



ENVIRONMENTAL HEALTH PROJECT

ACTIVITY REPORT

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Monitoring the Effect of Behavior
Change Activities on Cholera:
A Review in Chimborazo and Cotopaxi, Ecuador

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CONTENTS

ABOUT THE AUTHORS	v
ACRONYMS	vii
EXECUTIVE SUMMARY	ix
MAP OF ECUADOR	xi
1 INTRODUCTION	1
1.1 Background of the Follow-Up Monitoring Activity	1
1.2 Methodology	1
1.3 Background of the BACA Project (1994-1995)	1
1.4 Objectives of the BACA Project	2
1.5 Site Selection	3
1.6 Training	4
1.7 Some Initial Findings from the Follow-Up Activity	4
2. THE COMMUNITY PARTICIPATION INTERVENTION MODEL	6
2.1 Conceptual Background of CPI Model	6
2.2 A Three-Phase Process with Three Team Levels	7
2.3 Research Methodology	8
2.4 Training Workshops	8
3. CHOLERA IN ECUADOR	9
3.1 Two States: Four Communities	9
3.1.1 Communities of Chimborazo	9
3.1.2 Communities of Cotopaxi	11
3.2 Context of Poverty of the Sierra	12
4. FOLLOW-UP METHODOLOGY	14
4.1 Selection of Objectives	14
4.2 Identification of New Monitoring Instruments	15
4.2.1 Instruments for Measuring the First Objective	15
4.2.2 Instruments for Measuring the Second Objective	15
4.2.3 Instruments for Measuring the Third Objective	15
4.3 Fieldwork Preparation	15
4.3.1 State Epidemiologic Teams	15
4.3.2 Community Teams	15
4.3.3 Application of Data-Gathering Instruments	16
4.3.4 Organization of Data	17

4.4	Tabulation and Processing of Survey Information	17
4.5	Report Preparation	17
4.6	Limitations	17
5.	RESULTS	18
5.1	Results and Analysis of the Home Survey and Interview	18
5.1.1	Treatment of Stored or Piped-In Water	18
5.1.2	Washing of Hands, Food, and Dishes	19
5.1.3	Disposal of Excreta	21
5.2	Epidemiological Data on Morbidity and Mortality	22
5.2.1	Community Health Centers	22
5.2.2	Consultations for Diarrheal Diseases	23
5.2.3	Hospital Discharges	29
5.2.4	Incidence of Cholera in Ecuador	29
5.2.5	Incidence of Cholera in the BACA Project States	29
5.3	Analysis of Interviews Concerning the Project's Impact	34
5.3.1	Interviews with State Health System Administrators	34
5.3.2	Interviews with Community Members	36
5.4	Summary of Results	37
6.	CONCLUSIONS AND LESSONS LEARNED	40
6.1	Objective One: The Impact of CPI-Based Behavioral Change at the Community Level	40
6.2	Objective Two: The Impact of CPI-Based Behavioral Change on Community Morbidity and Mortality	41
6.3	Objective Three: The Impact of CPI-Based Behavioral Change at the Regional and National Levels	41
6.4	Lessons Learned	43
6.4.1	The Ripple Effect	43
6.4.2	The Power of Follow-Up	43
6.4.3	The Strength of the Second Generation	43
6.4.4	Widening the Net	44
6.4.5	Developing Local Leadership	44
6.4.6	Synergistic Energy: Epidemiology and Ethnography	44

TABLES

1	Cholera Incidence in Project Status	10
2	Treatment of Stored or Piped-In Water	18
3	Washing and Drying of Hands, Food, and Dishes	20
4	Disposal of Excreta	21
5	Communities and Health Centers that Serve Them	23
6	Incidence of Cholera in Cotopaxi and Chimborazo, 1991-1995	32
7	Number of Cases of Cholera in the Communities of Cotopaxi under the CPI Project, 1993-1996	32
8	Number of Cases of Cholera in the Communities of Chimborazo under the CPI Project, 1991-1996	32
9	Cholera Rates by Year Pre-CPI Project	42
10	Cholera Cases During and Post CPI Project	42

FIGURES

1	Acute Diarrheal Disease Cases by Location	24
2	Acute Diarrheal Disease Cases by Location and Age (Pre-Intervention)	25
3	Acute Diarrheal Disease Cases by Location and Age (Post-Intervention)	26
4	Total Acute Diarrheal Disease Cases in Pujili Hospital (includes earthquake figures)	26
5	Total Acute Diarrheal Disease Cases in Pujili Hospital (excludes earthquake figures)	27
6	Total Acute Diarrheal Disease Cases in Licto and Flores by Age and Date	27
7	Total Acute Diarrheal Disease Cases in Gatazo by Age and Date	28
8	Total Acute Diarrheal Disease Cases in Salcedo Hospital by Age and Date	28
9	Incidence of Cholera in Ecuador, 1991-1995	30
10	Cholera Cases by State, Week 27 of 1996	31
11	Incidence of Cholera in Chimborazo	33
12	Incidence of Cholera in Cotopaxi	33
13	Cases of Cholera in Ecuador by Age, 1996	35

APPENDICES

A	List of Members of the Regional and Community Teams
B	Health Data from the States of Chimborazo and Cotopaxi
C	Questionnaires and Interview Schedules, Monitoring Project
D	Monitoring Project Data
E	Morbidity and Mortality Data
	5.A Outpatient and Ambulatory Patient Data
	5.B Hospital Discharge Data
F	Community Generated Monitoring Form
G	Community Perceptions of the CPI Project

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ACRONYMS

ADDR Applied Diarrheal Disease Research Project

ADD Acute Diarrheal Disease

BACA Behavior-Based Cholera Activity

CIMEP Community Involvement in the Management of Environmental Pollution

CPI Community-Based Participation Intervention

DPS Provincial Directorate of Health

EHP Environmental Health Project

IESS Ecuadorian Social Security Institute

MEC Ministry of Education and Culture

MOH Ministry of Health

NGO Nongovernmental Organization

SSC Rural Social Security

USAID U.S. Agency for International Development

VBC Vector Biology and Control Project

WASH Water and Sanitation for Health Project

EXECUTIVE SUMMARY

Following the cholera epidemic of 1991-1993, endemic cholera has persisted in the isolated rural highlands of Ecuador despite the Ecuadorian Ministry of Health's success in controlling the epidemic in the country's more urban areas. To understand and modify behaviors that increased the risk of developing cholera continued in the sierra states of Chimborazo and Cotopaxi, the Ministry of Health, in collaboration with the United States Agency for International Development (USAID)/Quito and the Environmental Health Project (EHP), initiated the Behavior-Based Cholera Activity from October 1994 to October 1995. The aims of the 12-month project were to identify behaviors and beliefs about contracting cholera; gather and analyze data on environmental and domestic health behaviors to develop and implement interventions to change identified high-risk behaviors; develop a monitoring system; train local people to continue the monitoring; and document the activity for broader distribution.

The Behavior-Based Cholera Activity (BACA) project collected data on adult beliefs and practices about cholera, developed a health intervention model, transferred ethnographic and epidemiological skills, and incorporated the project's techniques and concepts within programs in the Ministry of Health and nongovernmental organizations. The project used the Community Involvement in the Management of Environmental Pollution (CIMEP) health model, a design that recognizes and facilitates decentralization from national government and provides a mechanism for community response to perceived environmental problems. Based on the findings of the BACA project, in 1996, the Ecuadorian Ministry of Health, along with USAID/Quito and EHP, collaborated to monitor the behavioral changes following the CIMEP intervention.

The BACA project identified three clusters of core behaviors that were indicative of high-risk behaviors: failure to decontaminate stored or piped-in water; insufficient hand washing; and

inadequate disposal of excreta. Using both ethnographic and epidemiological methods, the follow-up project monitored improvements in those core behaviors to assess the level of change among the project communities. The CIMEP methodology was refined within and developed into the Community-Based Participation Intervention (CPI) model.

The monitoring project, conducted in July 1996, had three objectives: (1) measure the impact of behavioral change at the community level by describing the changes in behaviors conducive to the transmission of cholera, particularly in terms of water storage and treatment; hand, food, and plate washing; and excreta disposal; (2) assess the impact of behavioral change on morbidity and mortality associated with cholera at the community and provincial levels; and (3) evaluate the impact of behavioral change and the use of the CPI model on the public sector. The project teams accomplished these objectives by readministering the BACA project's community baseline survey to evaluate any change. This survey contained open-ended questions, interviews, and household observations. Epidemiological data were collected nationally as well as at the levels of the community, township, *canton* (county), province. An effort was also made to review civil registry documents on cholera cases. In addition, project teams visited each community and conducted interviews with community people and members of the state (provincial) and national health care systems.

The results of the follow-up surveys were:

- an increase of 34% in households where water was treated with chlorine or was boiled;
- an increase of 94% of households in which water was stored appropriately;
- an increase of 42% of households in which dishes were washed with soap and clean water;

- an increase of 27% of households in which people washed their hands with soap and clean water after using the bathroom; and
- an increase of 29% of households in which raw fruits and vegetables were washed in treated water.

Fewer cholera cases and no cholera fatalities occurred in the four project sites during the two-year period of the BACA project and its evaluation.

More ephemeral but central to community health is the sense of achievement by the community as a result of the health education and water containers (*bidones*) provided by project personnel. The EHP teams found that not only did the communities continue to monitor household behaviors after the CPI project ended, but two communities initiated latrine and sewerage projects, and another began a child care center.

At the level of the community, the CPI intervention changed behaviors related to the risk of developing cholera, developed new community leadership, encouraged people to open their homes to their neighbors, and raised people's awareness of disease prevention. At the regional level, the CPI methodology has been used to replicate the BACA project's techniques in an animal husbandry project and to advance careers. One member of the project's Regional Team, was promoted to the position of State Health Director, while others have continued to use the methodology in new projects. Transfer of the CPI methodology to the community continues to receive support at the national level.

The benefits of the BACA project are visible at community, state, and national levels, but the advantages were perhaps best expressed by one of the community members that the project teams interviewed during the follow-up activity. "We are working to see that the lessons we have learned are not forgotten, and that they are taught to our children so that the community can move ahead and not forget the new behaviors necessary for good health."

INTRODUCTION

1.1 BACKGROUND OF THE FOLLOW-UP MONITORING ACTIVITY

Between October 1994 and October 1995, the Environmental Health Project (EHP), in collaboration with the United States Agency for International Development (USAID) and Ecuador's Ministry of Health (MOH), conducted the Behavior-Based Cholera Activity (BACA) project in four indigenous Ecuadorian communities. The purpose of the project was to identify and analyze high-risk behaviors associated with cholera and to develop and monitor interventions to change them. Most important, the project entailed training community members to continue these efforts once the project had ended. The results of the BACA project are presented in EHP's Activity Report No. 19, *Cholera Prevention in Ecuador: Community-Based Approaches for Behavior Change*, published in June 1996.

In July of 1996, EHP's Technical Team for BACA, and the Regional and Community Teams it trained, followed up its work of 1994-1995 by establishing a monitoring system to track the effectiveness of the BACA cholera-prevention efforts. (A list of the team members is included as Appendix A.) With the participation of members of the original project teams, the follow-up activity built upon baseline data gathered during the original project and incorporated qualitative and quantitative indicators. This report presents the results of this effort.

1.2 METHODOLOGY

For their initial work in Ecuador, the BACA project teams chose the CIMEP (Community Involvement in the Management of Environmental Pollution) methodology. Developed by the Water and Sanitation for Health (WASH) Project and

subsequently refined by EHP, CIMEP is used to develop the training and health education capabilities of public sector employees and nongovernmental organizations (NGOs). The methodology is designed to enable trainees to, in turn, train local community members to identify and monitor local environmental health problems. Trained community members can subsequently use their new skills to develop and sustain interventions that will reduce the prevalence of health hazards. The general CIMEP methodology was adapted for the BACA project and became reconceptualized in the Community-Based Participation Intervention (CPI) model.

1.3 BACKGROUND OF THE BACA PROJECT (1994-1995)

In March 1991, the El Tor cholera pandemic hit Ecuador. By the end of 1993 a total of 85,023 cases had been diagnosed; 977 of them fatal. The severity of the pandemic dropped off dramatically in 1993, and in the first six months of 1994, just over 1,000 cases were reported, with 14 deaths.

A Lasting Impression

As the jeep bumped along into Pompeya, people waved and came over to the vehicle. They all recognized Nancy Benitez, the state-level nurse and member of the Regional Team (RT) trained under the initial BACA project. She had been there many times for the project, as a community health educator, community assembly facilitator, and later as the person in charge of distributing bidones (water storage containers) and monitoring their use.

As a local woman approached the jeep, Nancy jokingly said to her that we had come back to take back the bidones. The woman recoiled in horror before Nancy could assure her she was joking. The lasting impression of fright in the woman's face at the thought of losing her access to safe water spoke more clearly than words of the significance of the water containers.

Although the disease greatly declined in most areas of the country, cholera outbreaks persisted in specific regions of the Ecuadorian sierra and the coast—areas characterized by high densities of either indigenous or peri-urban populations without water and sanitation and with local festivals that draw former residents who have moved away to find work. Cholera in these areas remained epidemic.

By 1994, the MOH believed that the government's aggressive program of social communication and hygiene education during the initial years of the epidemic had helped to lower the incidence of disease in most areas of the country. However, the MOH was concerned about the pockets where the epidemic continued. As a result, the Director of the Department of Epidemiology in the Ministry concluded that a better understanding of the local behaviors in areas of cholera persistence was necessary to provide regionally and culturally specific information. That information could be used to develop interventions and public health messages

to alter behavior in those high-risk areas. In support of the MOH's determination to reduce the attack rate of cholera, USAID/Quito requested assistance from EHP to investigate adult behaviors and beliefs in communities with continued high risk of contracting cholera. The BACA project was the result.

1.4 OBJECTIVES OF THE BACA PROJECT

The one-year project was a collaborative effort of the Ecuadorian MOH and the USAID Mission to Ecuador. The activity was designed to:

- identify high-risk behaviors and beliefs associated with increased risk of contracting cholera,
- analyze data to identify high-risk behaviors,
- develop and implement interventions designed to change identified behaviors,
- develop a community-based system to monitor behavioral change,
- train local people to continue the monitoring, and
- document the results for broader application.

In addition to its research and behavioral intervention components, BACA undertook steps to develop and strengthen local and national institutions. Three training workshops, conducted for Regional Teams (state-level staff and NGOs working in communities), focused on methods to educate adults, techniques for social communication, ethnographic methods, qualitative data analysis, and participatory development and monitoring of health interventions. The two Regional Teams worked in four communities to examine causes of and attitudes about cholera. Community members conducted behavior-based research in their homes and communities, analyzed the data, presented the analyses to their communities and, with their communities, designed health intervention projects based on those data.

1.5 SITE SELECTION

Much of the population of Ecuador continues to be at high risk of developing cholera and other diarrheal diseases partly as a result of the following socioeconomic indices:

- The level of basic sanitation coverage is low; only 59% of the population has access to potable water (75% in urban areas, 27% in rural areas).
- Sewage disposal is inadequate; only 39% of the population has sewerage disposal (60% in urban areas, 9.4% in rural areas).
- Limited availability of latrines; only 18% of houses have latrines (9% in urban areas, 30% in rural areas).

Ecuador, like many other Latin American countries, has experienced prolonged migration to urban centers. In response to the urban population density and political and economic factors, urban centers have received most of the government support for improvements in basic sanitation. The Ecuadorian sierra has received little assistance and distribution of resources is further complicated by multiple indigenous cultural groups who speak different languages and have distinctive cultural beliefs and behaviors.

During the first year of the cholera epidemic (1991), 46,320 cases were registered in Ecuador, representing a rate of 43.36 per 100,000 inhabitants, and reaching a case fatality of 1.52 (per 100,000), or 705 deaths. The epidemic affected all 21 states of the country, but was most heavily concentrated in a few states:

- Imbabura, with an incidence of 178.72 (per 100,000 people).

Two states in the sierra were selected for the BACA activity: Chimborazo and Cotopaxi. (See

- Esmeraldas, with an incidence of 176.92 (per 100,000 people).
- El Oro, with an incidence of 113.27 (per 100,000 people).
- Chimborazo, with a level of 86.10 (per 100,000 people).
- Cotopaxi, with an incidence of 78.78 (per 100,000 people).

Within these states the highest attack rates occurred in the indigenous communities in the sierra.

By 1992, 32,430 cholera cases were reported nationally, 29.36 per 100,000 inhabitants with a case fatality rate of 1.09 per 100,000 people, or 208 deaths. The two areas most strongly affected were El Oro (97.10/100,000) and Guayas (41.33/100,000) in the coastal areas, and the sierra states of Imbabura, Cotopaxi, and Chimborazo (52.91, 48.05, and 34.55/100,000, respectively).

The Ecuadorian government began health education and latrine-building campaigns, in addition to establishing state-level interinstitutional health committees to meet the danger posed by cholera. These efforts were successful in reducing the overall incidence of cholera. Despite the reduced number of cases, cholera still persisted, particularly in the indigenous communities in the sierra such as Imbabura, Chimborazo, Cotopaxi, and the coastal states of Esmeraldas and El Oro.

In 1994, three states in the sierra continued to have cases of cholera: Chimborazo, with an incidence of 70.58/100,000; Tungurahua, with 43.12/100,000; and Cotopaxi, with 34.11/100,000. The cases continued; in the first three months of 1995, 1,143 cholera cases were reported, and it was estimated that the incidence could surpass that of 1994. The BACA project was initiated to try an innovative approach to break the cycle of cholera in the sierra communities by changing behaviors associated with contracting cholera.

Appendix B for health data on these two states.)
The third sierra state with an ongoing cholera

problem was not included in BACA because another USAID sponsored project was already in place — the Applied Diarrheal Disease Research Project. The ADDR group was invited to participate in the workshops and share information. Sierra states were selected instead of coastal states because of transportation requirements; the CPI model required intensive interaction between groups located in Quito and the sites; therefore, those sites with the highest incidence of cholera and closest proximity to Quito were selected.

"People have been changed by participating in this project; before, they were quiet, complacent and unquestioning. Now they express their opinions, question others and feel they have rights." - Regional Team Member

1.6 TRAINING

The 12-month BACA project resulted in 55 people being trained in the identification of high-risk behaviors, community participation techniques, data collection, and the development of intervention design and monitoring. During this time, the EHP teams trained national and state MOH employees in community-based health interventions, including 2 representatives of the national MOH and 13 state-level epidemiologists, health inspectors, and educators. The teams also trained 40 community members. In addition, the project created community-level institutions designed to support and sustain behavioral changes.

In July 1995, the Community Teams gathered baseline data on the incidence of cholera and other diarrheal diseases in adults, conducted household observations of risky behaviors, and interviewed community members about their beliefs concerning the spread of infectious diseases. The following month, a policy workshop was held in Quito. This workshop was

attended by donors and senior MOH staff. Press coverage of the workshop stressed the important contribution USAID had made by supporting a process that enabled host country nationals to evaluate and modify high-risk behaviors for infectious and other diseases. The press highlighted potential application to other important areas of concern in Ecuador, such as childhood nutrition and feeding patterns.

1.7 SOME INITIAL FINDINGS FROM THE FOLLOW-UP ACTIVITY

On March 28, 1996, an earthquake killed 25 people and destroyed 2,743 homes in the 90 communities surrounding Pujili in the state of Cotopaxi. Six months previously, the BACA project had introduced water *bidones* (containers), health education to control the spread of cholera, and water chlorination techniques to the community of Alpamalag in Pujili. The earthquake not only killed people and destroyed homes, it also destroyed the community's water pipes. Alpamalag's residents described how they had to dig through the rubble of their homes to find their *bidones*, and how they then hid the containers so that other people would not steal them.

Following the CPI health education activities in Alpamalag, community members recognized the importance of protecting their water supply. Members of the CPI Community Teams traveled through the community, providing chlorine to families to use in their *bidones*. The result was that, contrary to health officials' expectations, not a single case of cholera broke out immediately following the earthquake.

While the EHP Technical Team does not attribute the successful control of cholera following the earthquake directly and solely to the CPI training, the team can demonstrate how communities that participated in the CPI showed lower incidence rates of cholera and fewer cholera fatalities in the year subsequent to the BACA project than did neighboring and comparable communities where the intervention did not occur. Each of the four communities involved in the project changed its level of cleanliness, provided

new leadership through training, increased the

level of recognition of community-based health risks, and caused community members to change their behavior in order to prevent illness.

The remaining chapters of this report present further background information on the original BACA project, the history of cholera in Ecuador, the methodology and results of the follow-up monitoring project, and the authors' conclusions and lessons learned from this experience. Finally, appendixes include monitoring data, morbidity and mortality data, and results of community surveys.

2

THE COMMUNITY PARTICIPATION INTERVENTION MODEL

2.1 CONCEPTUAL BACKGROUND OF CPI MODEL

Drinking contaminated water is the greatest risk factor for contracting cholera, and human behavior determines how water is handled. Handwashing, food handling and disposal of excreta are all behaviors determined by a combination of knowledge, beliefs and custom.

It has become clear that knowledge alone is not sufficient to cause behavioral changes; thus the BACA project was designed to focus on adult behaviors and the cultural contexts in which they occur—behaviors that put people at high risk of contracting cholera. One dimension of cholera that has received little attention is the role of behavioral patterns in transmission of the disease among *adults*. Most studies of diarrhea, and technologies to treat diarrhea, such as oral rehydration therapy, have focussed on childhood diarrhea. Since children tend to comport themselves by touching and tasting almost anything they come in contact with, any resultant diarrhea, even if it kills, has a behavioral logic to it.

Adult diarrheal disease, however, does not follow the same pattern. Many adult diarrheas appear to be related to adult behaviors, e.g., overdrinking, eating food at parties or fiestas, and buying prepared food from street vendors. Cholera, a potentially lethal diarrheal disease, primarily affects adults and thus presents an important opportunity to understand which behaviors and beliefs result in infection. Consistent with Ecuador's decentralization plan, the Interinstitutional

Cholera Committee decided that the best way to deal with the cholera crisis was to create committees in those provinces at greatest risk of continuing the epidemic. These committees were composed of individuals from the Ministries of Health and Education (among other groups) and local NGOs. The exact composition of each committee reflected the groups working in that particular province, and so they varied accordingly.

The national committee recognized that for public health messages to be effective, social communication programs and behavior change campaigns needed to be tailored to be appropriate for and relevant to the various rural, urban, peri-urban, or indigenous communities. However, the provincial committees did not know how to elicit the information they needed from those communities.

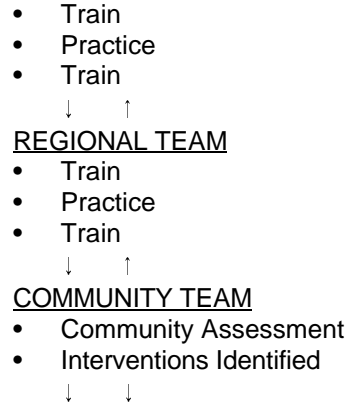
EHP's approach was based on the belief that the most important changes to unhealthy living conditions are best addressed by those who live in the community, those who suffer harm from the unhealthy condition(s) and those who will be required to sustain the efforts that improve health for children and adults. Sustainable interventions are those that remain after the departure of outside expertise and funding. EHP has found, based on experience with the WASH and VBC (Vector Biology and Control) projects, that the key to long term improvements in health is true community participation, backed by national policy and district- or regional-level support. The BACA project design is based on these operating assumptions.

2.2 A THREE-PHASE PROCESS WITH THREE TEAM LEVELS

The CPI model was designed to support national government decentralization plans and to provide a mechanism for sustainable community response to perceived problems. The object of the model was to train state- and county-level workers so that they could train members of local communities to identify local health problems; to develop appropriate interventions; and to institute, manage, monitor, and sustain those interventions. Three levels of teams were used in this model: technical, regional, and community. The Technical Team, or the EHP consultants, provided outside technical assistance and training; the Regional Team was composed of regional-level health and education or NGO staff—to be trained by the Technical Team and, in turn, to train the Community Team. The Community Team was made up of community volunteers, teachers and local leaders who are trained by the regional trainers to work in their communities. (See the accompanying text box for a diagram of the CPI model.)

In the BACA project, the principal output was the training of regional and local staff in using participative techniques for collecting health-related information and design of interventions to reduce transmission of cholera. The model is transferrable to any other problem areas that depend on a base of community support.

A critical assumption of the CPI model is national, regional, and local ownership of the project. Toward that end, local and regional counterparts were involved from the initial planning of the project. While the project was a cooperative endeavor between USAID/EHP and the Ecuadorian MOH, the support of NGOs and other health-related agencies was sought. Once national and international support was secure, the states in which the



All three teams jointly make presentations to potential funders, MOH, and NGOs.

two Regional Teams would be composed were asked to lend support.

Site selection was based on qualitative and quantitative criteria. Observations of the Technical Team member who made the site visits were important in the choice of research sites. In addition, sites were selected on the basis of the following criteria: continued presence of cholera, an active expression of interest in the BACA project by the State Health Director, access to an able and responsive state staff, and a willingness (and ability) to commit human resources (i.e., workers' time). The level of support provided made it possible to select sites in two states. Once the sites were selected, Regional Teams were assembled. With training provided by the Technical Team during three workshops, Regional Teams, in turn, assembled their own Community Teams. As a result of this process, the activity was able to solicit commitment

CPI Model

TECHNICAL TEAM

and participation from the State Directors of Epidemiology, their staffs, NGOs, the MOH, and representatives of significant interinstitutional committees.

2.3 RESEARCH METHODOLOGY

The research methodology combined epidemiological and ethnographic research techniques, based on the assumption that data must be generated by the community. A corollary assumption was that project sustainability is directly dependent on the integration of the communities in the project. The methodology incorporated adult education skills in the three workshops to prepare the trainers, and the delineation of a training/practice/training cycle. The workshops trained Regional Team members so that they, in turn, could prepare Community Teams to identify, isolate, and understand high-risk behaviors and beliefs and develop and sustain appropriate interventions. More details about the CPI methodology are available in EHP Activity Report No. 19.

Members of the four Community Teams were selected by the Regional Teams following a community assembly and interviews with community leaders. Community Teams were composed of members of the community who wished to

participate and who were able to read and write. Sometimes community leaders volunteered; often students and women became members of the Community Teams.

2.4 TRAINING WORKSHOPS

The training sessions were oriented toward the following goals:

- To leave with the Regional Teams an “institutional memory” of the CPI process so that they could apply the theories and methodologies in the search for solutions to health problems that they encountered in the future.
- To facilitate the process of community participation so that community members themselves become the principal actors in the resolution of community problems.

Three training workshops for the Regional Teams were designed and conducted by the Technical Team. Each Regional Team used the skills they acquired to train the Community Teams to ascertain local health risks, collect and analyze local behavioral data, conduct local assemblies to discuss potential interventions, and mobilize the community to deliver and sustain the intervention.

When we asked Doña Cristina (one of the Community Team members) to show us her water bidon she initially declined, but her fellow team members urged her to show us. When she did, we saw a two room home with dirt floors and minimal belongings. However, her real pride was across the dirt road. It was her kitchen. It was a thatch-roofed building of two large rooms. She proudly pointed out the bidon on a shelf, covered with a cloth to protect it from dirt. There was no furniture but herbs drying from the roof beams. Before the CPI project, the team explained, Doña Cristina kept her animals in her kitchen. But she learned they should not be kept in her cooking area. As we left she proudly showed us the eight cages of guinea pigs and rabbits that had previously shared her kitchen and now were in her yard.

3 CHOLERA IN ECUADOR

To better understand the significance of changes in behavior of members of the CPI communities, their lives must be put in the context of the cholera epidemic and the economic situation of these indigenous communities. Although indigenous people in Ecuador comprise at least one-third of the population, they are the most marginalized group of people in the country. They tend to live in isolated areas, often with little access to education or health care infrastructure. Their marginalized health status, coupled with the lack of sanitary conditions, put indigenous communities at high risk of developing infectious diseases such as cholera. In addition, the traditional distrust between indigenous people and “outsiders” serves as a cultural and structural barrier to medical care. The following pages are offered to help the reader understand the changes which occurred in these communities.

3.1 TWO STATES: FOUR COMMUNITIES

In collaboration with the Ecuadorian MOH, two states were selected for the intervention— each heavily populated by indigenous people and dominated by the volcanos from which the states draw their names. Cholera incidence is shown in Table 1.

Two communities in each state were selected as project sites. Certain characteristics prevailed: each community was rural, isolated, and continued to report new cases of cholera.

3.1.1 COMMUNITIES OF CHIMBORAZO

Gatazo Grande

Gatazo Grande is an indigenous community located in the state (*provincia*) of Chimborazo, county (*canton*) of Colta, in the parish

(*parroquia*) of Cajabamba. It is a community of 2,000 people living in 340 households. Quichua is the primary language, with Spanish spoken as a second language. Most people in the community (80%) are nominally Catholic, and the remaining 20% are members of fundamentalist Protestant churches. Land is held communally and the major occupation is agriculture, primarily corn, onion, potatoes, and vegetables. Produce is consumed locally and also sold for markets throughout the country. Most families keep some animals to be sold or consumed by the household. Rabbits and pigs are commonly sold; guinea pigs are raised for sale and also for local consumption during religious and community fiestas.

Local government is organized around a community president who is elected yearly. There are two other significant organizations: the “Padres de Familia” committee which works with the local elementary school, and the “Comite del Agua” which oversees water distribution, maintenance, and user fee collection. Gatazo Grande has electricity connected to individual homes, piped water, and latrines. The water, however, was not consistently treated for bacterial contamination, and the latrines had not been maintained.

TABLE 1
CHOLERA INCIDENCE IN PROJECT STATES

State (Provincia)	Year	No. of Cases	Incidence Rate (per 100,000)
Chimborazo	1991	3,140	819.83
	1992	1,418	365.49
	1993	556	141.49
	1994	288	72.37
	1995	288	70.58
Cotopaxi	1991	2,177	747.86
	1992	1,525	521.41
	1993	251	85.41
	1994	106	35.90
	1995	8	2.7

(Ecuadorian Ministry of Health data)

At the time of the initial activity (1994-1995), the most frequently reported diseases in the community were cholera, measles, and alcoholism. CARE International had provided the community with latrines, but at the time of the activity, CARE was no longer working there. The number of cholera cases in Gatazo Grande were as follows: 1991—2 cases, 1992—25 cases, 1993—32 cases, and 1994—19 cases.

It is thought that some indigenous communities are continually reinfected with cholera during community fiestas when labor migrants return from other communities. Labor migrants return in Gatazo Grande from high-risk areas such as Loja (on the Peruvian border where the initial outbreak was traced) and the Amazon areas of the Oriente.

Pompeya

Pompeya is in the county of Riobamba and in the parish of Licto. Pompeya is the most isolated of the four communities involved in this program. At the time of the activity, Pompeya had 1,500

inhabitants living in 295 of the 360 houses in the community. The remaining 65 houses stood empty, their occupants having either migrated out of the community or died.

Pompeya has a social organization similar to that of Gatazo Grande; a president is elected yearly to work on community-based projects. Presidents have honorary power and must lead the community by example, not by force.

Community labor groups (*mingas*) are constituted for community activities; those not able to participate are fined a set amount. Pompeya also has a water committee, but as of 1995, the community lacked piped water and latrines. Water is obtained from the river and local wells. Homes do have electricity. A “Padres de Familia” or school-based Heads of Household Committee facilitates the provision of resources to the local elementary school. In 1994, the only outside organization working in the community was the Swiss Development Assistance Agency.

Pompeya is a community divided by religion; religious factionalism curtails or impedes public

works and assistance projects. Forty percent of the community identify themselves as Catholic; the remaining 60% are members of fundamentalist Protestant groups. Until the activity, the various religious groups had polarized the community and paralyzed its abilities to develop community-wide projects.

Members of the community participate in subsistence agriculture. Agricultural products are cultivated on communal land by community-based work parties. Corn, potatoes, wheat, and quinoa are raised for consumption and sale. Chickens, pigs, rabbits, sheep, and guinea pigs are also raised.

According to self-reporting, the most common health problems were cholera, upper respiratory illness, measles, alcoholism, skin diseases, and drug use (marijuana). In the past five years, the number of cholera cases in Pompeya were as follows: 1991—20 cases, 1992—12 cases, 1993—32 cases, and 1994—8 cases.

Labor migrants from Pompeya return for fiestas from a variety of locations—Riobamba, Quito, Ambato, and Guayaquil. The potential consequences of a pattern of returning migrants from Guayaquil is significant because Guayaquil has had heavy cholera incidence.

3.1.2 COMMUNITIES OF COTOPAXI

Alpamalag de la Co-Operativa

Alpamalag, located in the county of Pujili, is a small community, with 428 inhabitants in 120 households. It is an indigenous Indian community; Quichua is the primary language, Spanish being a second language for most people. The community has a small elementary school, but the nearest health substation is four kilometers away.

At the time of the activity, there was no electricity in Alpamalag, and piped water came from an old system which was regularly out of commission. The water that did come through the system was untreated. Most water was brought in on donkey back or occasionally by truck. There was a community spigot with water from the mountains. Members of the community have a

key with which to open the spigot, if they have paid the amount assessed for water.

Sixty percent of the population had access to latrines; however, in general, the latrines were poorly maintained and poorly used. Fifteen percent of the latrines were used appropriately; the remaining 85% were either in disuse or used for other purposes (storage, etc.).

For most of the year, the land surrounding the community is too dry for most agriculture except agave. Most adult males migrate out of the community in search of work, leaving their families in Alpamalag and returning home for fiestas.

In the canton of Pujili, there were 22 cholera cases in 1993 and 8 cases in 1994.

Comunidades de la Zona del Canal

The eight communities that constitute the “Comunidades de la Zona del Canal” have 4,500 inhabitants. These communities share access to some resources even though they are geographically spread apart. Two contiguous communities with a total of 250 families were studied as “Zona del Canal” for this project. They are located in the county of Salcedo. There were 94 cholera cases in the canton of Salcedo in 1993, and 40 cases in 1994.

As the name implies, these communities are surrounded by irrigation canals which provide water to the large agricultural landholdings in the area. Much of the water used by community members was taken directly from the canals untreated. The canals are open to the air, pass by homes, and are frequently used as places in which to dispose of

household garbage and human wastes. At the time of the activity, the Zona did not have piped or treated water, but individual homes did have electricity. CARE International had supplied latrines to about 50% of the households in the community. Animals are generally kept in yards close to, and in some cases, within the open-air portion of the house.

Across the board, conditions in these four communities could be characterized as lacking reliable access to water, basic hygienic services, and knowledge about disease transmission and sanitary practices. Data from questions and observations revealed a wide range of high-risk behaviors which were conducive to transmission of cholera. In response to these data,

Doña Rita's Story (from Zona del Canal)

We had been driving straight into the mountains for an hour or so before we saw the two small figures far ahead of us in the distance—two women in long woolen skirts and traditional felt hats. They were wearing rubber boots and carrying hoes over their shoulders. As we got closer, we recognized Doña Rita and slowed so she and her friend could squeeze into the Jeep. Doña Rita had emerged as a strong and effective leader on the CPI community team. The women had been out since before dawn, working with 80 other women from the surrounding communities on a communal labor project (una minga) to repair water pipes damaged in the earthquake five months earlier. Doña Rita and the other women had gotten up early to feed their livestock, walked for two hours to spend eight hours digging ditches. Now they were walking the two hours back to their communities where they would check on their children and then head up to the pastures to bring their livestock back down. On their return to their homes, they would feed their families and rest. It was a long and arduous day for all of them, but as Doña Rita said, "It is important work." Then she laughed and added, "And we women are muy macho."

communities designed local interventions to reduce the spread of cholera and other water-borne infectious diseases.

3.2 CONTEXT OF POVERTY OF THE SIERRA

Life for indigenous people in the sierra is marked by high levels of poverty, high infant mortality rates, low levels of education, and low levels of services. In recent years the poverty has intensified to the extent that the men must leave their communities in search of work. They migrate to the cities of Quito and Guayaquil to work as laborers, returning to their home communities for ritual fiestas and whenever else they can. Women, children, the elderly, and the disabled remain in the small sierra communities. Women's work is particularly arduous for a combination of reasons: traditional gender roles emphatically place women in a lower status than men, and wives tend to be subservient to their husbands. In addition, when men migrate their labor falls to women; thus, women work the fields, tend the livestock, and work on communal labor crews. While there are exceptions to the commonly encountered paternalistic family structure, the four Indian communities selected for the CPI activity did reflect this traditional gender role pattern.

While poverty affects the majority of Ecuadorians, recent estimates calculate that 58% of the urban population and 61% of the rural population in Ecuador live in poverty, a percentage that has been steadily increasing since the economic crisis of 1980-82. Communities in the sierra have a greater concentration of poverty than most other areas of the country. In Cotopaxi and Chimborazo, 78% of the townships fall below the national mean for poverty and lack access to basic services. All of the counties in Cotopaxi and 89% of those in Chimborazo lack the basic services of potable water and either latrines or sewerage.

To live in a rural area lacking basic services can be dangerous to one's health, but to be Indian and living in the rural sierra puts one at high risk of disease and death. In Chimborazo the infant mortality rate (per 1,000 live births) is 49.94; in

Cotopaxi it is 49.20. Sixty-seven percent of the population of Cotopaxi suffer from malnutrition, 33.50% are illiterate, and 70% live in rural areas. While only 59% of the population in Chimborazo live in rural areas, they share with Cotopaxi the high levels of malnutrition (67.1 %) and illiteracy (36.40 %) (Ivan Laspina).

The two states fall along the sierra backbone of poverty. These are not the only states in Ecuador with high levels of poverty, but poverty is highly concentrated in specific areas in the two states. This information is significant because it provides some of the numerical indices of poverty for the communities in which the CPI model was applied.

“Did they sell the community land to pay for this health fair?” People in the most traditional and isolated of the four communities had few services from outside

their community. When the CPI brought a health fair to Pompeya, community members feared that their land had been sold to pay for the participation of the various groups CPI brought to the community to demonstrate healthy hygiene practices, sanitation, and food preparation.

We visited the communities unannounced. People were pleased to see us, proud that we had come back to see them again and proud of their achievements. They pointed out how they had cleaned up the common areas, the plazas or town squares since the CPI project. They showed us where the garbage container with CPI-EHP printed on its side stood, and they took us into their homes to show us the precious bidones (water containers). In almost every home the water container had its own cloth cover—to keep it clean they told us. We were impressed and touched by the sacrifice incurred by the creation of the clean cloth that covered every bidon we saw, and the respect that its presence demonstrated.

4 FOLLOW-UP ACTIVITY METHODOLOGY

4.1 SELECTION OF OBJECTIVES

As part of its follow-up monitoring activities in July 1996, EHP's Technical Team surveyed the four communities involved in the original BACA project to determine the impact the project had made on residents' behavior. Using the original project's primary objectives as a base (see Chapter 1, Section 1.2), EHP/MOH/USAID established the following objectives for monitoring purposes:

- Measure the BACA project's impact in terms of behavioral changes that influence the transmission of cholera, and in terms of the interventions the communities themselves selected.
- Assess the project's impact by estimating the demand on health care services to combat diarrhea among adults, and verify levels of mortality due to diarrhea within the project zones.
- Verify the level of transference and the level of acceptance of the proposed CPI methodology, at both the public-institution and community levels.

The third of these objectives was ambitious and difficult to measure objectively because a complete set of indicators for tracking progress in this area was not developed during the follow-up task. In addition, mortality and morbidity rates for diarrhea and related diseases, including cholera, vary over time. Although the CPI contributed to an improvement in health behaviors, the precise contribution to reduced incidence of diarrheal disease is difficult to evaluate.

The following steps were established to achieve the first objective:

- Determine the quality of water being consumed inside the house. (Improving home water quality was the purpose of several microprojects each of the communities carried out.)
- Determine the level of behavioral change with respect to cholera transmission.
- Measure changes related to basic sanitation in the four communities.

For the second objective:

- Analyze existing patterns of diarrhea and related illnesses, including the number and percentage of consultations and hospital discharges attributable to acute diarrheal disease (ADD-cholera) and the health services being provided to the communities involved in the project.
- Gather information on the number of deaths attributed to ADD-cholera by the Provincial Directorates of Health.

For the third objective:

- Identify the perceptions, level of acceptance, and level of use of the project methods by health or government authorities and institutions.
- Identify the level of satisfaction with the methodology and how the communities themselves have profited from it.

4.2 IDENTIFICATION OF NEW MONITORING INSTRUMENTS

On the basis of the proposed objectives and given time and budget considerations, the instruments described in the following subsections were developed. (Copies of these instruments are

included as Appendix C.)

4.2.1 INSTRUMENTS FOR MEASURING THE FIRST OBJECTIVE

Outcome Measure Survey

The team considered the outcomes of the BACA project and identified three clusters of core behaviors to measure:

- Treatment of water consumed at home
- Washing of hands, food, and dishes
- Disposal of excreta

To measure these behaviors, the team prepared a form titled “Home Survey and Interview,” which included observations of and/or interviews with community members about their hygiene practices in the kitchen, in the bathroom/latrine, and with respect to garbage disposal. The form consisted of a closed-ended questionnaire that repeated the questions asked in the initial baseline assessment.

4.2.2 INSTRUMENTS FOR MEASURING THE SECOND OBJECTIVE

Morbidity/Mortality Data Forms

In order to determine morbidity and mortality statistics regarding ADD-cholera, the team analyzed the number of ADD-cholera consultations made at health care facilities in the areas around the four communities both before and after the CPI. (Consultations were determined based on ambulatory-service and hospital-discharge data.) The team recorded consultations from December 1994 through April 1995 and December 1995 through April 1996 and data on deaths attributable to ADD-cholera as registered at the region’s Civil Registration Office using forms prepared by statisticians working at the Provincial Directorates of Health.

beforehand, including records of the community leaders participating in the project. Finally, the Technical Team requested the participation of a central-level MOH nurse in filling out the

4.2.3 INSTRUMENTS FOR MEASURING THE THIRD OBJECTIVE

Interview Guides

The team prepared two different types of interview guides to elicit perceptions and acceptance of the CPI methodology. One guide was used to interview regional authorities, health care staff, and teachers; the other was used to interview community members. The guides were based on a series of open-ended questions.

4.3 FIELDWORK PREPARATION

4.3.1 STATE EPIDEMIOLOGIC TEAMS

The Technical Team trained the State Epidemiologic Teams to use the instruments described above. The state epidemiologists (who were also members of the original CPI State Epidemiologic Teams) then trained members of the Community Teams.

4.3.2 COMMUNITY TEAMS

The State Teams simultaneously trained all four Community Teams on the use of the “Home Survey and Interview” form for behavioral-data collection. Training included on-the-job skills and was supervised by the state epidemiologist of Cotopaxi and the state nurse of Chimborazo.

The latter two professionals also trained the state statistics specialists in using the morbidity/mortality forms to collect ADD-cholera data at the health units and local Civil Registration Offices. In addition, selected health units were visited and data collected

interview guides to gauge local acceptance of the CPI methodology.

For the follow-up activity, the original Chimborazo Community Teams were reduced by

25%, with only 15 leaders left (8 at Gatazo and 7 at Pompeya). Cotopaxi, however, maintained all of its 23 leaders (11 at the community of Alpamalag de la Co-Operativa and 12 at the Zona del Canal).

At the time of the follow-up activity, the State Epidemiologic Team of Chimborazo was staffed by only two members (one state public health nurse and one health educator from the Ministry of Education and Culture, or MEC); the sanitation inspectors who had been on the team originally had been relocated to their former workplaces after the BACA project was

Spreading the Word to Vendors

Señora Hilda, a Community Team member from Alpamalag, decided to take the lessons from BACA to the wider community. “We can teach our children to wash their hands, drink only clean water, and wash their fruit, but we all eat food from the street vendors. How can we teach them the lessons of CPI?”

To teach the street vendors about sanitation and hygiene, Sra. Hilda and other women from the community set up a stall in which they prominently displayed one of the BACA water bidones. The women used water from the bidon to wash and prepare the food they sold, as well as to clean the plates on which they served the items. “Everyone bought food from us because they didn’t want to get sick. The vendors asked us what we were doing that made people buy from us and not from them.”

completed. Furthermore, the MEC health educator’s role was changed for the follow-up work because of state downsizing. The follow-up Cotopaxi State Team was staffed by only three people (an epidemiologist and two sanitation inspectors).

4.3.3 APPLICATION OF DATA-GATHERING INSTRUMENTS

Home Survey and Interview

The administration of the “Home Survey and Interview” forms took three days on average, although the Community Teams were allotted one week to complete them. During that time, the State Epidemiologic Teams were ready to provide support and to make sure the Community Teams were maintaining the proper methodological standards to ensure the survey information’s reliability. Communities selected for follow-up were the same communities selected for the original intervention. During the study week, all homes where a head of household (male or female) was present were selected for interviews. Sampling was based on convenience. There were no refusals.

All four communities were visited, and interviews were conducted with community leaders and Community and Regional Team members. As part of their work, the teams checked the location of bidones and inspected latrines.

The four Community Teams collected 132 completed surveys or interviews: 44 from Zona del Canal, 35 from Alpamalag, 25 from Pompeya, and 28 from Gatazo. The teams used the same methodology in each community.

Morbidity/Mortality Forms

The state statisticians compiled morbidity and mortality information with difficulty because some health units had kept inadequate records. During and following the cholera epidemic (1991-93), Ecuador required clinical verification

of deaths attributed to cholera. Under-reporting and incomplete records, however, are common. The participation of Provincial Directors was needed to elicit information from Civil Registration Offices.

Interview Guides

Using one of the interview guides, the Community Teams focused on people's perceptions of the benefits of the CPI; specifically, the delivery of water containers, donated equipment, and the use of these materials.

4.3.4 ORGANIZATION OF DATA

The teams reviewed the data on the same days on which they were collected. The State Team reviewed every form together with the person in charge of the activity.

4.4 TABULATION AND PROCESSING OF SURVEY INFORMATION

The Technical Team processed the information acquired from the three survey/data collection instruments both manually and via computer programs. To analyze the results of the home survey, the team used the EPI INFO program; for the morbidity/mortality data, the team manually processed the forms and sorted qualitative data by topic or by information given.

4.5 REPORT PREPARATION

Once the data analysis was complete, the Technical Team's physician-epidemiologist and medical anthropologist wrote the final report. Both team members had co-directed the original BACA project.

Prized Possessions

“But what will happen when our children marry and move away? Where will I get another bidon for them?” The Community Team in Gatazo Grande frequently encountered this sentiment among residents. Families there realize that bidones are their source of clean, safe water, and they wonder where they will get additional containers when the time comes for their children to leave home. “They will want to take the bidones with them,” said one community member. “What will we do?”

4.6 LIMITATIONS

Both sample size (132 households) and the sampling frame (convenience) are standard in the social sciences; they are uncommon in epidemiological studies. The present study combines both social science and epidemiological techniques and the methodology reflects that combination. Limitations on the reliability of the mortality/morbidity data and hospital discharge data reflects administrative record keeping procedures. Hospital-based data includes only cases considered sufficiently acute to warrant the expenditure of time and other resources to take the patient to the hospital, therefore, under-reporting occurs. In addition, hospital discharge records include diagnoses but do not include patients' addresses; therefore some error may result when patients from one catchment area seek hospital care from another closer hospital in another catchment area.

5 RESULTS

The following sections present the results of the follow-up monitoring of the 1994 BACA project. To assess changes in behavior since the project's completion, the teams not only conducted interviews and made on-site observations, but also asked the community members themselves to identify changes.

5.1 RESULTS AND ANALYSIS OF THE HOME SURVEY AND INTERVIEW

As indicated in Section 4.2, interviewees were asked questions designed to elicit information about behavioral changes within the following core clusters: treatment of stored or piped-in water; washing and drying of hands, food, and dishes; and disposal of excreta. The data collected through these interviews and observations are included here as Appendix D. The following paragraphs and tables highlight the most salient findings. Results are reported by question and by community.

5.1.1 TREATMENT OF STORED OR PIPED-IN WATER

Findings of the survey and interviews are as follows (see Table 2).

- Three of the four communities receive water from underground springs or receive untreated piped water. Only Gatazo Grande receives treated, piped water, which is chlorinated by the local *Junta de Agua* (Water Committee). (Gatazo's water, however, is not piped into each house, but rather is distributed through a system of standpipes situated every few blocks.) The other communities must chlorinate their water themselves. Of the communities that chlorinate their own water, close to 60% of the families observed use chlorine properly, compared with 36% during the baseline comparison period. In two of the communities in Cotopaxi that chlorinate

**Table 2
TREATMENT OF STORED OR PIPED-IN WATER**

Behavior	Baseline	Follow-up Survey
1. All water used in household cooking, whether piped or stored, is treated chemically or by boiling.	36%	70%
2. Stored water is kept in small-necked, covered vessels and drawn through spigots or with a ladle used only for that purpose.	6%	100%

their own water, 87% of households treated water properly, but in Pompeya, Chimborazo, where chlorine is not yet provided, only 4% of households use chlorinated water.

- Proper bidon use occurred in 96% of the households visited, and people in all communities use the bidones to store water in their homes.
- All of the families surveyed (100%) use the bidones to avoid contamination previously caused by dirty water containers or utensils used to get the water out of the container. During the baseline survey only 6% used safe water containers.
- Almost all of the respondents (92%) agreed that it is important to add chlorine to their drinking water. The exception occurred in Pompeya, the most disadvantaged of the four communities, where only 60% of respondents said chlorination is important and, as noted above, municipal authorities do not yet provide chlorine. This response rate therefore lowered the overall average. Even with the low Pompeya average, the overall average of 92% reflects remarkable success for the Community and Regional Teams in their efforts to communicate their message to the communities.
- When community members were questioned about their source of chlorine (to ascertain better the level of their knowledge about chlorine acquisition and use), 93% of the people in Gatazo Grande knew that the community prepared its own chlorine, as compared with Pompeya where only 20% of the respondents knew where the chlorine came from. In the two target communities in Cotopaxi, where the MOH provides chlorine, 95% of the people surveyed in Zona del Canal were familiar with the source of chlorine, compared with 57% of those in Alpamalag.
- Although 96% of the people observed across all four communities use their bidon to store water for drinking and cooking, only 70% of the people observed have safe, treated water. This means that only 67% (95% x 70%) of the people in the four communities have access to safe water. The percentage of people

who drink treated water in Gatazo Grande, Zona del Canal, and Alpamalag is 89%, but in Pompeya, only 3% of the households observed drink safe water.

- The number of households using water from the bidon for cooking showed less of an increase from the time of the original baseline survey; 45% of the households surveyed observed this practice. However, the proportion using safe water falls to 32% (45% x 70%), again because of Pompeya's lack of water treatment. When Pompeya is excluded, the average of households in the two Cotopaxi communities and Gatazo Grande who cook with bidon water rises approximately 10%.

5.1.2 WASHING AND DRYING OF HANDS, FOOD, AND DISHES

Findings of the survey and interviews are as follows (see Table 3).

- In the communities of Gatazo Grande, Zona del Canal, and Alpamalag, in 89% percent of the observed households, people wash their hands with clean water stored in a bidon. In the observed households in Pompeya, however, only 16% wash their hands with water from the bidon. The overall mean is 75%.
- Despite the low level of household hand-washing, Community Team members in the Pompeya community (with assistance from the Ministry of Social Well-Being), began a community-wide child care center. There, bidon water is used to wash children's hands several times a day, and to brush their teeth at least once a day. Both activities were introduced to Pompeya through the CPI.
- Eighty-two percent of the households observed use bidon water to wash their plates; considering that 70% of the households have treated or safe water, an estimated 57% (82% x 70%) of households wash their plates with treated water overall. This percentage rises to 64% when Pompeya is excluded from the analysis. In the baseline survey conducted in 1995, only 15% of the households observed wash their plates with treated water and soap.

In the current survey, the percentage has risen substantially because the percentage of households with treated water has risen substantially. No decrease in the use of soap was assumed.

- An average of 77% of the households surveyed in 1996 wash their raw fruits and vegetables. This percentage rises to 88% when based exclusively on observations in

Gatazo Grande, Zona del Canal, and Alpamalag. In contrast, the percentage in Pompeya is only 32%.

- Of the households that do wash their fruits and vegetables, 85% do so using bidon water. When the quality of water in the bidon is taken into consideration, 59% (85% x 30%) of those observed washed their raw food with safe water, up from 30% in the baseline survey. When only the two Cotopaxi communities and Gatazo Grande are considered, the percentage is 88%. In Pompeya, of the 64% of households observed washing their raw fruits and vegetables, only 4% use treated water from the bidones.

Table 3
WASHING AND DRYING OF HANDS, FOOD, AND DISHES

Behavior	Baseline	Follow-up Survey
1. People engaged in food preparation wash their hands with soap and clean water.	25%	40%
2. After washing their hands, food preparers air-dry their hands or dry them on clean cloths.	20%	30%

Behavior	Baseline	Follow-up Survey
3. After defecating or urinating, all people wash their hands with soap and clean water.	50%	77%
4. Hand washing is done in running water or in a container of clean water.	37%	46%
5. Dishes are washed with soap and clean, treated water.	15%	57%
6. Raw fruits and vegetables are washed in treated water before being served.	30%	59%

- Following the intervention, 77% of people in observed households who do the cooking washed their hands with soap and treated water. Since only 75% used water from the bidones and only 70% of the bidones contain treated water, the percentage (77% x 74% x 70%) of people who wash their hands with soap and treated water before they prepare food falls to 40%, compared with the 25% observed during the baseline survey.
- In Gatazo Grande, where piped-in treated water is available (i.e., water that need not be treated inside the house), 89% of households observed wash their hands with running water. Of those, 96% use bidon water. However, the average for the four communities combined using either running or standing water in a bowl or sink, falls to 46%. This is nonetheless an improvement over the baseline survey's average of 37%. Washing hands in running water uses more water than washing in standing water, and in those households where water must be treated inside the home, handwashing in standing water may well be a method of conserving water.
- An average of 30% of the people surveyed reported that they use a clean towel or that they let their hands dry in the air. No significant difference regarding this practice

occurs among the communities. The baseline data indicated that only 20% of the people surveyed use this method to dry their hands.

- Handwashing following defecation is critically important in preventing the transmission of cholera. The baseline survey reported that 50% of those surveyed wash their hands with soap and water after defecation. Assuming that the use of soap remained the same, the teams observed that 77% of those surveyed in 1996 follow this practice, with the highest percentage (94%) occurring in Zona del Canal, and the lowest (48%) in Pompeya.

5.1.3 DISPOSAL OF EXCRETA

Findings of the survey and interviews are as follows (see Table 4).

- In the baseline survey, only 15% of the households observed in the four communities dispose of excreta in hygienic ways. In the 1996 survey, the average across the four communities was 72%, with 30% using toilets and 42% latrines.
- An overall decrease has occurred in the number of adults who report defecating in open fields, from 69% in the baseline survey to 28% in 1996. Of those who currently use

**Table 4
DISPOSAL OF EXCRETA**

Behavior	Baseline	Follow-up Survey
1. Excrement is disposed of in a toilet or cleaned latrine	15%	72%
2. Children and adults defecate on open ground (fields).	69%	28%
3. Those who bury feces in open ground as a percentage of all residents.	16%	23%

open fields, 82% report that they bury the feces. This represents 23% (82% x 28%) of all residents, compared with 16% during the time of the baseline survey.

The Technical Team observed in Gatazo Grande what it believes to be one of the direct consequences of the BACA project. There, through a community-initiated effort, residents recently succeeded in putting in a sewerage system. In contrast, Pompeya still lacks latrines. Since the baseline survey, however, 30% of the households in Pompeya have acquired latrines. The remaining two communities, Alpamalag and Zona del Canal, each have household latrines.

In addition to behavioral changes observed in the three core behavior clusters, the Technical Team believes the BACA project resulted in behavioral changes that led to overall increases in both personal and community cleanliness. According to community members, prior to the BACA project, residents of the communities studied exhibited no particular concern about maintaining either a clean personal appearance or clean living spaces. As a result of the community-based monitoring, people began to pick up trash (in particular, toilet paper) and throw it away or burn it. Of the homes inspected, 57% had no trash or garbage littering their yards or patios, and their interiors were clean, and 83% of the households observed either burn or bury their garbage.

5.2 EPIDEMIOLOGICAL DATA ON MORBIDITY AND MORTALITY

As noted in Chapter 4, the second objective of the follow-up monitoring was to measure the BACA project's impact on the demand for health services to treat diarrhea and cholera—especially among adults—and to assess changes in mortality associated with diarrheal diseases.

The Technical Team's analysis of morbidity and mortality data is described in the following subsections.

5.2.1 COMMUNITY HEALTH CENTERS

State Public Health statisticians gathered data on diarrhea-related diseases for three age groups: children younger than 5, children aged 5 to 14, and people 15 and older. Data was obtained at health centers that usually provide services to the four communities included in the BACA project.

Based on the daily reports issued by the health centers during the rainy season, in which the incidence of diarrheal disease is highest, the statisticians plotted two groups of data, one for the rainy season months (December through April) of 1994-1995 and one for the same months in 1995-1996. These two periods correspond to conditions prior to and following the BACA project, respectively.

The health centers providing services to the four project communities are described below.

(See Table 5 for a list of the communities and health centers.)

Zona del Canal

The MOH Hospital Cantonal Yerovi Makuart in the county of Salcedo is the closest health center for Zona del Canal residents; a car ride from Zona del Canal takes approximately 10 minutes. The hospital is small, with only 15 beds. It takes care of the population in the county’s main town and serves as a referral center for less complex health centers in the area (health subcenters). The hospital’s catchment area includes 22,890 people and encompasses both rural and urban populations. It is estimated that the area comprises some 45 communities, including Zona del Canal.

Alpamalag de la Co-Operativa

The MOH Hospital Cantonal Rafael Ruiz in the county of Pujili is the closest health center for the residents of Alpamalag de la Co-Operativa. This 15-bed hospital also acts as the

**Table 5
COMMUNITIES AND HEALTH CENTERS THAT SERVE THEM**

State	County	Community	Hospital or Health Center
Chimborazo	Colta	Gatazo Grande	– Gatazo Health Subcenter – SSC Dispensary – Colta Hospital – Hospital Policlinico de Riobamba (outside assigned health district)
	Riobamba	Pompeya	– Licto Health Subcenter – Flores Health Subcenter
Cotopaxi	Pujili	Alpamalag	– Rafael Ruiz Hospital
	Salcedo	Zona del Canal	– Yerovi Makuart County Hospital

main office for the health area. It is located approximately 15 minutes by car and 45 minutes on foot from Alpamalag.

The hospital takes care of people from Pujili’s main town and acts as a referral center both for health subcenters in the area and for the rural

population neighboring the main town (about 33,157 people). It serves approximately 30 communities, including Alpamalag.

Gatazo Grande

People from the Gatazo Grande community go to the MOH Health Subcenter at Gatazo and to the Rural Social Security (SSC) Dispensary, which belongs to the IESS (Ecuadorian Social Security Institute). These facilities provide ambulatory services only.

The Health Subcenter at Gatazo is located approximately 2.5 kilometers from Gatazo Grande, and the SSC Dispensary, less than 1 kilometer. Both provide services to affiliates within area communities. These health units belong to the health sector at Colta and take care of people from approximately 40 small rural communities that are very similar to Gatazo Grande.

Patients from Gatazo Grande requiring hospitalization are supposed to go to the Hospital Cantonal de Colta (15 beds), but instead they go to the Hospital Policlinico de Riobamba, which is closer than Colta but outside of their assigned health district.

Pompeya

Pompeyans go to the Health Subcenters at Licto and Flores. In theory, the community of Pompeya belongs to the Parish of Licto and Pompeyans should go to the Licto Health Subcenter, but the Subcenter at Flores is closer. The Flores Subcenter is about one hour by foot from Pompeya, and the Licto Subcenter, about two hours (vehicles are not readily available in this community). These two health units provide services to approximately 10 communities, with Pompeya among them.

5.2.2 CONSULTATIONS FOR DIARRHEAL DISEASES

Consultations As a Whole

The statisticians' analysis of the morbidity and mortality information gathered from the health centers is presented in Appendix E and summarized in this section and Figures 1-8.

From December 1994 to April 1995, prior to the BACA project, 589 consultations for diarrheal diseases were recorded, 7% of all consultations. During the second period, December 1995 to April 1996, 621 consultations

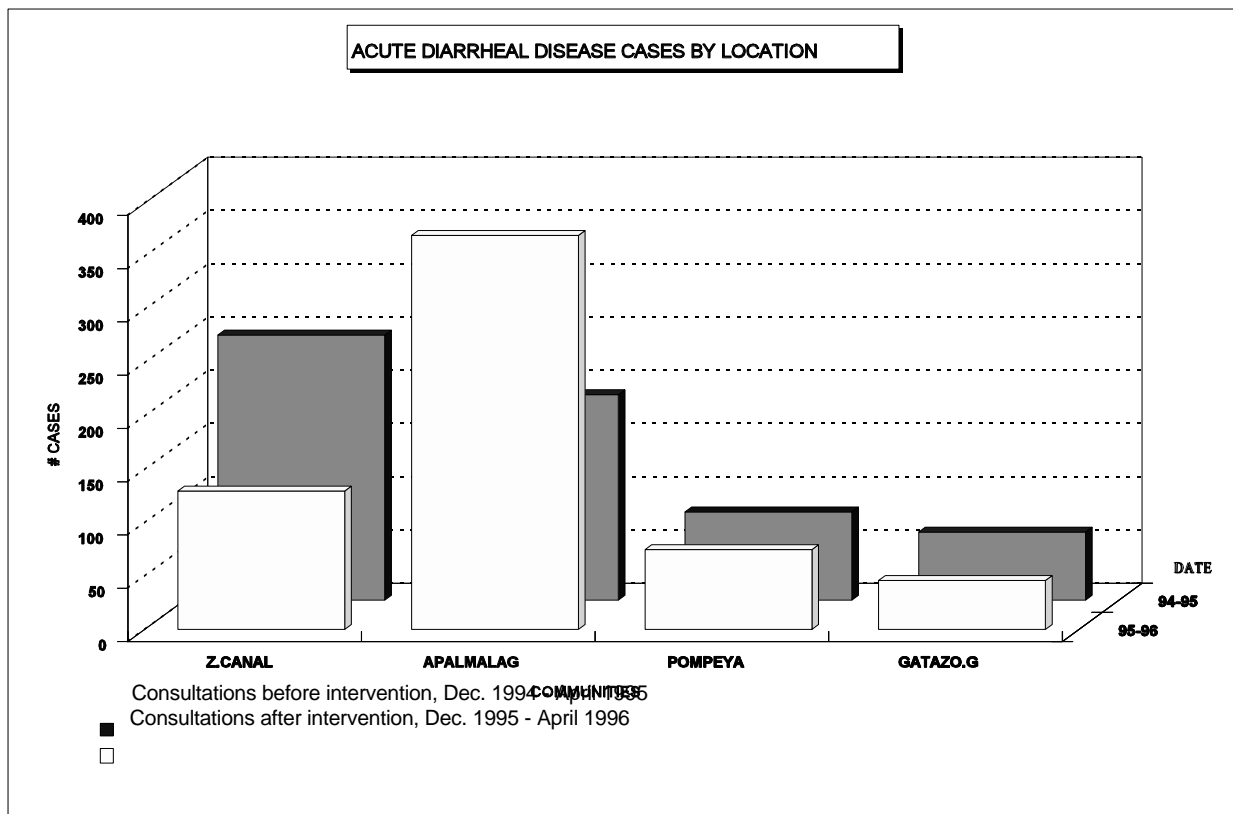
were recorded, for a total of 5% of consultations (see Figure 1). (Data for Gatazo combine figures from the Health Subcenter with those from the SSC Dispensary. Data for Pompeya also combines figures from the Health Subcenters at Licto and Flores.)

The percentage decline in consultations differs across health centers. At the Yerovi Makuart Hospital in Salcedo (which treats Zona del Canal residents), for example, consultations dropped from 249 to 130 from the first to second periods, while the Subcenter at Gatazo and the SSC Dispensary recorded a drop from 64 to 46 consultations. For the Subcenters at Licto and Flores (which treat residents of Pompeya), consultations fell, from 83 to 32.

It should be pointed out that in Pompeya the level of change in high-risk behaviors for the transmission of cholera was much less than in the other communities. This is partly because this community has many more destitute sections than other communities in the county.

As shown in Figure 1, the Hospital in Pujili (which treats inhabitants of Alpamalag) experienced a sharp rise in consultations (from 193 to 373) between the two periods studied. This is due, as was previously mentioned, to the earthquake that took place there at the end of March 1996. During December 1995 and January and February 1996, consultations for acute diarrheal disease averaged 12 a month. By contrast, such consultations rose to 282 in March 1996 and to 55 in April 1996. In order to meet the increased demand, medical and

Figure 1



paramedical staff from the capital city in the disaster area had to be mobilized to the region.

Because of the earthquake, the Technical Team has excluded the months of March and April from the two study periods in order to analyze accurately the BACA project's impact on Alpalmalag. When comparing only the months from December 1994 to February 1995 with those from December 1995 to February 1996, consultations for acute diarrheal disease fell from 104 (5% of total) to 36 (2.3% of total).

Consultations by Age Group

Cases of diarrheal diseases by the three age groups pre- and post- intervention, are shown in Figures 2 and 3. Most diarrheal diseases were seen in children under 5, accounting for 66% of diarrheal diseases recorded in the first study period and 76% in the second. Fewer cases are seen in children 5 to 14.

The group at greater epidemiological risk for contracting cholera are adults aged 15 and older. Ninety-seven consultations with members of this age group took place during the first period, 16% of the total for diarrheal diseases. In the second period, consultations dropped to 77 or 13% of the total for acute diarrheal disease.

When observing the demand for acute diarrheal disease consultations for people aged 15 and over per health unit, one must again account for the unusual demand at the Hospital in Pujili as a result of the March 1996 earthquake. Total acute diarrheal disease cases in each age group increased from the first study period to the second when March and April figures are included (see Figure 4). When March and April numbers are excluded, however, total cases of acute diarrheal disease at the Pujili Hospital fell in the second period (see Figure 5).

At the Subcenters of Licto and Flores, which provide services to the people of Pompeya, acute diarrheal disease consultations for people 15 and older rose from the first study period to the second (5 to 15 consultations; see Figure 6). As noted above, the level of behavioral change in Pompeya is less than that in the project's three other communities.

Figures 7 and 8 show a breakdown of acute diarrheal disease cases by age group at the Gatazo Health Subcenter and the Yerovi Makuart Hospital in Salcedo (which serves Zona del Canal), respectively. Comparisons show a decrease in cases of acute diarrheal disease in all communities with the exception of Pujili during the period following the earthquake.

Figure 2

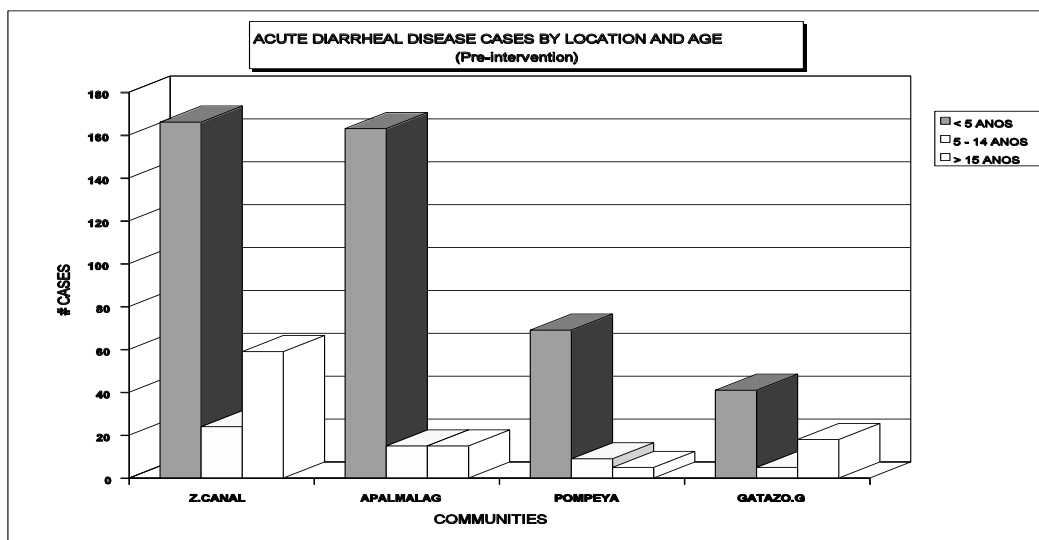


Figure 3

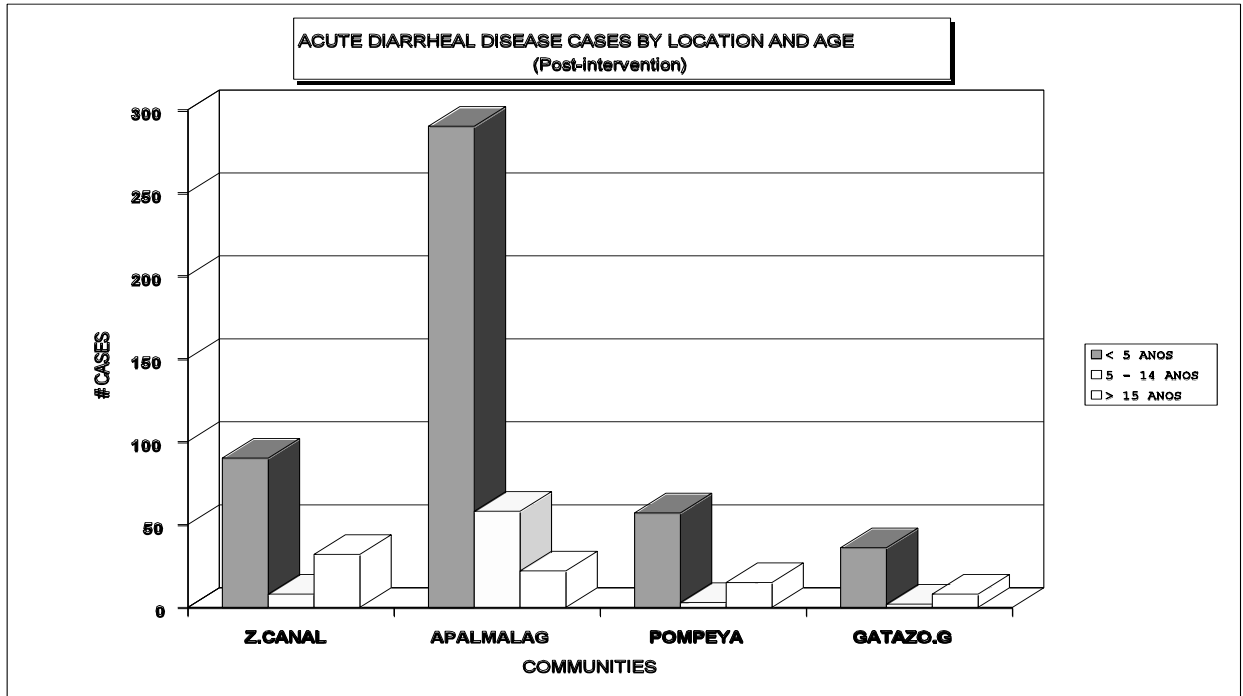


Figure 4

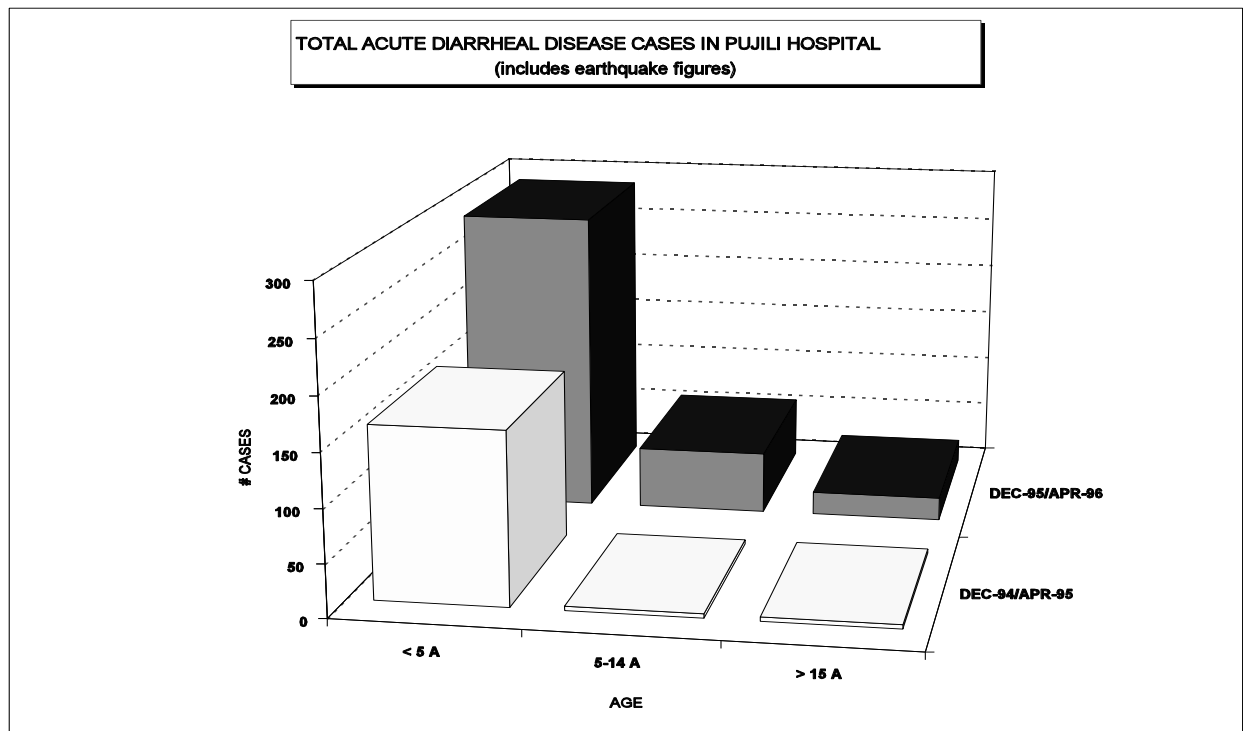


Figure 5

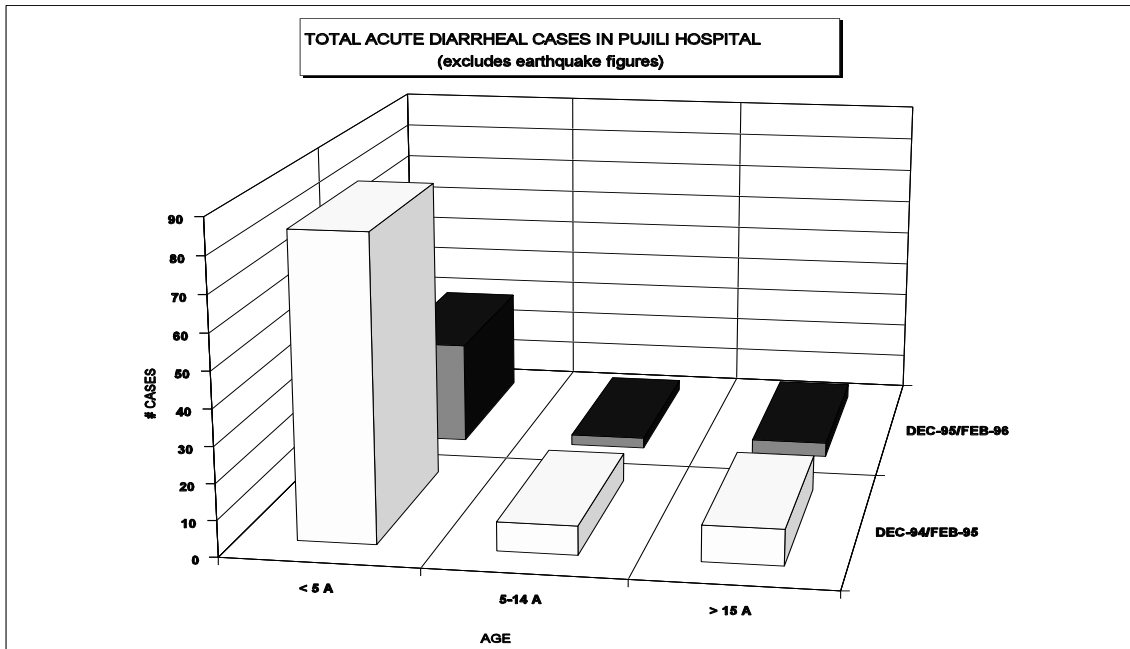


Figure 6

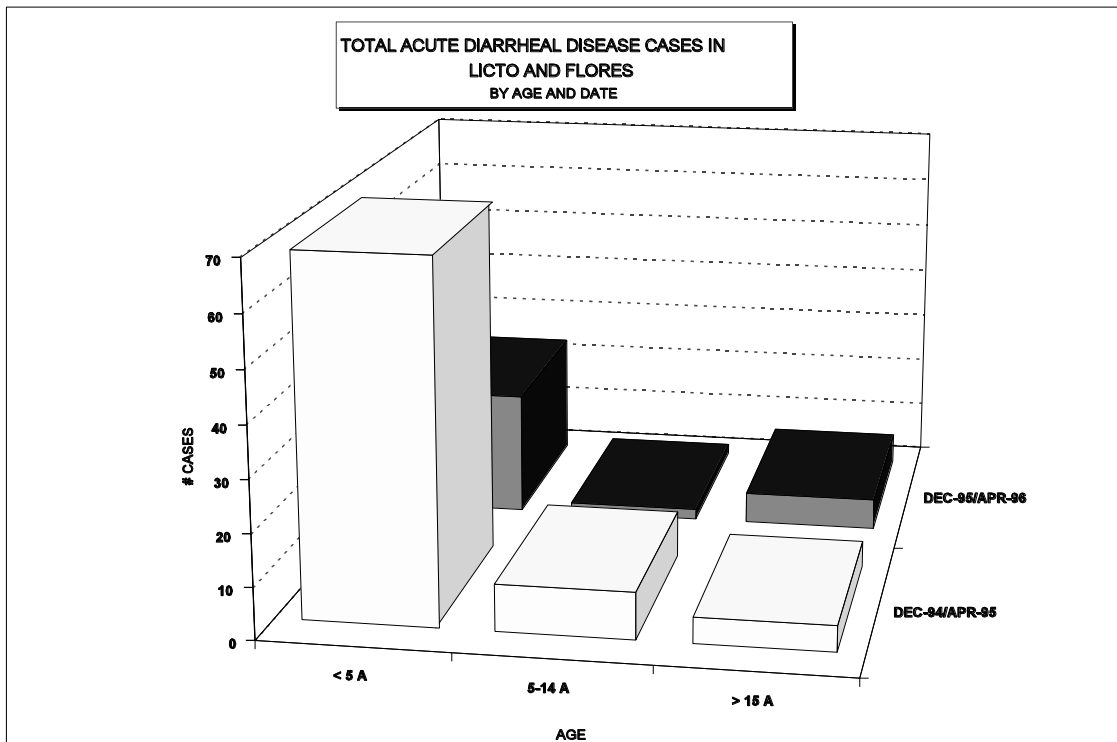


Figure 7

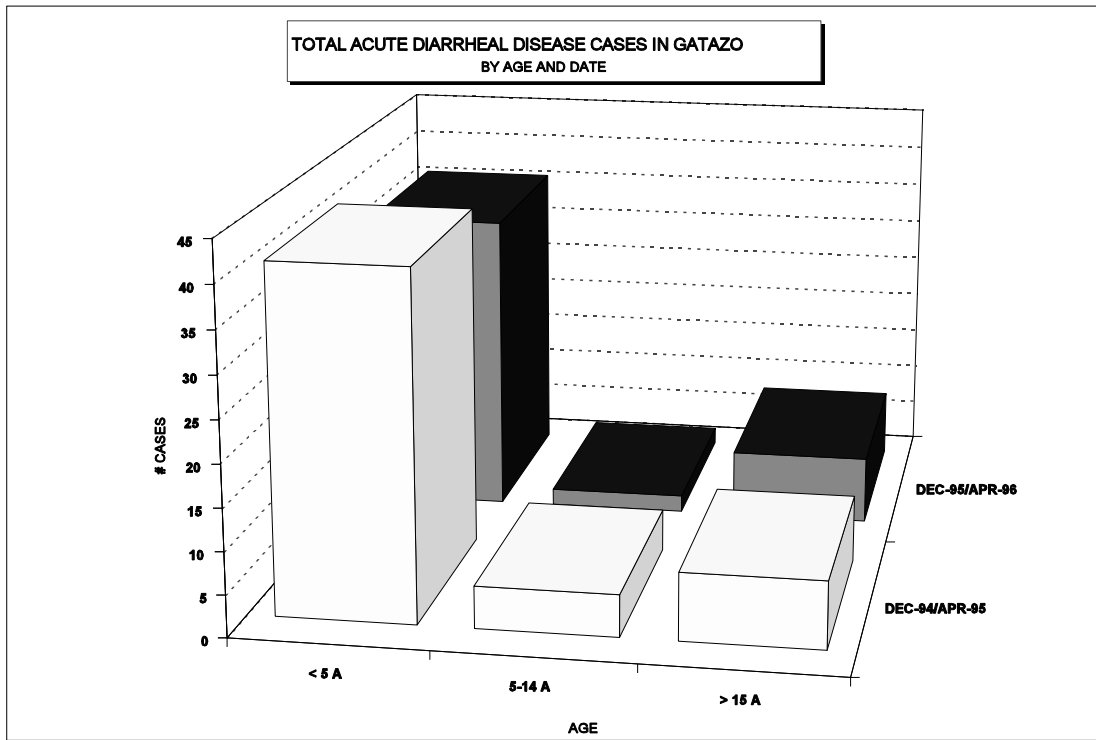
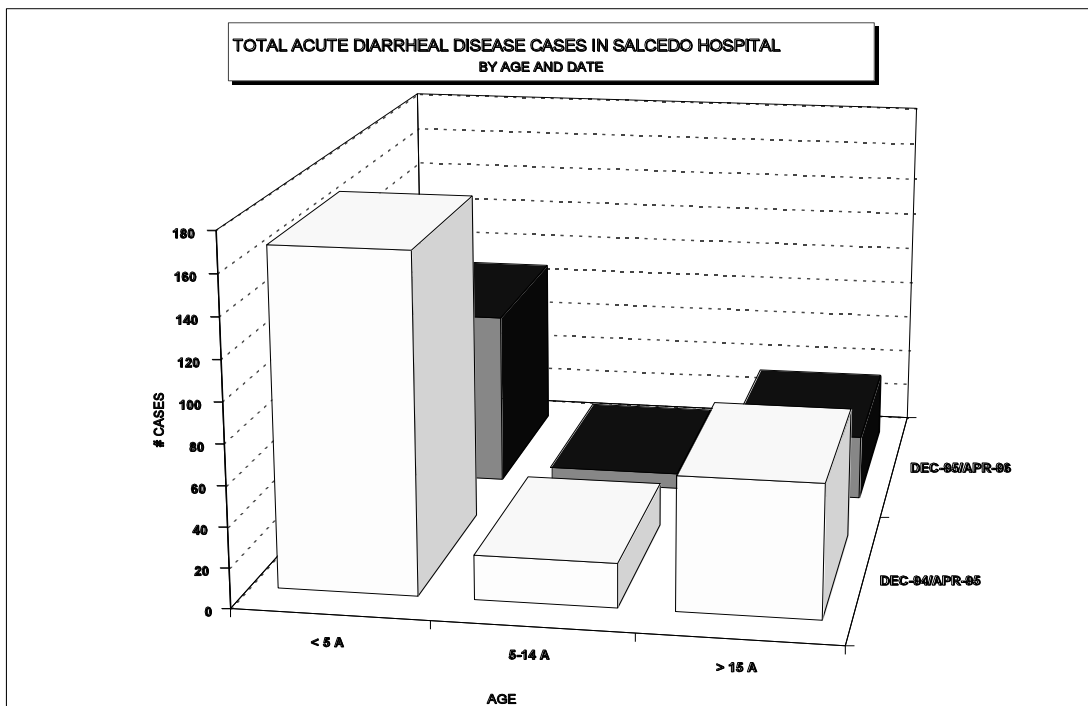


Figure 8



5.2.3 HOSPITAL DISCHARGES

The analysis of information on hospital discharges associated with diarrheal diseases is presented in Appendix E and summarized in this section. The information pertains to the hospitals at Salcedo, Pujili, Colta, and Riobamba.

Unfortunately none of the hospitals' discharge books record the patient's home community, making it impossible for the EHP teams to break down discharge data by project community. (The teams attempted to locate home addresses from available clinical records, but found them to be unavailable for more than 60% of the patients.)

According to the hospitals' discharge records during the first study period (December 1994 through April 1995), 5.4%, or 199, of all patients discharged had suffered from a diarrheal disease. During the second period (December 1995 through April 1996), the figures fell to 3.7% and 139, respectively. The percentage of persons over 15 discharged for acute diarrheal diseases was 84% in the first period and 74% during the second.

At the Hospital at Salcedo (Cotopaxi), 20 acute diarrheal disease discharges took place during the first period, and 15 during the second. The majority of cases involved patients age 15 or older (12 and 4 such discharges for each period, respectively).

The Hospital at Pujili (Cotopaxi) showed variation in acute diarrheal disease discharges between the two study periods, from 5 to 10. It is important to note that the hospital's discharges for all causes also increased from 291 to 328 from the first to second periods as a result of the earthquake.

A similar phenomenon can be observed at the Hospital in Colta (Chimborazo) serving the community of Gatazo Grande. No important variation occurred between periods (38 acute diarrheal disease discharges for the initial period and 36 for the second); similarly, 87% and 86% of discharged acute diarrheal disease patients, respectively, were 15 years of age or older.

Finally, at the Provincial Hospital in Riobamba (Chimborazo), acute diarrheal disease discharges fell 57% from one study period to the

next, from 136 to 77 (88% in the first study were 15 or older, compared with 79% in the second study).

5.2.4 INCIDENCE OF CHOLERA IN ECUADOR

By mandate, cholera cases must be reported immediately because the disease is under epidemiological surveillance. Cases are reported to the appropriate Provincial Directorate of Health (DPS) for confirmation and treatment and quarantine measures.

The incidence of cholera in Ecuador dropped dramatically from 1991 to 1994— from a national rate of close to 450 cases per 100,000 inhabitants to a rate of 15.90 per 100,000 inhabitants (see Figure 9). During 1994, the incidence rose in the states of Esmeraldas (86.95 per 100,000 inhabitants), Chimborazo (72.37 per 100,000), Tungurahua (43.77), and Cotopaxi (35.90). In 1995, the national rate increased slightly to 19.17 per 100,000 inhabitants. The most affected states were Imbabura (76.71 per 100,000 inhabitants), Esmeraldas (62.85), Chimborazo (53.11), El Oro (43.34), and Tungurahua (36.35).

By week 27 of 1996, the province reporting the most cases of cholera was Imbabura, with 620 cases out of a national total of 985. The province of Los Ríos had the next greatest amount by week 27, with 113 cases, followed by Guayas, with 94 cases, and Chimborazo, with 59 cases, among the most relevant provinces (see Figure 10).

5.2.5 INCIDENCE OF CHOLERA IN THE BACA PROJECT STATES

Focusing on the two states that participated in the BACA project, Cotopaxi and Chimborazo, DPS records reveal that 47 cases of cholera

Figure 9

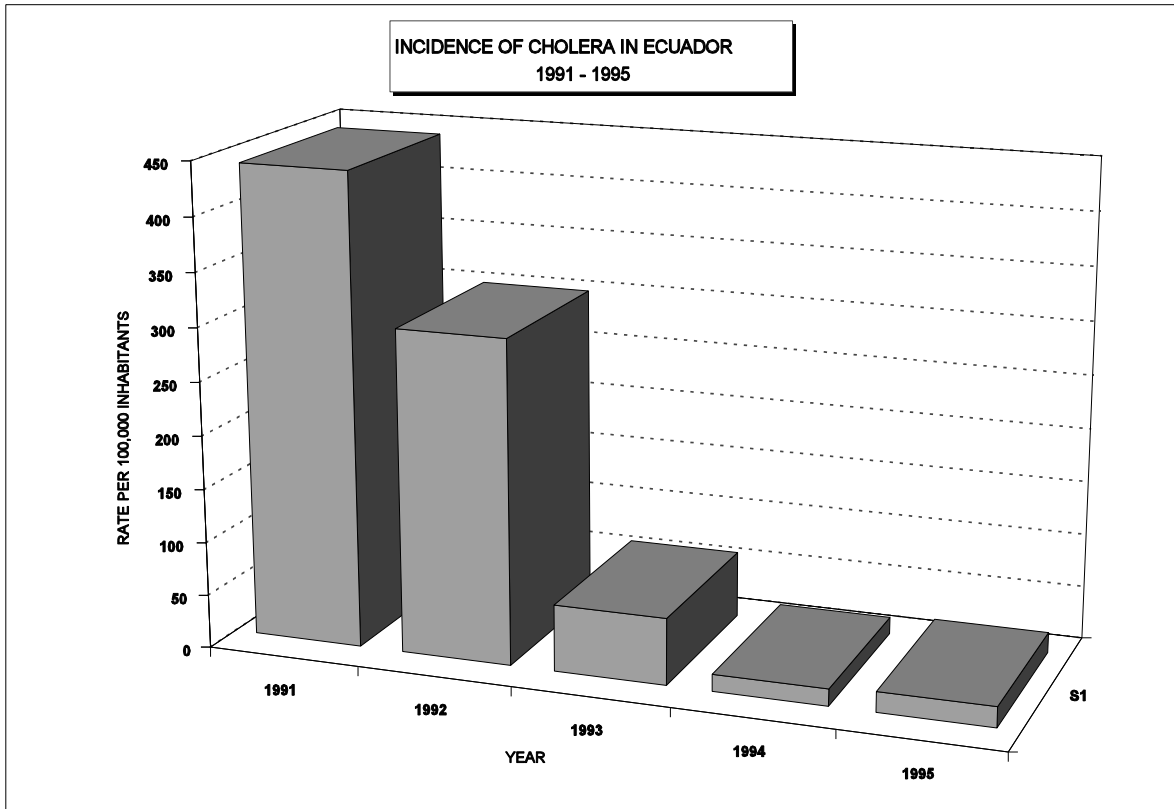
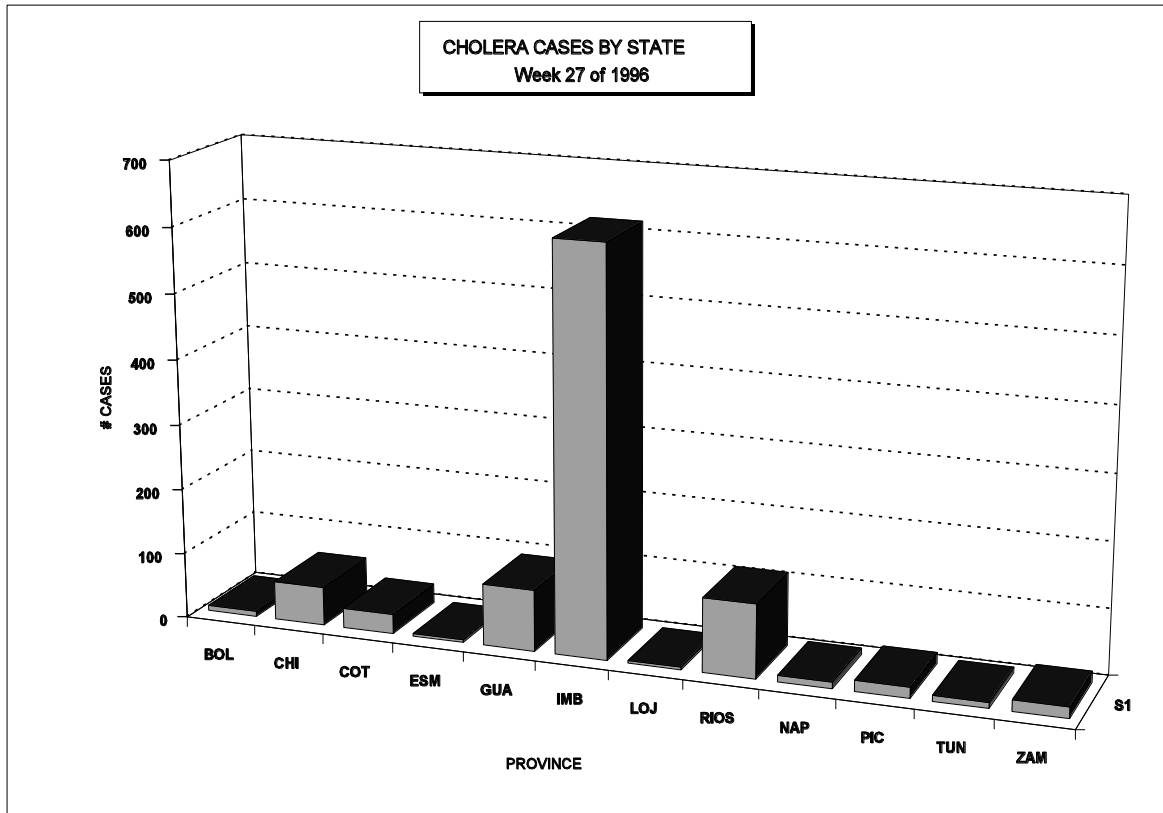


Figure 10



Legend — Abbreviations for Provinces (States)

- | | | |
|------------------|-----------------|-------------------------|
| BOL = Bolívar | GUA = Guayas | NAP = Napo |
| CHI = Chimborazo | IMB = Imbabura | PIC = Pichincha |
| COT = Cotopaxi | LOJ = Loja | TUN = Tungurahua |
| ESM = Esmeraldas | RIOS = Los Rios | ZAM = Zamora-Chinchiipe |

Table 6
INCIDENCE OF CHOLERA IN COTOPAXI AND CHIMBORAZO, 1991-1995
 (Rate per 100,000 inhabitants)

Year	Cotopaxi	Chimborazo
1991	747.86	819.83
1992	521.41	365.49
1993	85.41	141.49
1994	35.90	72.37
1995	15.80	76.69

Source: Ministry of Health, Epidemiological Department

Table 7
NUMBER OF CASES OF CHOLERA IN THE COMMUNITIES OF COTOPAXI
UNDER THE CPI PROJECT, 1993-1996

Year	Zona del Canal	Alpamalag
1993	94	22
1994	40	8
1995	0	0
1996*	0	0

*Through week 27.

Note: Figures for 1991 and 1992 were unavailable.

Source: DPS in Cotopaxi, Epidemiological Department

Table 8
NUMBER OF CASES OF CHOLERA IN THE COMMUNITIES OF CHIMBORAZO
UNDER THE CPI PROJECT, 1991-1996

Year	Gatazo Grande	Pompeya
1991	2	20
1992	25	12
1993	32	32
1994	19	8
1995	2	2
1996*	1	1

*Through week 27.

Source: DPS in Chimborazo, Epidemiological Department

Figure 11

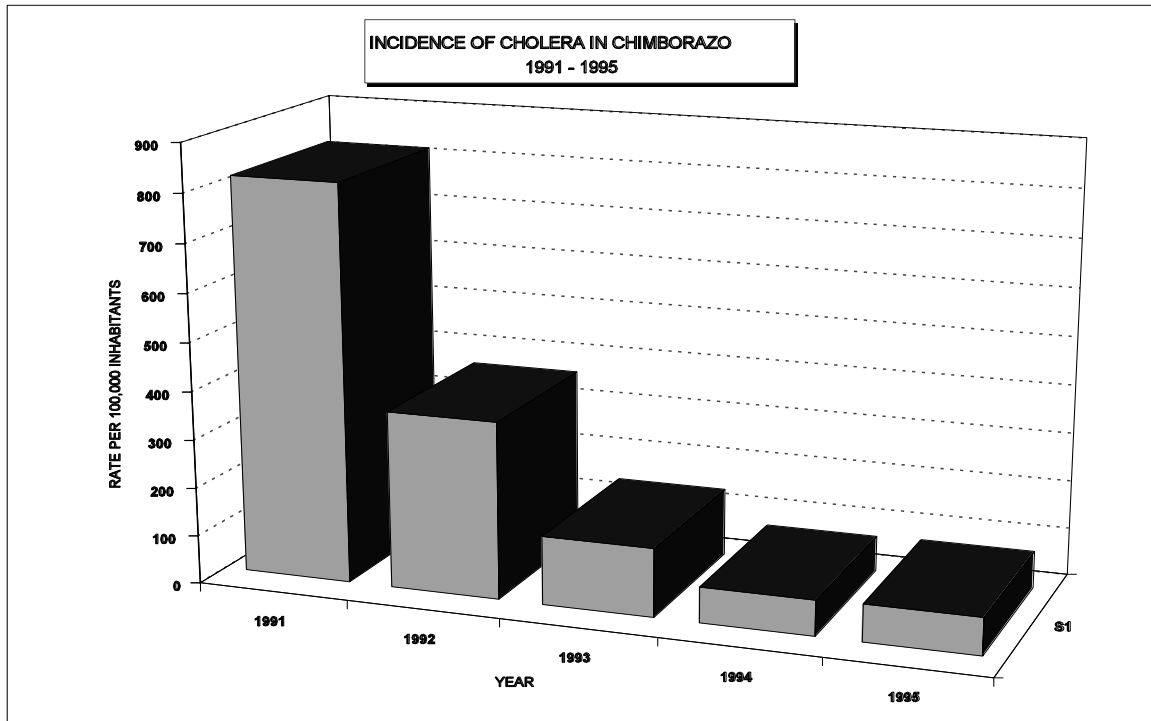
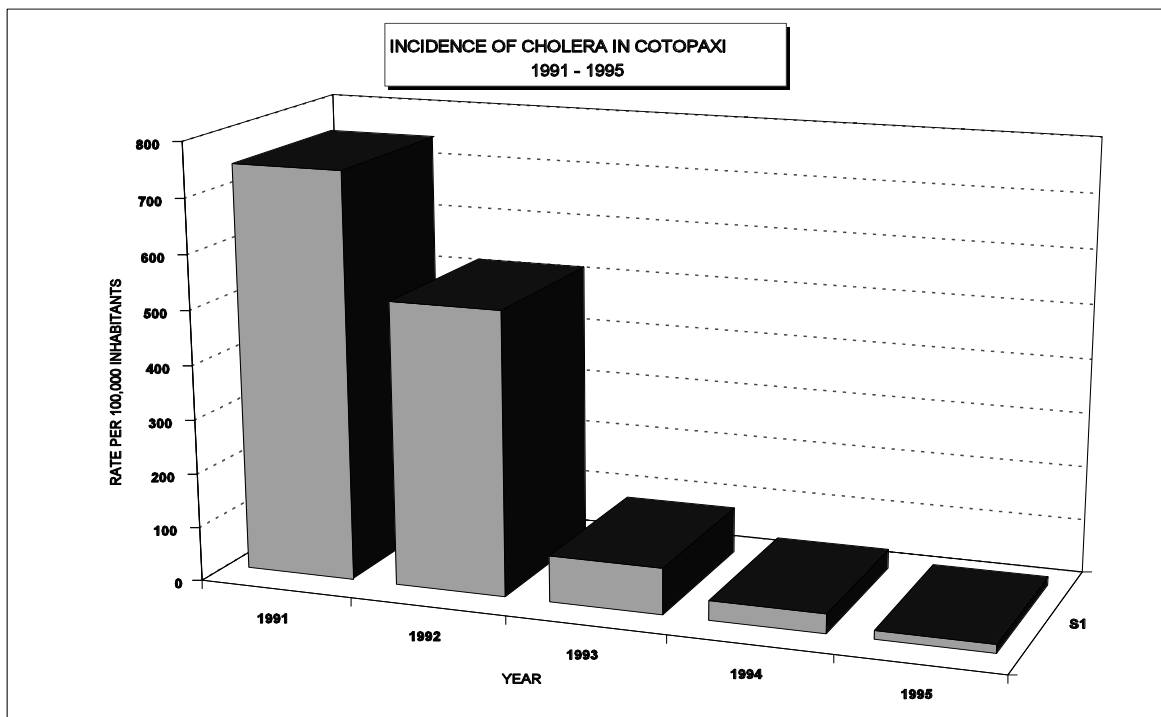


Figure 12



occurred in Cotopaxi in 1995, an incidence of 15.80 per 100,000 inhabitants (see Table 6 and Figures 11 and 12). Although three of these cases occurred in Salcedo and Pujili, there were no cases in the communities of Zona del Canal or Alpamalag de la Co-Operativa (see Table 7). According to the records of the DPS in Chimborazo, 309 cases of cholera occurred in the state in 1995—an incidence of 76.69 per 100,000 inhabitants. Of those, 31 occurred in the counties of Colta and Riobamba, but only 4 in the communities of Gatazo Grande and Pompeya (see Table 8).

By week 27 of 1996, 10 cases of cholera had been reported in Cotopaxi within the counties of Salcedo and Pujili, but none originated in the two project communities. By the same week, 59 cases had been recorded in Chimborazo, 17 in Colta and Riobamba, but only 2 (without laboratory confirmation) in Gatazo Grande and Pompeya. Figure 13 breaks down Ecuador’s incidence of cholera by age as of week 27 of 1996. As one can see, the greatest number of cases by far occurs among individuals age 15 to 44 and those 45 and older.

Within the past two years, none of the four project communities has had a fatal case of cholera.

5.3 ANALYSIS OF INTERVIEWS CONCERNING THE PROJECT’S IMPACT

The Regional Teams and Community Teams conducted open-ended interviews with regional-level health administrators and members of the communities in which the BACA project took place. The interviews and self-administered surveys were designed to elicit information concerning the level of knowledge about BACA’s CPI methodology and opinions concerning its strengths and weaknesses.

5.3.1 INTERVIEWS WITH STATE HEALTH SYSTEM ADMINISTRATORS

The Regional Teams provided questionnaires to the State Health Directors of both of the project states and to doctors and nurses in the administrative districts of the CPI communities. Seven state-level health administrators or other health care professionals were interviewed.

The Community Teams interviewed community members, community leaders (such as the community president or other officials), and teachers in the local grade schools. Thirty-five community members were interviewed in the four project sites.

All of the state health officials interviewed had heard about the CPI methodology, although the depth of knowledge varied. Several knew only that CPI was working in the most rural and isolated communities and had provided those communities with health education and water bidones. Other members of the state health system had participated in the CPI training and understood and appreciated the methodology. One of the Regional Team members, Adela Vimos, was promoted to the position of State Health Director of Chimborazo following the BACA project.

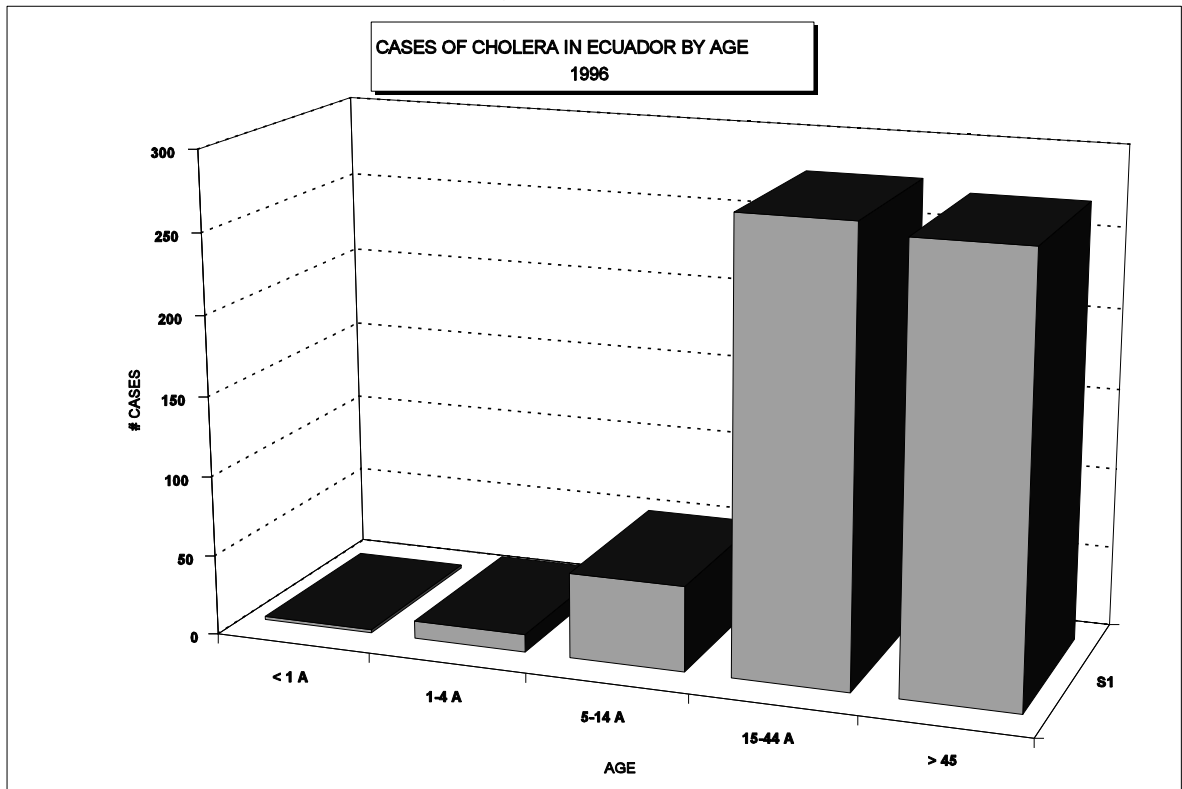
In the interview, Director Vimos talked about the advantages of the CPI methodology and how she had used it in an agricultural project funded by the Ministry of Agriculture

“This project improved the level of education in the community and developed new leaders in the areas of health and sanitation. These leaders not only learned about health, but they put their knowledge into practice.”

“I see the possibility of using this methodology in a variety of health identification and promotion activities, such as in agriculture, forestation, animal vaccination, and the development of community-based clubs.”

— Dr. Adela Vimos, State Health Director, Chimborazo

Figure 13



and designed to change the behavior of rural peasants and their treatment of livestock. The project was intended to demonstrate the importance of using salt with iodine to improve the health of local livestock. According to Director Vimos, CPI was an effective means by which to involve the local community and to facilitate the desired changes in behavior.

Two themes emerged in the analysis of the interviews with state health officials. One was that the CPI methodology was innovative and unusual because it succeeded in involving the community and facilitated community direction of the intervention. Both state health officials and community members mentioned how the methodology created leaders in the community by training them in leadership skills and techniques, and by opening the community up to new leadership. In some instances the new leaders were student members of the Community Teams; in

others, they were residents who became involved in the BACA project.

Both health professionals and community members mentioned the need to use the CPI methodology in other communities. In a community in Chimborazo near the project community of Gatazo Grande, residents asked to have the CPI project (and water bidones) extended to their area.

In Cotopaxi, the Regional Team was asked to extend the CPI to a community near Zona del Canal, which it did. Guadalupe Guerrero, the epidemiologist on the Cotopaxi Regional Team, replicated the intervention along with her team in a community within walking distance of the site of the original intervention. This time, however, she and her teammates modified the methodology in several ways.

***The Cow That Cried
and the Man Who Loved Her***

The CPI methodology was replicated in Chimborazo in an agriculture and animal husbandry project. The project required farmers to have their livestock vaccinated, after which the farmers would be eligible to participate in an iodized-salt intervention. People in the sierra live and work closely with their animals. Guinea pigs, rabbits, and cows often live within the shelter provided by the home. Local Indians depend on their livestock not only for labor and income, but also for companionship. In the salt project, one farmer brought his cow in to be vaccinated. Her name was Butterfly, and while he wanted her to have the iodized salt, he didn't want her to have to feel the pain of an injection. "She cries," he said. And she did and so did he.

In the replication project, there were not enough people who could read and write to serve on the Community Team, but there were people who were interested in the project and wanted to help the community. The Cotopaxi Regional Team creatively resolved this problem by encouraging the involvement of the local elementary school, its principal, and its teachers. The teachers stimulated the interest of their students in the personal hygiene and sanitation issues being discussed. This enabled the students (aged 8 to 12) to help their illiterate parents learn the BACA project's lessons. Children went from house to house with their mother or father, writing down information for the baseline survey, while their parents asked the questions. The Cotopaxi replication not only actively involved the children of the community, but it also enlisted schoolteachers to help organize community assemblies and help reinforce messages in the classroom.

Another Cotopaxi innovation was the use of student teachers who were residing in the community during a period of practice teaching. These students, along with community residents, made up the members of the Community Team.

When they finished the BACA project and their student teaching, the students dispersed to rural areas throughout Ecuador, taking with them the skills and knowledge acquired during the BACA experience.

In interviews, state health officials said the BACA project was a mechanism by which communities became organized and galvanized to act on health-related problems. The CPI methodology helped communities recognize and prioritize their common health problems.

5.3.2 INTERVIEWS WITH COMMUNITY MEMBERS

The community members echoed the state health officials' remarks, saying the project helped them recognize health risks in their immediate environment and enabled them to do something about them. Said one, "I have learned better how to protect my health and that of members of my family. I am also more aware of things that can endanger one's health. Now there is more interest in the community about health and education." Another commented on the new-found water safety that resulted from the project. "BACA is a magnificent project; before we had to use untreated piped water. Now, we can drink safe water."

The interviews reflected the community members' appreciation for the BACA project, the water bidones, garbage containers, and health education. They also reflected people's changed perceptions and behaviors and revealed concern for the communities' future and a desire to continue with community-based activities and the MOH personnel visits to the communities. See Appendix F for list of questions used in community interviews and observations and Appendix G for a report on community perceptions of the CPI project.

One of the most salient points that came from the interviews was the surprise community members expressed about the importance of personal hygiene and sanitary practices. It was as if these ideas had never before been introduced. In actual practice, it may well be that the rigors of daily life amid extreme poverty and, in most cases, without access to clean running water had

effectively obscured the importance of cleanliness for health.

“We didn’t want to do that first survey,” Fernando Cuvi, a member of the Community Team in Gatazo Grande, told the Technical Team. “We didn’t want to ask people those questions about health because [we thought] they weren’t important, we knew what people would say, and we didn’t want to enter peoples’ homes.” But the Community Team did the survey, and although it was difficult, the team did enter peoples’ homes to observe their behavior.

What the Community Team members found surprised them. In Gatazo Grande, people didn’t talk about health very much. They simply lived or got sick and died. What surprised the Community Team was that people who knew so little about how to protect themselves from illness were willing to learn. They were even willing to let their neighbors come into their homes for the first time.

In the sierra, neighbors are wary of each other. Except during fiestas, people stay out of each other’s way, and certainly out of each other’s homes. When Community Teams were asked to do home visits, they responded with caution, saying that most people would not let them in. A remarkable trust developed in the community during this project. When one of the community leaders was asked what some of the advantages of the CPI program were, he said: “That our neighbors came to our very homes to visit and observe our behaviors.” Said another: “One of the advantages of this methodology is that it enabled us to visit homes; that it allowed the community to open up and participate.”

Members of the community spoke about the importance of drinking safe water, of chlorination, using bidones, maintaining personal hygiene and sanitation, and using latrines. They expressed their new ideas about cleanliness, and, indeed, personal visits to their communities and homes verified an observable difference in the level of cleanliness. Most striking in the community interviews was the sense of accomplishment. People spoke about what they learned and how they changed their behavior.

As Jose Chavi, a Community Team member in Alpamalag told the Technical Team: “The BACA

project taught us new customs and behaviors, especially about how to keep our community clean. When we received the water bidones we learned many ways to change the way we acted. We learned to clean our hands, to bury the garbage, and to teach our neighbors to put chlorine in their water. [We also learned about] the importance of keeping latrines clean.”

In addition to the community members’ receptiveness to learning, the role of the Community Team members as effective leaders was paramount to the project’s success. Likewise, the reinforcing role the Regional Teams continually played was central to the effectiveness of the Community Teams.

5.4 SUMMARY OF RESULTS

Changes in behavior are clearly noticeable at the community level. The communities are cleaner. Family members are proud that they sweep their plaza and home; they pick up loose papers and throw them and other garbage into a large container. They bury the garbage. They use the water stored and chlorinated in the bidones for drinking and washing their plates and hands. Their latrines are kept clean and are used appropriately.

In addition to learning new ideas and health behaviors, the community members said they want to teach their children new behaviors.

Three of the four BACA communities appear to be more cohesive and more open as a result of the project. The other, Pompeya, was a community divided by religious factionalism before the CPI project and did not develop

“This project is very good because it showed us how important cleanliness is for health. The most important things I learned were to treat the water in the bidon with chlorine and to clean and use the latrine to avoid illness and keep our families healthy. I want to teach my children these new behaviors, and help them help the community perpetuate the new behaviors.”

— Alpalagal Community Team member Hilda Sangucho

the level of cohesiveness shown in the other three communities. Pompeya was more isolated and more closed than the other communities before the project began, and while Pompeya as a community and its members did change as a result of the CPI experience, the community’s progress reflected its original difficulties.

Residents in Zona del Canal told the Technical Team that they benefited from the community gatherings, in which they learned more about health, CPI, and their own community. “The cohesion we now feel as a community helps us provide for ourselves,” said one.

At regional and community levels, BACA has produced desirable results. The training provided to members of the Regional Teams facilitated the promotion of one of the Regional Team members to the position of State Health Director, while others trained in the CPI skills and techniques moved into positions in the Department of Education. Another became a teacher in the Superior Politechnica School in Chimborazo.

Regional Team members in both of the project states replicated the CPI methodology independently. In one, the replication was a modification of the original CPI experience; in the other, the CPI methodology was modified to be used in an animal husbandry project.

At the national level, the CPI experience has continued to be supported by the MOH. In particular, the Ministry has provided ongoing support to personnel in the Departments of Prevention and Protection (whose areas include primary health care, child and maternal health, and

community assistance), and also in the Department of Epidemiology (which tracks and documents the spread of contagious diseases such as cholera). In these departments, the Ministry has continued to provide support in the form of time and personnel to maintain ongoing community-based follow-up in the four project communities. The Ministry has also provided the departments with transportation and time to process information.

The BACA project succeeded in developing a methodology by which the people involved in the problem were able to identify an intervention based on their own perceptions. This facilitated a change in behavior related to the transmission of cholera.

The Community Teams were the personnel who effected the behavioral changes. They noted two important key aspects to the success of the interventions. One was the community members’ ability to recognize high-risk behaviors that were not previously perceived as a way of transmitting cholera; only by being conscious of their own habits were community members able to recognize health risks. The second aspect was the ability of the Community Teams to work inside the communities, which, initially, was extremely difficult. Support and legitimization from local authorities within the community were required.

The Community Teams, made up of young adults from the communities, were able to develop as leaders, as a result of their participation in the CPI methodology. It was the first time they had participated in the preparation of “microprojects” based on community-wide decisions about health improvements.

The project not only motivated the target communities to change residents’ risky behaviors, but it also facilitated support in Gatazo Grande, for example, to initiate a sewerage system. Similarly, in Pompeya, people were supported in their attempts to improve the provision of latrines.

The results of the BACA project are evident in part because the Regional and Community Teams sustained the follow-up. The BACA project succeeded in achieving its objectives.

The follow-up monitoring activity this year has provided community-, state-, and national-level documentation that community-defined behavior change can occur, even in isolated and impoverished rural communities.

6

CONCLUSIONS AND LESSONS LEARNED

“The BACA project is so good that it deserves recognition for all the good it has done our community. It has helped us a lot. We now have a water container which helps us keep our water free from contamination and our children free of cholera. We learned how to change the way we think and act; BACA has been good for the community.”

*— Jose
Sangucho,
community
member*

The objectives of this monitoring project were to evaluate the impact of the BACA project and the CPI methodology as to: (1) changes in behavior associated with the transmission of cholera; (2) change in mortality and morbidity associated with cholera and other diarrheal diseases in the community and region; and (3) changes in institutional behavior among organizations associated with the CPI project, including issues of sustainability, replication, professional advancement of CPI-trained personnel, and continued MOH support.

This chapter summarizes the changes described in the previous chapter and concludes with some lessons learned from the follow-up monitoring activity.

6.1 OBJECTIVE ONE: THE IMPACT OF CPI-BASED BEHAVIORAL CHANGE AT THE COMMUNITY LEVEL

Changes in behavior initiated by the CPI project were associated with fewer cases of cholera and other diarrheal disease in adults, development of local leadership among Community Team members, and opening the communities to change on individual, family, and community bases. Community members not only learned about public health practices, they also learned about each other and, as a consequence, became more open to cooperative and collaborative community-

based activities. In addition, the relationship between community members and representatives of the central government (state health workers) changed to one of increased trust and confidence.

There were remarkable improvements in community members' hygienic and sanitary behaviors, in the behavior clusters targeted for the intervention—use of clean water, washing hands, food and utensils, and disposal of excreta. (These conclusions were based on data from a non-random sample of households.)

First, only 36% of residents treated their water before the BACA intervention, compared with 70% after the intervention, and use of appropriate water containers increased from 6% to 100%.

Second, the EHP team found that 77% of interviewees washed their hands after using the bathroom, versus 50% prior to the project; 59% washed their fruits and vegetables in clean water, up from 30%; and 57% washed their dishes with clean, treated water, up from 15%.

Third, the team found an overall increase in the percentage of people who maintain and use latrines (from 15% to 72%), a decrease in the percentage of people who use open fields for defecation (from 69% to 28%), and an increase in those who, when they use open fields, bury the excreta (from 16% to 23%).

6.2 OBJECTIVE TWO: THE IMPACT OF CPI-BASED BEHAVIORAL CHANGE ON COMMUNITY MORBIDITY AND MORTALITY

The regional health centers that serve people with cholera and acute diarrhea cared for fewer patients following the CPI project. In general, the number of cases was reduced by almost 50% in each of the communities, except for the area of the earthquake, where the number of cases of acute diarrhea almost doubled. Excluding figures for the earthquake-affected area, the overall number of cases reported fell from 396 to 208.

One way to evaluate the project's effect on behavior is to compare the changes in knowledge and behavior between the original 1995 baseline survey and the follow-up survey conducted in 1996, as detailed in Chapter 5. Another way is to compare those states having undergone the CPI project with other, comparable states in which the CPI project did not occur. In doing the latter, the Technical Team compared the cases of cholera in the two intervention sites (Chimborazo and Cotopaxi) with those in Imbabura, a comparable, nonproject site. Imbabura showed a significant outbreak of cholera earlier in 1996, with 611 cases having been diagnosed by week 27, while Chimborazo and Cotopaxi had only 56 and 30 cases during this time. (See Tables 9 and 10.)

Cholera is characterized by outbreaks lasting many months followed by periods when no disease is diagnosed. This pattern may occur in both endemic and non-endemic regions. It is possible that the difference in the number of reported cholera cases in Imbabura and in Cotopaxi and Chimborazo was due to factors other than behavior change that occurred in the latter two communities, but the difference is impressive. In future studies, cases of other types of diarrhea in intervention/non-intervention communities could also be compared. A similar reduction in

the number of patients presenting for other diarrheal diseases in the intervention versus control communities would argue in favor of the success of behavior modification interrupting the transmission of all types of diarrheal pathogens.

Finally it is possible but unlikely that community members in the intervention community were less likely to present to health centers for treatment of diarrhea, after the intervention occurred. For example, it is possible that diarrhea could be considered a failure of hygienic behavior. In future studies, presence of diarrheal disease that did not result in a visit to a health center could be assessed during the household surveys.

In summary, although a clear cause and effect between the intervention and fewer reported cases of cholera can never be proven in epidemiologic studies, the BACA project was clearly associated with a decline in cholera in intervention communities, based on epidemiologic and ethnographic data. Thus the BACA project seems to have achieved the desired effect.

6.3 OBJECTIVE THREE: THE IMPACT OF CPI-BASED BEHAVIORAL CHANGE AT THE REGIONAL AND NATIONAL LEVELS

Ecuador's MOH has continued its support of the BACA project, specifically by providing personnel in the Departments of Epidemiology and Protection and Prevention to oversee the project follow-up. The Ministry has also expressed continued interest in the project's mission via a commitment to facilitate the current monitoring project and the state-based CPI replications.

In the current period of governmental decentralization, the greatest sustained effects of the CPI model have occurred at the community and state levels. This is a particularly important observation because of a

Table 9
Cholera Rates* by Year Pre-CPI Project

State	1991	1992	1993	1994
Chimborazo	819	365	141	72
Cotopaxi	747	521	85	35
Imbabura	1633	556	208	28

* Per 100,000 inhabitants

Table 10
Cholera Cases During and Post CPI Project

State	1995	1996 (January - June)
Chimborazo	93	56
Cotopaxi	1	30
Imbabura	11	611

change of national government that may leave in place public sector professionals at all levels of the MOH, and state and local CPI workers already trained under the BACA project.

At the regional and state levels, the project has engendered three replications, each with appropriate modifications. As one CPI-trained individual told the Technical Team: "In the replication of the BACA project, I developed a more profound understanding of the process and its potential applicability to a wide variety of settings" (Guadalupe Guerreri, Regional Team member in Cotopaxi).

In addition to the project replications, parts of the CPI methodology have found their way into community and state activities, from United Nations-funded projects to cooperative,

community-based projects. Community perception maps have been popular and useful, as have the paraphrasing skills acquired in the CPI workshops.

The BACA project has also made the intervention communities more accessible to public health workers partly because of increased mutual understanding and trust engendered by the Regional Team and Community Team training process. The project also facilitated the development of regional and local leadership.

Following the project, one member of the state-level team was promoted to the position of State Health Director, while other Regional Team and Community Team members have also moved into new, enhanced positions.

6.4 LESSONS LEARNED

“I learned from the BACA project why it is important to wash my hands, to make sure my drinking water is chlorinated, and to keep my house and latrine clean. These ideas changed the way I act. Now I spend more time cleaning my house and myself.”

— Berta Cajamarca, community member

What lessons can be derived from the BACA project that can be applied elsewhere? We have seen people in rural, isolated, closed Indian communities change the way they think and behave. People there have learned to recognize and prevent cholera and other types of diarrhea, and their communities have experienced a new sense of solidarity and accomplishment.

6.4.1 THE RIPPLE EFFECT

Because each community determined its own intervention under the BACA project, the interventions were appropriate to the community they served and to other communities nearby. Members of neighboring communities watched the BACA communities as they gathered together to conduct the baseline survey and discuss its results and were provided multiple training sessions with the Regional Team, in which they were taught new skills and techniques. In addition, the neighboring communities watched while the BACA communities received water containers and learned methods for keeping their water clean, and they expressed a desire to obtain these benefits for their own communities. As neighboring communities asked for the training and the water containers, Regional Team and Community Team members replicated the CPI process whenever possible.

6.4.2 THE POWER OF FOLLOW-UP

After the initial Regional Team and Community Team training, the baseline survey, and the design of the intervention project, Regional Team members continued to follow the community activities. These activities included a health fair

and the publication of small educational pamphlets that were distributed to the communities. During the site visits in 1995 and again in 1996, and in the community survey in 1996, members of each of the four communities credited their Regional Team members with keeping the project invigorated, keeping people interested, and continuing the community-based monitoring. In many cases, personal relationships of respect developed between the MOH epidemiologists and health inspectors who made up the Regional Teams, and the emerging community leaders who made up the Community Teams. The Technical Team is convinced that much of the success of the BACA project was a result of the continued follow-up that the Regional Teams provided.

6.4.3 THE STRENGTH OF THE SECOND GENERATION

Another indication of the success of the BACA project in both project states is that the MOH and the respective Regional Teams collaborated to replicate the project in other communities. In each case, the replication modified the original methodology to fit new conditions. The Ministry and the Regional Teams were able to make necessary modifications because of the quality of the original training provided to the Regional Teams, and their good command of the CPI methodology.

Local modifications included pairing literate children with their illiterate parents to conduct the baseline survey and monitoring activities and enlisting the interest and support of a grade school director who got teachers involved in incorporating BACA's health and hygiene lessons into school plans. Another community innovation used student teachers to reproduce the CPI program, enabling the student teachers to take their CPI skills and techniques to communities all over the country once they finished their training.

6.4.4 WIDENING THE NET

NGOs and governmental agencies that had previously been unavailable or uninterested in the regional project became interested and linked (often by the communities themselves) with follow-up activities. This pairing of programs and sharing of resources strengthened each participant.

Even in the poorest and most isolated of the four project communities, the health fair hosted by the Regional Teams had several unintended benefits. It brought representatives of a number of health-related agencies to the community and provided health-related talks and demonstrations. In addition, fair attendees received hats, T-shirts, and toothbrushes.

Following its health fair, one community decided with help from the Ministry of Social Well-Being to use some of its water bidones in a new day care center for children while their parents were working in the fields. Two women who were members of the Community Team became the primary caregivers in a day care center for 45 children. There, the children used the water bidones to wash their hands and brush their teeth (novel behaviors for both adults and children in the community). While BACA provided the original set of toothbrushes to adults in the community as part of the health fair, the children's toothbrushes and money for food for the communal kitchen were provided by the Ministry of Social Well-Being.

During the period of the BACA project and the subsequent monitoring project, the people of the

6.4.5

DEVELOPING LOCAL LEADERSHIP

The BACA project provided skills, techniques, and opportunities to a variety of people, most of whom had never had such opportunities presented to them. Several of those people maximized their opportunities to become true community leaders. The nascent leaders emerged from multiple cultural categories, including women whose social position often denies them access to power, young people and students whose age traditionally limits their access to community leadership, and others who do not fit traditional community categories of leadership. But leaders they have become.

6.4.6 SYNERGISTIC ENERGY: EPIDEMIOLOGY AND ETHNOGRAPHY

Part of the power of the CPI model is the combination of well-established epidemiological and ethnographic skills and methods of analysis. The model builds on the different perceptions in the anthropologic and epidemiologic methods and the benefits of combining them for a detailed analysis of any situation.

This combination of perspectives can best be seen in the community perceptual "maps" of high-risk areas and activities. First, an epidemiological analysis defined community health problems. Then these were given local definition through the ethnographic techniques of maps that reflect local perceptions. The strength of this approach is that information generated by ethnographic techniques gives a human face and cultural context to the population-based statistics generated by epidemiological methods.

four communities freely and generously shared the fruits of their labors. They feasted the EHP teams with their *cuyes* (guinea pigs) and potatoes, gave us fruit from their gardens, and sent us home with quinoa and corn from

their harvests. Their largesse and the central place the water bidones occupy in their homes emphasizes the contributions this project has made to their lives. Clean, safe water; health education; new avenues for leadership; and a newfound sense of community cohesion and purpose are, indeed, changes to be recognized.