with a child over three months of age were selected, as the families of younger infants did not have sufficient time since

the child's birth to take part in the project activities. Families interviewed in the pre-intervention survey whose child turned five before the midterm were not included in the midterm survey, as the age limit was set at 60 months of age.

The same questionnaire was used for the pre-intervention and midterm surveys, with some omission of questions that were not useful to analyze the project interventions. A few questions were modified to make them more understandable. (The possible ramifications of those adaptations are noted in the discussion of the results.)

Questionnaire topics in Peru were:

- Socio-demographic data
- Hygiene infrastructure and observation of infrastructure
- Water-related behaviors (observed)
- Handwashing behaviors (demonstration of technique observed)
- Latrine use and elimination of waste behaviors (latrine observed)
- Health: diarrhea and treatment
- Contact with the hygiene promoter and use of project didactic materials (midterm only)
- Hygiene store/hygiene fund (midterm only)

The number of respondents surveyed in the two countries were:

Peru	Nicaragua
Pre-intervention appraisal sample in April 2003: 108	Initial appraisal sample in Jan./Feb. 2003: 145
Midterm sample in April 2004: 114	Midterm sample in April 2004: 144

The next two sections summarize the findings for Peru and for Nicaragua respectively.

Evaluation Findings: Peru.

Table 8. Indicators with comparison of initial appraisal and midterm

No.	Behavior change indicator	Initial Appraisal, April 2003	Midterm Survey, April 2004	P-value for difference in percentages
SAFE WATER BEHAVIORS				
1	% of households that store drinking water in covered containers (observation)	46%	94%	<.001 *
2	% of households that use a safe method for transferring water from container (observation)	36%	84%	<.001 *
3	% of households that report treating drinking water	34%	98%	<.001 *
4	% of households that report chlorinating drinking water	10%	74%	<.001 *
5	% of households that treat drinking water and store water in covered container (report and observation)	11%	89%	<.001 *
6	% of household that treat drinking water, store in covered container and have access at home to an improved water system at home (report and observation)	9%	82%	<.001 *
HANDWASHING BEHAVIORS				
7	% of mothers who report washing hands before eating	57%	47%	.134
8	% of mothers who report washing hands after using the latrine	29%	51%	<.001 *
9	% of mothers who report washing hands after cleaning child who defecated	16%	14%	.721
10	% of mothers who report washing hands before breastfeeding or feeding food to a child	12%	32%	<.001
11	% of mothers who report washing hands before preparing food	48%	33%	.024 *
12	% of mothers who use soap to wash hands (by observation)	37%	92%	<.001
13	% of mothers who wash hands with soap and rub hands at least three times (by observation)	22%	61%	<.001 *
14	% of mothers who dry hands on a cloth or air dry (by observation)	25%	77%	<.001 *
15	% of mothers who wash with soap, rubbing at least three times and dry hands on a cloth or air dry (by observation)	12%	50%	<.001 *
LATRINE USE/ ELIMINATION OF HOUSEHOLD EXCRETA				
16	% of families with a covered wastepaper basket in their flush latrine (observation)	11%	43%	.016 *
17	% of families that report cleaning their latrine in the last week	57%	61%	.456
18	% of families that report youngest child	3%	10%	.054 *

No.	Behavior change indicator	Initial Appraisal, April 2003	Midterm Survey, April 2004	P-value for difference in percentages
	used a potty			
19	% of families that report youngest child used the latrine	36%	38%	.773
20	% of families that report youngest child defecated in fields or yard	30%	21%	.147
21	% of families that report using toilet paper to clean their youngest child who defecated	43%	70%	<.001 *
22	% of all children under 5 who had diarrhea in past two weeks (by report)	22%	9%	.001 *
PROMOTERS' VISITS/ HYGIENE FUND BEHAVIORS				
23	% of families who report being visited by the hygiene promoter at least once per month	----	91%	----
24	% of families who have a project poster or reminder observed in the home	----	92%	----
25	% of families who report making at least one purchase in the community hygiene store	----	88%	----

* Denotes statistically significant difference between data collected in initial behavioral appraisal (2003) and after one year of project intervention (2004).

Safe Water Behaviors. Drinking water storage (Indicator 1). Interviewers observed the presence and type of a container used to store drinking water. A large, statistically significant rise in families with a covered container was observed from initial appraisal (46%) to midterm (94%). The increase was probably influenced by the fact that the project staff considered covered drinking water containers a key priority, so the hygiene fund subsidized them to give a 50% discount to families. The hygiene promoter worked with families who still chose not to purchase the container to find an appropriate cover for their current container and stressed the importance of using it consistently.

Table 9. Drinking water storage

Have cover for drinking water container	Initial appraisal, N= 76, *without 32 missing responses		Midterm, N= 109 *without 5 missing responses		P-value for difference in percentages
Yes	35	46%	102	94%	<.001
No	41	54%	7	6%	

Method to draw water from the container (Indicator 2). The promotion of the drinking water containers also increased the number of families with an ideal method to pour drinking water, as the container sold has a spigot for pouring water. In the initial appraisal, only 36% of interviewees had an acceptable way of taking drinking water from its container, as compared with 84% by the midterm. The significant improvement for this behavior can be credited to both product promotion and to hygiene promoters' education with families. This behavior requires a change in the practices in the home, but it was facilitated by the subsidized price of the container.

Table 10. Whether family used adequate method to draw water

Adequate method	Initial appraisal, N= 108		Midterm, N=114		P-value for difference in percentages
	Count	Percentage	Count	Percentage	
Yes	39	36%	96	84%	<.001
No	69	64%	18	16%	

Treatment of drinking water (Indicator 3). In the initial appraisal, only 34% of families reported treating their drinking water by any method. In the midterm, this percentage showed a statistically significant increase to 98%. Even if this result reflects some people reporting to please interviewers, it indicates an impressive jump in awareness of the importance of treating drinking water. In the pre-intervention survey, it was acceptable for two-thirds of the families with young children to report drinking water without any treatment at all.

Table 11. Whether family treats drinking water with any method

Treatment of drinking water	Initial appraisal, N= 94		Midterm, N= 114		P-value for difference in percentages
	Count	Percentage	Count	Percentage	
Yes	32	34%	112	98%	<.001
No	62	66%	2	2%	

Chlorination of drinking water was a key behavior emphasized by the project, as it was considered to be less expensive and time-consuming than boiling. Only four families (10% of total who answered the question) reported chlorinating their drinking water at initial measurement, as compared to 74% at the midterm (P-value <.001). The percentage of families who practice ideal water behaviors, by treating drinking water and covering the container, increased significantly from 11% initially to 89% (*Indicator 5*).

Table 12. Whether family chlorinates drinking water

Chlorinate	Initial appraisal, N= 39 (*N= without 69 missing responses)		Midterm, N=112 (*without 2 missing responses)		P-value for difference in percentages
	Count	Percentage	Count	Percentage	
Yes	4	10%	83	74%	<.001
No	35	90%	29	26%	

Handwashing Behaviors. *Critical moments (Indicators 7–11).* In the initial appraisal, primary caregivers were asked to remember the times when they washed their hands the day before. They were later asked the same question in case they forgot to report anything in the previous question. The midterm questionnaire asked respondents to remember when they used soap that day or the day before, and did not repeat the question to probe for forgotten responses. Both pre-intervention and

midterm questions permitted multiple responses, but these were limited to those pre-defined critical handwashing moments mentioned by the respondent. Two of the critical times failed to demonstrate a significant change (before eating and after cleaning a child who had defecated). At one of the critical times (before food preparation), handwashing appeared to decrease. However, two important responses (after visiting the latrine and before breastfeeding or serving food to a child) showed statistically significant increases.

The interviewers from both surveys noted the difficulty in receiving a sufficient number of responses for this question, as interviewees were reluctant to take the time to think about and mention each and every time they washed their hands. Few surveys mentioned more than two or three responses, as if respondents were satisfied to mention a few and didn't take the time to go further. This question can be most effectively interpreted as indicating the priority handwashing times for families, rather than as an indicator of total handwashing practices.

Table 13. Reported handwashing behaviors at critical moments

Critical moments	Initial appraisal, N=108		Midterm, N=114		P-value for difference in percentages
	N	%	N	%	
Before eating	61	57%	54	47%	.134
After visiting the latrine	31	29%	58	51%	<.001
After cleaning child who defecated	17	16%	16	14%	.721
Before breastfeeding or serving food to child	13	12%	36	32%	<.001
Before food preparation	52	48%	38	33%	.024

Handwashing technique (Indicators 12-15). Survey respondents were asked to demonstrate how they wash their hands, and interviewers noted the materials and technique used. All three key indicators showed a statistically significant increase. Use of soap showed the most impressive increase from 37% to 92%. Respondents who both used soap and rubbed hands together at least three times, increased from 22% to 61%. Those who dried their hands safely (avoiding the common behavior of drying hands on clothing), also increased significantly from 25% to 77%. Overall, the percentage of “ideal” handwashers (those who use soap, rub three times and dry hands correctly) showed an impressive gain from only 12% to 50% at the midterm (Indicator 15). The promotion of soap and towels sold through the community store supported family’s motivation to change their handwashing technique. Also, health promoters taught families that any soap is effective for handwashing; therefore they were more likely to wash hands with any soap in the home, including laundry detergent.

Table 14. Handwashing technique

	Initial appraisal, N= 108(*N= , without missing responses)		Midterm, N= 114 (*N= , without missing responses)		P-value for difference in percentages
	N	%	N	%	
Any type of soap	40	37%	105	92%	<.001
Soap and rub three times	24	22%	70	61%	<.001
Dry on cloth or air dry	27	25%	88	77%	<.001

**In the initial appraisal, observations of handwashing in Patabamba showed that soap was used only 11%. At midterm, all communities had over 90% use of any type of soap.*

Latrine Use/Elimination of Household Excreta. *Covered trash receptacle (Indicator 16).* Interviewers observed the presence of covered wastepaper baskets in the flush latrines. Due to skipped questions in the initial survey, 20 responses from families with flush toilets were omitted. In 18 initial latrine observations, only two had covered wastepaper baskets (11%). The midterm survey showed a significant increase to 43% of flush latrines with the covered trash baskets. The community hygiene store promoted the sale of plastic wastepaper baskets with a swinging covered lid, as well as improvised lids for the existing wastepaper baskets.

Table 15. Use of covered wastepaper baskets for flush latrines

Covered wastepaper basket	Initial appraisal, N=18 (*N=without 20 missing responses)		Midterm, N=42		P-value for difference in percentages
	N	%	N	%	
Yes	2	11%	18	43%	.016
No	16	89%	24	57%	

Hygiene habits of youngest child (Indicators 18–20). Interviewees were asked where their youngest child under five defecated the last time. Although the numbers are small, there was a statistically significant increase in the percentage of children using potties (from 3% to 10%). No statistically detectable change was found for latrine use by children under five, or children who last defecated in open fields or the yard (despite a downward trend for that undesirable behavior). Since the age of children who took part in the study varied between the two surveys, it is not possible to draw a conclusion from this data.

Table 16. Place where youngest child defecated the last time and use of toilet paper

	Initial appraisal, N=96 (*N= without 12 missing responses)		Midterm, N=112 (*N= , without 2 missing responses)		P-value for difference in percentages
	N	%	N	%	
Potty	4	3%	11	10%	.054
Latrine	35	36%	42	38%	.773
Fields or yard	29	30%	24	21%	.147
Used toilet paper to clean child	46 (N=84, w/o 24 missing)	43%	80 (N=114)	70%	<.001

Diarrhea prevalence (Indicator 22). Respondents were asked whether any of the children under five living in their household had diarrhea in the past two weeks. The initial appraisal question referred to the youngest child by name in a question about diarrhea prevalence, followed by a second question that inquired about other children under five. The midterm asked one question about all children under five and categorized the positive responses by ages. This change in the question makes it difficult to compare diarrhea prevalence by age of the child. However, for the total of children under five, there was a statistically significant decrease in diarrhea prevalence from 22% to 9% at the midterm. Seasonal variance is not thought to be a factor in this decrease since both the initial and midterm surveys were conducted during the third week of April.

Table 17. Percentage of children under age five with diarrhea in past two weeks

	Initial appraisal, N=137		Mid-term, N=157		P-value for difference between percentages
	Diarrhea cases (N)	%	Diarrhea cases (N)	%	
Total cases	30	22%	14	9%	.001

Feedback on Project Activities. *Frequency of promoters' visits.* To establish whether hygiene promoters are counseling with sufficient intensity to motivate changes, families were asked how often they receive visits from the hygiene promoter. 91% of families (104 of 114) report receiving visits from the hygiene promoter monthly or more frequently.

Dissemination of reminder materials. Interviewers requested to see any project posters or reminders that the hygiene promoter had left posted in the home. In 92% of families' homes (105 of 114), evaluators observed at least one large poster or small behavior reminder.

Use of the community hygiene store. Respondents were asked whether they have ever made a purchase in the community store, and if so, to name the products they purchased. The majority of families indicated that they had made multiple purchases,

but this question sought to know whether the family at least knew of the existence of the store and had been motivated to make at least one purchase. 88% of families (100 of 114) had made at least one purchase in their community's hygiene store.

Evaluation Findings: Nicaragua

Table 18. Indicators with comparison of initial and midterm appraisals

No.	Indicator	Initial survey, 2003	Mid-project survey, 2004
SANITARY INFRASTRUCTURE			
5	% of houses with a composting latrine	2.9%	46.3%
6	% of houses with a traditional latrine	36%	31.3%
7	% of houses with an elevated, ventilated latrine	20.6%	13.4%
SAFE WATER BEHAVIORS			
8	% of families that treat their drinking water	60.4%	86.8%
9	% of families that chlorinate their drinking water	55%	85%
10	% of families that keep chlorine in an opaque container (observation)	2.5%	57%
11	% of families that obtained chlorine in the « hygiene store » (casa base)	43%	76%
12	% of families that obtained chlorine in the health center	3.4%	9%
13	% of families that use the bottle cap to measure the quantity of chlorine to add to the water	9%	64%
14	% of families that use a dropper to measure the quantity of chlorine to add to the water	12.5%	22%
15	% of families that store water in a filter with a faucet	35.4%	55%
16	% of water that store water in a water container	33%	33.3%
17	% of water that store drinking water in a covered container	87%	98.6%
18	% of families that take drinking water from a filter with a faucet	38%	78%
19	% of families that have the drinking water container on their table	56.3%	61.1%
20	% of families that have the drinking water container on a bench	30%	33%
21	% of families that have the drinking water container in the kitchen area	7%	6.3%
22	% of families that wash the water container at least twice a week	10.4%	10.6%
23	% of families that wash the water container at least three times a week	16.4%	10%
24	% of families that wash the water container every time they fill it	8%	1.5%
25	% of families that wash the water container weekly	3.0%	3%
26	% of families that wash the water container every day	52%	74.2%
27	% of families that have a second container for water that is not used for drinking	75.8%	81.8%

No.	Indicator	Initial survey, 2003	Mid-project survey, 2004
HANDWASHING BEHAVIORS			
28	% of mothers/caregivers who washed their hands yesterday after using the latrine	88%	93%
29	% of mothers/caregivers who washed their hands yesterday after cleaning their child's bottom	31%	73%
30	% of mothers/caregivers who washed their hands yesterday before eating	67%	91%
31	% of mothers/caregivers who washed their hands yesterday after working	19%	43%
32	% of mothers/caregivers who washed their hands yesterday after preparing food	62%	76%
33	% of mothers/caregivers who washed their hands yesterday after feeding children	19%	49%
34	% of partners or husbands who washed their hands yesterday when they returned from work	66%	67%
35	% of mothers/caregivers who wash their hands in the washing area (observation)	76%	80%
36	% of mothers/caregivers who wash their hands in the kitchen area	21%	13.2%
37	% of families that have drainage for used water	48.3%	63.2%
38	% of families who let used water run freely	10.4%	37%
39	% of families that have a trench for used water	24%	35%
40	% of families that have a hole for used water	36%	16%
41	% of mothers/caregivers who, when they demonstrate handwashing, wash with clean water (observation)	34.5%	94%
42	% of mothers/caregivers who, when they demonstrate handwashing, wash with soap (observation)	91.4%	92.4%
43	% of mothers/caregivers who, when they demonstrate handwashing, rub their hands together at least three times (observation)	37%	59%
44	% of mothers/caregivers who, when they demonstrate handwashing, dry their hands on a clean towel (observation)	7%	27%
45	% of mothers/caregivers who, when they demonstrate handwashing, air dry their hands (observation)	12%	15%
46	% of mothers/caregivers who, when they demonstrate handwashing, dry their hands on their clothes (observation)	12%	15%
LATRINE USE/ELIMINATION OF HOUSEHOLD EXCRETA			
47	% of families that have children who use a potty bowl	14%	17.4%
48	% of mothers who clean their baby after defecation with toilet paper	67%	82%
49	% of families that have children under 5 that use a latrine	60%	95%
50	% of children who defecate in a latrine	10%	60%
51	% of children who defecate in a latrine outside near the house	0.73%	11.1%

No.	Indicator	Initial survey, 2003	Mid-project survey, 2004
HEALTH STATUS			
52	% of children with diarrhea in the last two weeks	14.6%	13.2%
53	% of children under 1 with diarrhea in the last two weeks	1.4%	5.6%
54	% of one-year old children with diarrhea in the last two weeks	0%	3.5%
55	% of two-year old children with diarrhea in the last two weeks	0%	3.5%
56	% of three-year old children with diarrhea in the last two weeks	2%	0.7%
57	% of four-year old children with diarrhea in the last two weeks	0.7%	0%
58	% of five-year old children with diarrhea in the last two weeks	1.4%	0%
59	% of latrines with flies	81%	
60	% of latrines with cockroaches	77%	
61	% of latrines with used wiping paper on the ground	77%	
62	% of latrines with a bad smell	71%	
63	% of latrines with the hole covered	20%	
64	% of latrines with excreta on the ground nearby	19%	
65	% of latrines with a toilet paper holder	0%	
66	% of latrines with animals in the vicinity	90%	
67	% of latrines with a path leading to them	69%	
68	% of latrines with a clean path leading to them	60%	

Safe Water Behaviors. *Water treatment (Indicators 8–14).* There was an increase of 26.4% in families that treated their water, 30% for chlorine, a figure supported by the increase in the production of chlorine at the local health center by 33% and the creation of additional distribution points for chlorine in the communities.

Plan Nicaragua supplied opaque bottles to store chlorine, an activity reflected in the 54.5% increase in this indicator. The increase by 55% in the percentage of families that correctly measure chlorine using the bottle cap indicates good teaching by the promoters. Another 9.5% of families obtained their own measures for chlorine.

Water storage (Indicators 15–27). There was an increase of 19.6% in families that stored water in a filter with a tap, and an increase of 11.6% in families with a covered container, although Plan, only just before the survey, had made these available through the revolving fund. There were small increases in placement of the water containers off the ground, where they were less accessible to small children.

Handwashing Behaviors. *Handwashing at critical times (Indicators 28–34).* The priority times for handwashing were identified as after changing a baby’s diaper, after cleaning a potty, and before serving food. These increased by 42%, 14%, and 30% of families, respectively. Although not priority practices, there was also an increase of 24% in the percentage of families that washed hands before eating and after working.

Correct handwashing technique (Indicators 41–46). There were increases of 50.5% for washing with clean water, in 22% for rubbing hands at least three times, and 20% for drying with a clean towel, with decrease in air drying and drying on clothes (by observation). Other sub-behaviors had either increased modestly and/or were promoted only just before the mid-project survey.

Latrine Use/Elimination of Household Excreta (Indicators 47–51). The key changes were increases of 3.4% in families that used a potty bowl, of 15% in mothers who cleaned the child with toilet paper after defecation, of 50% in the percentages of children who defecated in a latrine, and of 35% of under-fives who used a latrine.

Cleanliness and hygiene of latrines (Indicators 59–64). The condition of latrines improved dramatically – 71% fewer had flies, 70% had roaches, 68% fewer had a bad smell, 23% more had a cover on the hole, and 11% fewer had feces on the ground nearby. Some families (7%) took the initiative to purchase their own toilet paper dispenser, there was a decrease of 23% in latrines with animal feces in the vicinity, an increase of 18% in latrines with a path to them and of 29% with a clean path.

Health Status

Although there was a minimal decrease in diarrhea prevalence from the initial appraisal, this was due to an epidemic of diarrhea-causing virus among under twos in the communities. In prior months the health center reported no cases of diarrhea. This evidence, plus the experience of other projects with similar improvements in hygiene practices, makes it likely that the Nicaragua project in reality had a significant positive impact on the prevalence of diarrhea.

Other Significant Findings (Both Projects)

- Significant, measurable changes were observed for many of the behaviors promoted by the hygiene promoters, especially those that required new materials such as children's potties, chlorination of water, and hand soap.
- Two essential factors can be credited for the behavior changes were promotion and negotiation of behaviors and promotion of essential products. These critical elements for successful adoption of new hygiene behaviors worked in synergy to support positive change.
- In both projects, results indicators are consistent with indicators of hygiene promoters' performance in conducting counseling visits to assess, negotiate, and promote improved behaviors (at least one visit per month). The project teams reported a transformation of the volunteers from shy, anxious mothers into confident, effective counselors, as well as widespread appreciation among families of the work of the promoters. Volunteer promoters have stayed motivated and active, despite bad weather and (in Nicaragua) problems in getting the hygiene store up and running.

- In Peru the hygiene fund has improved availability and access to key supplies, as shown by significant increases for many of the behaviors that require supplies to carry out the behavior; 88% of respondents have purchased hygiene supplies.
- Communication materials have been well used in both country projects, e.g., reminder materials posted as intended in and around almost all homes.
- There has been extensive community organization during project planning and implementation.

Project Sustainability and Replication

In Nicaragua, the project has clearly had an impact beyond the three communities:

- Red NicaSalud (a health PVO network) adapted the behavior-change methodology into its strategy for all USAID-funded projects for the next five years. In August 2003, NicaSalud began training staff from three PVOs and the ministry of health in the hygiene behavior-change methodology. They subsequently managed the implementation of activities in seven additional communities.
- In July 2004, Plan International Nicaragua began replicating the methodology in 33 additional communities in Chinandega.
- Plan International and other partners in the initial project have presented the methodology in a number of meetings with government and PVO staff.

In Peru, presentations of the methodology have generated interest in the MOH, Plan and USAID to include this methodology in other health promotion projects, particularly in the area of hygiene promotion. Plan International is currently adapting the project's methodology and communications materials for use elsewhere in Peru. The project team deliberately invited a broad range of participants from all partner organizations, as well as external organizations that could have a potential interest in using the methodology, to participate in the qualitative evaluation. The participation of these organizations (UNICEF, Sanbasur, as well as the MOH and Plan) resulted in enthusiasm and interest in using the methodology in the future.

5. Lessons Learned and Recommendations

Formation of the team. In both countries, consistent participation of technical collaborators was a problem. The Peru project coordinator suggests that it may be helpful to require a written commitment from technical team candidates and their institutions to attend all training and work sessions. She notes that was very important to identify strengths and weaknesses in the multi-disciplinary team, and team members' interest in building their capacities, and that this opportunity to strengthen professional skills provided an incentive for team members to invest time in the project.

Selection of Project Communities. The local Peru coordinator had the following recommendations:

- **Ensure the commitment of both communities and health workers.** Before expanding this intensive process, sponsoring organizations should hold a series of orientation meetings and discussions with both prospective communities and local health staff who might participate. They need to have a clear understanding about the process and the level of their expected commitment and should feel free to reject the program if they cannot make that commitment.
- **Criteria for communities.** In selecting communities, the team should be clear about whether it desires communities that are socio-economically homogeneous or heterogeneous. It is suggested to choose communities with documented high incidence of diarrhea, in order to focus on the most needy populations and show results. If a program is going to take on communities with limited sanitary infrastructure, it needs to be prepared to facilitate families' obtaining this infrastructure.

Extend formative research to outside interviews. As part of the formative investigation, conduct interviews with NGOs, churches and other institutions that are working in each community. If interviews are limited to community informants, the project may miss opportunities for collaboration.

Pretesting of Instruments. The Peru coordinator provided the following recommendations for pretesting of materials in future projects:

- Test materials with health promoters as well as with the target population. In the case of counseling materials, their content and images should be tested with families. Training is provided to promoters on how to use the materials. Then, the promoters actually use the materials with a few families and obtain feedback.

- Simplify pretesting, possibly making it more in-depth and qualitative than quantitative, which requires a larger sample and computer analysis.
- When possible, modify materials with the help of community members before doing a second pretest with a larger sample.
- Assure that team members who pretest materials are trained to conduct interviews and receive comments in the population's dominant language. Details are easily missed by a non-fluent speaker.
- Carry out a review of draft materials with technical experts in the subject area before pretesting to assure that messages testing are consistent with ministry of health technical norms.

Development of Communications Materials. In both projects, a very useful step was holding community meetings as part of the process of creating project materials, which provided insights on visual concepts as well as on people's vocabulary and local expressions used to describe hygiene behaviors.

Training of Health Promoters. The Peru coordinator had the following recommendations:

- Cut behavior-change theory from promoter training and focus on real cases that have occurred in the communities, using these stories to diagnose and resolve problems.
- Take advantage of the training events to pretest monitoring instruments with promoters.
- Consider dividing the training course into modules with opportunities for field practice in between modules.
- Consider language preference and literacy levels of promoters in designing training and support materials.

Community Participation and Activities. Not only communities, but also individual families should be given a choice of committing to the project. Make popular assemblies the medium for contact with the community. After explaining the proposed activities and responding to questions and suggestions, request interested families to sign up for participation in the project; the project could begin the intervention with these motivated families and then scale up to include others as a second stage of the project.

Evaluation Surveys. If a project wants or needs to follow strict evaluation procedures, the need for repeated questioning of the same households is problematic because this in itself might influence families' knowledge, attitudes and practices. This is difficult to avoid in such a pilot/research project without increasing the size of the project area, but one positive step would be to avoid pretesting the initial appraisal instrument at intervention homes that may be randomly selected for a future interview.

It was felt that the need for statistical analysis of surveys by computer removed the process too much from some members of the local teams. Therefore, it is

recommended that whenever possible, the team should craft survey questions for ease of analysis and consider doing a few examples of hand-tabulation with the technical team so that indicators are understood and managed by the entire team. It was also noted that questions that require recall of past events multiple responses may not provide a full description of behaviors as respondents are reluctant to take the time for a full recall.

Project Design/Management Issues. There has been an inevitable trade-off between the time and resources devoted to project implementation and capacity building of the local project teams. It is important to understand that the quality of the formative research, epidemiological and behavioral analyses, training, and communications work in these projects reflects the work-in-progress of a team that was growing in their familiarity and capacity to carry out the activities asked of them. This trade-off was explicitly accepted by the focus on capacity building.

A second issue has been the limited implementation period. Besides making both implementation and capacity-building more challenging, this caused problems for some of the local team members and their organizations, which had committed the time to this initiative but which later faced conflicting responsibilities that demanded their attention. Because of the ambitious schedule, the implementation teams, the Dominican participants, as well as the lead consultant have had to work very long hours during the technical assistance visits. Finally, the tight schedule has made it difficult to adequately investigate and address some technical issues uncovered in the formative research.

Community Participation: The Key to Success. The promise of Behavior-Centered ProgrammingSM is that it facilitates a mutually supportive relationship between the technical and managerial contributions of technical personnel and organizations with the unique local knowledge of feasibility and volunteer contributions of communities, families, and individuals. This combination appears to have worked effectively in the Peru and Nicaragua hygiene projects.

In her final report, the local Nicaragua project coordinator made the following points. The behavior-change methodology that was used permits communities to articulate their values, reconcile different interests, and act on common grounds. It is a process of continual dialogue and negotiation, public and private, in which people define who they are, what they want, and how their motivation, confidence and effectiveness can grow, and how they can gain more control over their lives.

The key to project success was the thorough process of community participation. The transformation initiated under the detailed study of current hygiene practices and how to improve them created a base of mutual confidence for participation and enabled joint prioritization of the behaviors to promote, the development of joint action strategies, the generation of materials and counseling. This gradual learning process created motivation among participants and built an acceptance of change.

The human resources contributed by the communities were absolutely essential in the process. The community ownership that resulted has meant that the official end of the projects is only the end of one phase and that both activities and benefits will continue. The mechanisms built in so that individual families as well as communities receive frequent feedback on where they are regarding behavior changes has been another key to motivation and awareness of progress.

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