



## **ENVIRONMENTAL HEALTH PROJECT**

# **Activity Report**

**No. 19**

**Cholera Prevention in Ecuador:  
Community-Based Approaches for Behavior Change**

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The following appendixes are available on request from the Environmental Health Project. They are entirely in Spanish. Due to their size, they are not included in this report.

- A. Team Planning Meeting Notes, Quito, December 12-13, 1994  
Contains work plan with objectives, brief description of methodology, activities, and products (16 pages).
- B. Workshop I Data, February 21-24, 1995  
Forming the Regional Teams (66 pages).
- C. Workshop II Data, April 10-13, 1995  
Working with communities, communications skills and gathering information, building a plan of action designed with the community (73 pages).
- D. Workshop III Data, June 13-15, 1995  
Findings from the four survey in four communities, training in proposal preparation, plans of future action (81 pages).
- E. Final Presentation for the Ministry of Health and USAID, Quito, August 8, 1995 (8 pages).
- F. Participant Evaluations from the Three Workshops (18 pages).

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## ACRONYMS

ADDR	Applied Diarrheal Disease Research
BACA	Behavior-Based Cholera Activity
CPI	Community-Based Participatory Intervention
CT	Community Team
EHP	Environmental Health Project
MOH	Ministry of Health
NGO	Nongovernmental Organization
RT	Regional Team
TT	Technical Team
USAID	United States Agency for International Development

## EXECUTIVE SUMMARY

In March 1991, the El Tor cholera pandemic hit Ecuador. By the time it began to subside at the end of 1993, a total of 85,023 cases had been diagnosed, 977 of them fatal. Epidemiological data from 1991 through 1993 show that 80% of cases appeared in 20 cantons, or counties. Because the cholera bacterium is waterborne, the communities that experienced the highest incidence of cholera were those that had limited access to safe water and adequate sanitation.

Even after the pandemic declined in 1993 and 1994, the disease persisted in specific regions of the Ecuadorian sierra and the coast. A kind of continual state of epidemic remained in communities in the coastal provinces of Esmeraldas and El Oro, and in inland Chimborazo and Imbabura provinces, areas characterized by densely clustered indigenous or peri-urban populations without water and sanitation and where local festivals draw former residents who have moved to urban areas. The Ecuadorian Ministry of Health (MOH) was concerned that its fairly aggressive program of social communication and hygiene education, which in many parts of the country had increased public awareness of cholera transmission routes, had had little impact in these specific areas. The Director of the MOH Department of Epidemiology concluded that a better understanding of local behaviors in areas of cholera persistence would yield information that could be used to develop interventions and public health messages aimed at reducing the incidence of the disease.

To support the MOH, USAID/Quito requested the Environmental Health Project (EHP) to undertake an in-depth investigation of cholera-related adult behaviors in high-risk communities. The objectives of this Behavior-Based Cholera Activity were to identify behaviors and beliefs associated with potential increased risk of cholera; to gather and analyze data on environmental and domestic health behaviors, to develop and

implement interventions to change those identified high-risk behaviors, to develop a monitoring system; to train local people to continue the monitoring; and to document activity results for broader distribution. Conducted from October 1994 to October 1995 as a collaborative effort of EHP, USAID/Quito, and MOH, the activity resulted in the collection of data about adult beliefs and behaviors related to cholera, development of a health-intervention model, transference of ethnographic methodological skills, and incorporation of new techniques and concepts within the MOH and NGOs. The activity used a health intervention model, *Community-Based Participatory Intervention (CPI)*, a design that recognizes and facilitates national government decentralization plans and provides a mechanism for community response to perceived problems. The object of CPI is to train NGO and public-sector employees in community-based health intervention techniques so that they, in turn, can train members of local communities to identify and monitor local problems and develop, evaluate, and sustain interventions.

Four communities in two states with high prevalence of endemic cholera were identified for the activity. Using the CPI model, two state-based Regional Teams and four Community Teams were assembled. Over a period of five months, three separate weeks of workshops were held to train the Regional Teams, who then trained the Community Teams. In all, 55 people received training in use of the CPI Model. The Community Teams analyzed local beliefs and behaviors and, in conjunction with the community members, designed interventions. Three core behavioral clusters were winnowed from the qualitative and quantitative data gathered in the four communities: 1) quality of stored or piped-in water; 2) washing and drying of hands and washing of food and dishes; and 3) disposal of excreta. While the specific interventions varied slightly, all four communities

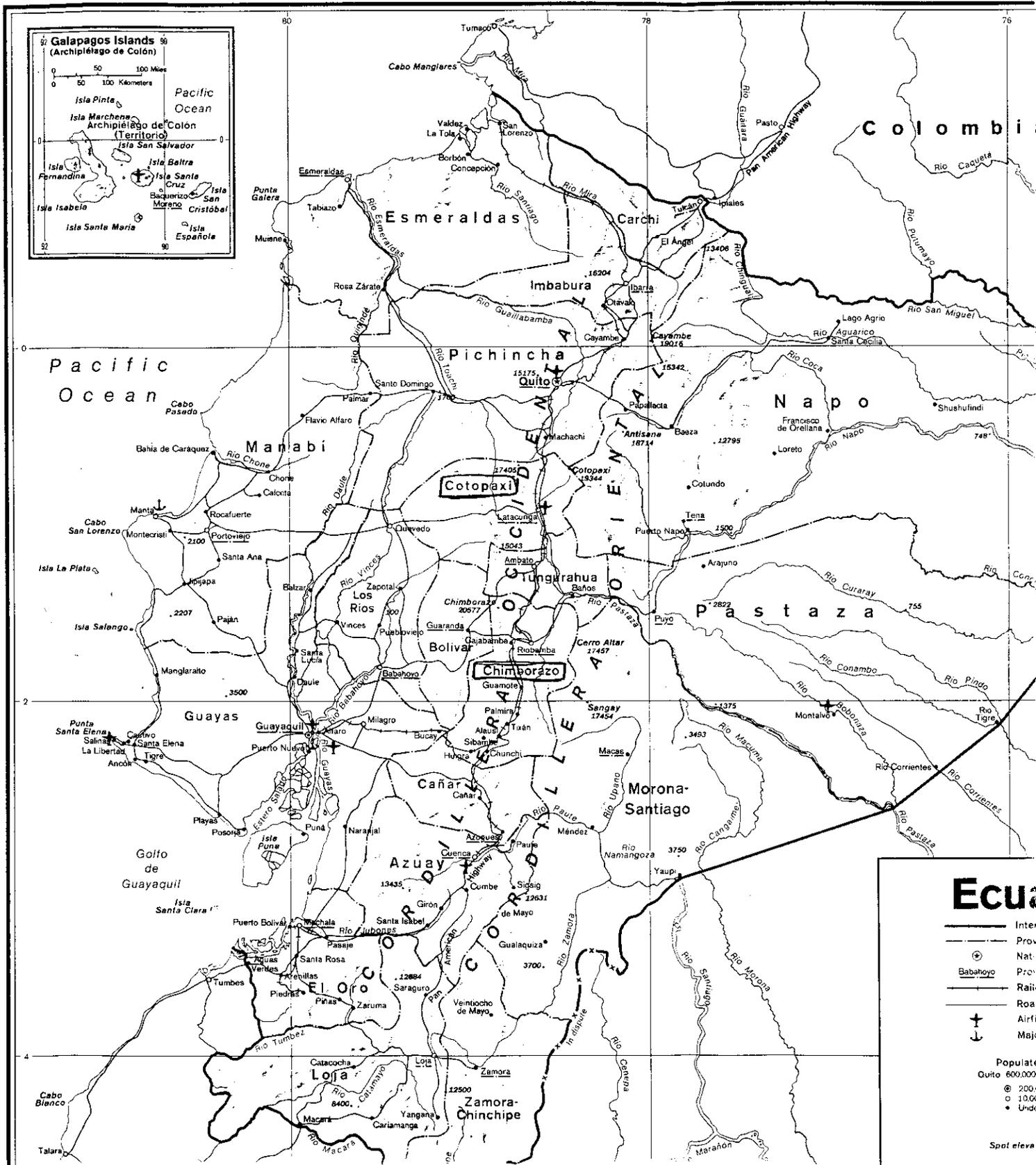
chose to secure household water tanks; develop a community health education campaign aimed at water storage and maintenance and cleaning of water tanks; and disseminate information about infectious disease.

The activity produced a core of committed national and regional professionals (and NGO staff) who are experienced in using the community-based model, a replicable methodology for community-based research, public health interventions designed and monitored by the communities themselves, a manual on latrine use

and maintenance, health education activities focusing on infectious disease, and a brief video on the CPI process.

The relative effectiveness of this behavior change effort on cholera incidence will be monitored through direct dataC how many cases of cholera appear in four communities within a set time period. Behavior change indicators will also be usedC quality of water and its storage, handwashing and other food preparation issues, and household and personal defecation patterns.

# MAP OF ECUADOR



# 1 INTRODUCTION

## 1.1 Background

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. Epidemiological data show that from 1991 through 1993, 80% of the cases appeared in 20 cantons (counties). The cholera bacterium, *Vibrio cholerae*, is waterborne, and the disease is common in regions with poor sanitation. The Ecuadorian communities experiencing a high incidence of cholera were areas where access to safe water and adequate sanitation was extremely limited. Most of the morbidity and mortality from the disease occurred in 1991 and 1992. 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.

Although the disease greatly declined in most areas of the country, there was a pattern of persistence in specific regions of the Ecuadorian sierra and the coast. In communities in the coastal provinces of Esmeraldas and El Oro, and in inland Chimborazo and Imbabura provinces, areas characterized by appreciable densities of either indigenous or peri-urban populations without water and sanitation and with local festivals that draw former residents who have moved to other areas, there continued to be small but persistent outbreaks of cholera. These areas are informally referred to as being in a continual state of epidemic.

By 1994, the Ministry of Health (MOH) believed that the government's fairly 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 of resistance where the epidemic continued. The MOH communication efforts, which were general in nature, had had little impact in these areas. 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 in order to provide regionally and culturally specific information. That information could then be used to develop interventions and public health messages to influence behavior in those high-risk areas. In support of MOH's determination to reduce cholera incidence, USAID/Quito requested assistance from the Environmental Health Project (EHP) to undertake an activity for in-depth investigations into adult behaviors and beliefs in communities with continued high risk of contracting cholera. This Behavior-Based Cholera Activity was the result.

## 1.2 Project Objectives

The Behavior-Based Cholera Activity (or BACA) began in October 1994, a collaborative effort of the Ecuadorian Ministry of Health, the Environmental Health Project, and the USAID Mission in Ecuador. BACA was designed to:

- # Identify high-risk behaviors and beliefs associated with increased risk of cholera,
- # Analyze data to identify high-risk behaviors,
- # Develop and implement interventions designed to change identified behaviors,
- # Develop a monitoring system,
- # Train local people to continue the monitoring, and

- # Document the results for broader application.

In addition to the research and behavioral intervention components of BACA, institutional development was given significant emphasis. BACA would undertake steps to strengthen local and national institutions as follows:

- # Create a partnership with and train community people and/or NGO staff to continue data collection and analysis on a regular basis for program monitoring and program impact
- # Train community members or NGO staff in the use of a behavior-based monitoring system and, via the Regional Teams, to link it to databases at the national level on disease mortality and morbidity
- # Conduct two seminars with national-level ministries and NGO staff to discuss findings and determine specific areas where support is needed for ongoing community-based prevention measures

By October 1995, BACA had met its project objectives. Two national seminars (held in December 1994 and August 1995) provided information about BACA to national policymakers and leaders from the private sector (e.g., NGOs and certain manufacturers in related environmental work). Information from the initial seminar was incorporated into the project activities; as a result of the August 1995 seminar, qualitative and quantitative evaluations of the project were strongly recommended.

Through three training workshops and 15 community assemblies, community and regional-level people were trained in behavior-based monitoring. These gatherings trained people to be cognizant not only of general information about the transmission of cholera, but most importantly, about their own practices which facilitated that transmission. The three training workshops, conducted for Regional Teams (state-level staff and

NGOs working in communities), focused on adult education practices, social communication techniques, ethnographic methods, qualitative data analysis, and participatory development and monitoring of health interventions.

Using these techniques, the two Regional Teams then worked in four communities to examine causes and attitudes surrounding cholera issues. 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.

### 1.3 Site Selection

Much of the population of Ecuador continues to be at high risk of cholera and other diarrheas, according to the following socioeconomic indices: the level of basic sanitation coverage is low; 59% of the population has access to potable water (75% in urban areas, 27% in rural areas); 39% of the population has sewerage (60% in urban areas, 9.4% in rural areas); and 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 continued and extensive urban migration and to political and economic factors, urban population centers have received the bulk of governmental support for infrastructure improvements in basic sanitation.

In the Ecuadorian sierra this maldistribution of resources is further complicated by multiple indigenous cultural groups who speak different languages and have distinctive cultural beliefs and behaviors. These differences are clearly evident in beliefs about illness causation, prevention, and treatment. To further complicate health education and delivery of medical services, state-level health workers often don't speak the local languages or share local ideas about illness. This conceptual and communications gap severely limits the ability of

the national government to provide effective services to indigenous people in the sierra.

Cholera is believed to have entered Ecuador from Peru in 1990, with the first recognized cases in February 1991. It spread into the interior of the country and up in the sierra through the return of migrants from the sierra who had sought work in the coastal areas. During the first year of the epidemic, 46,320 cases were registered, representing 43.36 per 100,000 inhabitants, and reaching a fatality level 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 level of 178.72 (per 100,000 people); Esmeraldas, with an incidence level of 176.92; El Oro, with a level of 113.27; Chimborazo, with a level of 86.10; and Cotopaxi, with an incidence level of 78.78. These states were strongly affected by the epidemic; particularly hard hit were the indigenous communities in the sierra.

By 1992, 32,430 cholera cases were reported, corresponding to a level of 29.36 per 100,000 inhabitants, with a fatality rate of 1.09, or 208 deaths. The two areas most strongly affected were El Oro (97.10/100,000) and Guyas (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 level of cholera. During 1993, only 6,883 cases of cholera were officially registered, representing a level of 6.05 per 100,000 inhabitants, and a fatality rate of 1.05. Despite the

reduced number of cases, cholera still persisted in pockets of endemicity, particularly in the indigenous communities in the sierra such as Imbabura, Chimborazo, Cotopaxi, and the coastal states of Esmeraldas and El Oro. The number of cases registered continued to drop; in 1994 only 1,778 cases were registered nationally, reflecting a level of 15.56 per 100,000 inhabitants. Fifteen deaths (fatality rate of .13) were attributable to cholera during that year.

In 1994, three states in the sierra exhibited a continued presence of cholera: Chimborazo, with a level 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 registered, and it was estimated that the incidence level might surpass 1994's. In recognition of the persistent endemicity in indigenous communities in the sierra, the BACA project was initiated to try a different approach to breaking the cycle of cholera through behavior change.

Two states in the sierra were selected for the BACA project, Chimborazo and Cotopaxi. 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. Instead, the ADDR group was invited to participate and share information. The sierra states were selected instead of the coastal states because of transportation requirements; the CPI model used for this project 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.

# THE COMMUNITY PARTICIPATION INTERVENTION MODEL

## 2

### 2.1 Conceptual Background

Contaminated water is the clearest link in the cholera transmission chain, 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. Over the years, a considerable amount has been written about sources of cholera contamination, cholera control, and food contamination (e.g., Barakamfitiye, D. et al; Esrey, S.; Reiff, F.). Much of that literature has focused on factors which contribute directly to the spread and severity of cholera, such as water quality, water quantity, excreta collection and disposal, solid waste disposal, and personal and communal hygiene practices (Fry, S.). Recently, however, attention has turned to the cultural context and the behaviors themselves.

It has become clear that knowledge alone is not sufficient to cause behavioral changes; thus the "Behavior-Based Cholera Activity" 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 have concentrated on children, and technologies developed to cope with the diarrhea, such as oral rehydration therapy, have also been directed at children. The conventional wisdom is that children comport themselves by touching and tasting almost anything they come in

contact with. Thus, any resultant diarrhea, even if it kills, has a behavioral logic to it.

Adult diarrhea, 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, which is an especially lethal diarrheal disease, primarily affects adults and thus presents an important opportunity to understand which behaviors and beliefs result in adult infection. Consistent with Ecuador's decentralization plan, the Interinstitutional Cholera Committee decided that the best way to deal with the crisis was to create committees in those provinces at greatest risk of continuing the epidemic. These interinstitutional cholera 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.

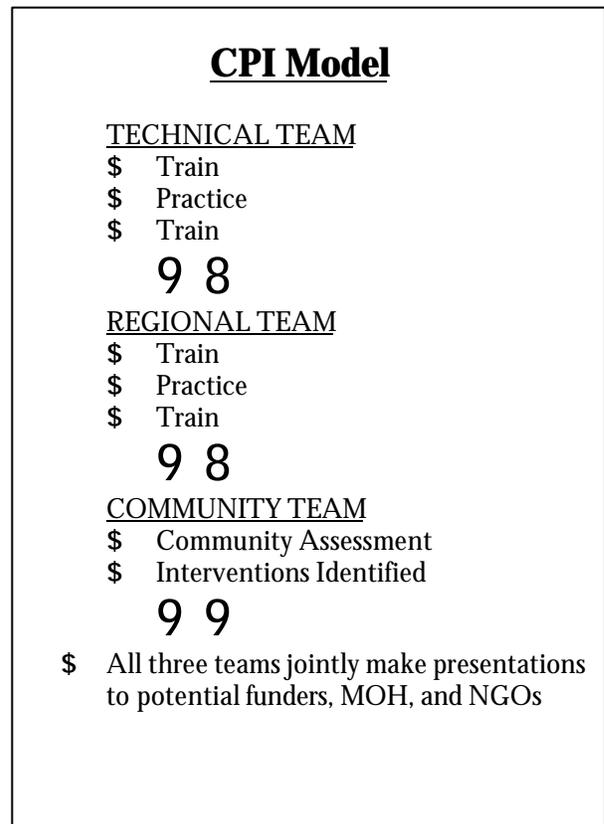
The national committee recognized that for public health messages to be effective, social communication programs and behavior change campaigns needed to be tailored to the various rural, urban, peri-urban, or indigenous communities toward which they were aimed. However, the provincial committees did not know how to elicit the information they needed from those communities. To bring about behavior change, social communication must be based on an understanding of how people perceive their environment and the health risks within it. In other words, social communication has to be based on why people practice *risky* behaviors, and what

in their environment makes it advantageous for those behaviors to persist.

The Environmental Health Project's approach is based on the belief that the most important changes regarding 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 which bring about better health for children and adults. Sustainable interventions are those which are likely to remain after the departure of outside expertise and funding. And EHP has found, building on the experience of the WASH and VBC Projects, that true community participation, backed by national policy and district or regional-level support, is key to any long-term improvements in health status.

## 2.2 A Three-Phase Process with Three Team Levels

The community participation model is designed to support national government decentralization plans and to provide a mechanism for sustainable community response to perceived problems. The object of the model is to train state- and county-level workers so that they, in turn, can train members of local communities to identify local health problems, to develop appropriate interventions, and to institute, manage, monitor, and sustain those interventions. As shown in the adjacent figure, three levels of teams are used in this model: Technical Team (TT), the Regional Team (RT), and the Community Team (CT). The Technical Team provides outside technical assistance and training; the Regional Team is composed of regional-level health and education or NGO staff to be trained by the TT and, in turn, to train the Community Team. The Community Team (CT) is made up of community volunteers, teachers, and local leaders who are trained by the regional trainers to work in their communities.



In the Behavior-Based Cholera Activity, the principal output was the training of regional and local staff in using participative techniques for data collection and design of interventions to reduce transmission of cholera. The model is transferrable to any other problem areas that need a base of community support. It could well be applied to other health areas, such as improving nutritional outcomes in specific areas.

Development of the model occurred in three phases:

### **Phase 1**

- # Initial discussions were held between EHP and the Ministry of Health's National Director of Epidemiology.
- # Potential sites were identified.

## **Phase 2**

- # A member of the Technical Team visited each potential site and interviewed the relevant state director of epidemiology and staff.
- # Those state directors expressing an interest in the project and willingness to commit human resources were invited to attend a meeting in the capital.
- # Epidemiologists from each site were asked to prepare materials for a meeting in which the MOH staff epidemiologists discussed the social and physical epidemiology of endemic cholera in those states.
- # In addition, each state director was asked to prepare an overview of activities, cooperative agreements, interinstitutional working groups, and community-based sources (for instance, NGOs) for presentation at the meeting. Each group was clearly informed that, due to limited funds, not all sites could be selected; the selection process would occur during the meeting at which they made their presentations.

## **Phase 3**

During the Quito meeting, each state director and staff epidemiologist made presentations about two items:

- # the status of endemic cholera and programs for prevention and intervention in their state;
- # a case for why the candidate community should be chosen to participate in the project and how they would contribute to it.

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 EHP and the Ecuadorian Ministry of Health, the support of

NGOs and other health-related agencies was sought. Once national and international support was secure, the states in which the two Regional Teams would be composed were asked to lend support.

A two-step process was employed to enlist help from the Regional Directors of Health, NGOs, and members of the Interinstitutional Cholera Committee. First, one member of the Technical Team went to regions where there were pockets of endemic cholera and met with the Regional Health Director and others. The Technical Team member explained the BACA project, requested detailed information, discussed the level of support required, and invited those interested in participating (and able to provide the necessary information and support) to meet in Quito the following month. The information requested focused on sociological indicators, health indices, NGOs working in the region, potential community sites, personnel to compose the Regional Team, and potential level of support.

At the meeting in Quito, State Health Directors and NGOs were invited to present the information requested and to demonstrate how CPI would be used in their region. Groups from the three candidate states were invited to compete for inclusion in the BACA project. By the end of that meeting, state and community selection was completed and a commitment of ongoing resources was made. Site selection was based on qualitative and quantitative criteria. Observations of the TT member who made the site visits were significant. In addition, the following variables were used as 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 made it possible to select two states rather than one in which to work.

The three-phase process allowed the Technical Team to inform potential participants of the project, encourage their participation, and select the most viable communities within which to work. Each stage fulfilled a particular purpose: introductory discussions in Phase 1, site visitation and preliminary information gathering in Phase 2, and information sharing and site selection in Phase 3. At the two-day meeting in Quito, on the first day, each potential participant presented information and answered questions from Technical Team members and personnel from the MOH and NGOs. After presentation of regional information, there was a discussion of the proposed BACA project and suggestions from MOH and NGO representatives. During the second day, discussions covered the research methodology and site selection.

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-Based Teams.

As a result of this three-stage process, the project was able to solicit commitment and participation from the State Directors of Epidemiology, their staffs, NGOs, MOH, and representatives of significant interinstitutional committees.

## 2.3 Research Methodology

The research methodology combines epidemiological and ethnographic research techniques, on the assumption that data must be generated by the community to be valid and useful to the community. A corollary assumption is that project sustainability is directly dependent on the integration of the community in the project. The methodology incorporates adult education skills in the three workshops to prepare the trainers, and the delineation of a training/practice/training cycle. The workshops train Regional Team members so that they, in turn, can prepare Community Teams to identify, isolate, and understand high-risk behaviors and beliefs and develop and sustain appropriate interventions. A brief overview of the objectives, contents, and products from each of the three workshops is found in Attachment 1.

The three levels of teams involved in this process were a Technical Team, a Regional Team, and a Community Team. The *Technical Team* (TT) was composed of a medical anthropologist, an epidemiologist-physician, and an adult educator. One member was based in the United States; the other two were Ecuadorians living in Quito. The Technical Team provided three extensive training sessions, relying on a variety of didactic methodologies for members of the two *Regional Teams* (RT). One RT of 8 to 10 members was assembled for each state—professionals working in the areas of health, education, and sanitation or representatives of NGOs working in those geographic and topical specialties. The third level was the *Community-Based Team* (CT). Members of the four Community Teams were selected by the Regional Teams following a community assembly and interviews with community leaders. CTs 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. Members of the RTs did not receive extra compensation beyond their regular salaries for their labors in this activity. CT members received no remuneration.

## 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 principle actors in the resolution of community problems.

Three training workshops for the RTs were designed and conducted by the Technical Team. (See Attachment 1.) 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 to mobilize the community to deliver and sustain the intervention.

During each training workshop, the Technical Team combined a presentation of concepts, theories, and skills, with direct practice and supervision. The aim was to introduce ideas and technical skills; allow RT members time to

practice those skills, be observed, and get feedback; and then for the RT members to practice those skills in communities before the next workshop. The second and third workshops began with a review of activities from the previous workshop and a description by RT members of their experiences utilizing those skills in communities.

# 3 TWO STATES: FOUR COMMUNITIES

## 3.1 Descriptions of the Communities

During the height of the epidemic, the communities most severely affected were those along the coast (such as Guayas and Esmeraldas), and in the mountains (such as Cotopaxi and Chimborazo). As the epidemic died down, the number of cases in the mountainous, indigenous communities diminished but the disease did not disappear. In collaboration with the Ecuadorian Ministry of Health, two states were selected for the BACA project: the sierra states of Chimborazo and Cotopaxi, each heavily populated by indigenous people and dominated by the volcanos from which the states draw their names.

In the state of Chimborazo, there were 3,140 cases of cholera in 1991; 1,418 cases in 1992; and 556 cases in 1993. By 1994, while the epidemic was winding down, Chimborazo had 288 cases (Ministry of Health data) and a similar number for the following year. This translates into the following rates:

<i>year</i>	<i>rate (per 100,000)</i>
1991	819.83
1992	365.49
1993	141.49
1994	72.37
1995	70.58

The second state selected, Cotopaxi, showed a similar epidemiological pattern. The number of cholera cases peaked in 1991 and 1992, was reduced by 1993, yet still continued at a lower rate in 1994 and 1995. In 1991, there were 2,177 cases

of cholera in the state of Cotopaxi. While the number was still high in 1992, with 1,525 cases reported, the incidence had begun to drop. By 1993, 251 cases were reported, and by 1994, only 106 cases. When these numbers are expressed as rates, it appears as follows:

<i>year</i>	<i>rate (per 100,000)</i>
1991	747.86
1992	521.41
1993	85.41
1994	35.90
1995	34.11

(Ecuadorian Ministry of Health data)

While the rate dropped off rapidly between 1992 and 1993, there was relatively little change after that.

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.

While the four communities are similar in many ways, their distinctiveness is worth noting because it suggests that, while the data described here are based on convenience sampling, the results are generalizable to other communities. In the section below, the communities are briefly described in terms of size, social organization, and access to relevant services.

### 3.1.1 Chimborazo

#### Gatazo Grande

Gatazo Grande is an indigenous community located in the state (provincia) of Chimborazo,

county (canton) of Colta, in the parroquia of Cajabamba. Gatazo Grande is a community of 2,000 people dispersed in 340 households. It is a sierra indigenous community (altitude: 3,000 meters) in which 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, pigs, and peccary are commonly sold; guinea pigs, while sold, are also raised to be consumed during religious and community fiestas.

Local government is organized around a community president who is elected yearly. There are two other significant organizations: the APadres de Familia@committee which works with the local elementary school, and the AComite 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, is not consistently treated for bacterial contamination, and the latrines have not been maintained.

At the time of the BACA project, the primary diseases reported were cholera, measles, and alcoholism. CARE International had provided the community with latrines, but at the time of the BACA project, CARE was no longer working in the community.

The number of cholera cases in Gatazo Grande were:

<i>year</i>	<i>cases</i>
1991	2
1992	25
1993	32
1994	19

It has been hypothesized that some indigenous communities become continually reinfected during community fiestas when labor migrants return from other communities. It is notable that labor migrants in Gatazo Grande return 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, also in Chimborazo, is in the canton of Riobamba and in the parrochia of Licto. Like Gatazo Grande, Pompeya is an isolated, indigenous community located in the Ecuadorian sierra (3,350m. altitude). Pompeya was the most isolated of the four communities. At the time of the project, Pompeya had 1,500 inhabitants living in 295 of the 360 homes in the community. The remaining 65 homes stand 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 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 as well as latrines. Water is obtained from the river and local wells. Homes do have electricity. A APadres de Familias@or 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 BACA project, 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, escabiosis, and drug use (marijuana). In the past five years, the number of cholera cases in Pompeya were:

<i>year</i>	<i>cases</i>
1991	20
1992	12
1993	32
1994	8

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 Cotopaxi

#### **Alpamalag de la Co-Operativa**

Alpamalag, located in the state (provincia) of Cotopaxi and in the canton of Pujili, is a small community, with 428 inhabitants in 120 households. It is an indigenous Indian community; Quichua is the primary language, and Spanish is a second language for most people. The community has a small elementary school, but the nearest health substation is 4 kilometers away.

There is no electricity in Alpamalag, and piped water comes from an old system which is regularly out of commission. The water that does come through the system is untreated. Most water is brought in on donkey back or occasionally by truck. There is 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 has access to latrines; however, in general, the latrines are poorly maintained and poorly used. Fifteen percent of the latrines are used appropriately; the remaining 85% are either in disuse or are used for other purposes (storage, etc.). The land surrounding the community is too dry for most agriculture except maguey. Most adults migrate out of the community in search of work, leaving their families in Alpamalag and returning home for fiestas.

The number of cases of cholera in the canton of Pujili were:

<i>year</i>	<i>cases</i>
1993	22
1994	8

#### **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 spread apart geographically. Two contiguous communities were studied as **Zona del Canal** for this project. They are located in the canton of Salcedo and have a total of 250 families.

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 is 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.

While the Zona does not have piped or treated water, individual homes do have electricity. CARE International has supplied latrines to about 50% of the households in the community. Animals are kept in yards close to, and in some cases, within, the open-air portion of the house.

Cholera cases in the county of Salcedo were:

<i>year</i>	<i>cases</i>
1993	94
1994	40

Across the board, conditions in these four communities can be characterized as lack of reliable access to water, use of untreated water, lack of basic hygienic services, and lack of knowledge about disease transmission and sanitary practices. Data from questions and observations revealed a wide range of high-risk behaviors which are conducive to transmission of cholera. In response to these data, communities designed local interventions designed to reduce the spread of cholera and other water-borne infectious diseases.

### 3.2 Interview and Observation Data

The interview and observation survey instrument are found in Attachment 2; questions/observations were divided into sections by type of site (i.e., households, street markets, local fiestas) and numbered within each section. Some of the most important questions and observations relating to high-risk behaviors are presented below. Here they have been grouped according to behavior rather than site. The numbers on the left refer to the question or observation number in the survey instrument. For some questions, responses from only one or two communities are noted, and in others it may be that all of the communities are practicing a high-risk behavior on a regular basis. Percentages represent the proportion of individuals (in a community) who were observed practicing a particular behavior or action. Attachment 2 also contains the numerical breakdowns by town and mean score for selected items on the questionnaire.

#### 3.2.1 Handwashing Behaviors

- 1.7 *Does the person in the household who cooks wash their hands with soap?* In Catazo Grande and Pompeya, 89% and 94% of the persons cooking do not wash their hands with soap and water.
- 1.9 *How does the person cooking dry their hands?* In Alpamalaga and Pompeya, 72% and 67% of cooks were observed drying their hands on a used cloth.
- 2.1 *Do individuals wash their hands after defecating and/or urinating?* In Alpamalaga and Pompeya, 61.9% and 94% don't wash their hands after defecating and/or urinating.
- 2.3 *How does an individual wash his or her hands (after defecating and/or urinating)?* In Zona del Canal and Alpamalaga, 100% and 66.7% of those observed in households wash their hands in a container of standing water.
- 6.5 *How do street vendors wash their hands?* 73.7% of street vendors in Zona del Canal, 100% in Alpamalaga, and 78% in Pompeya wash their hands in standing water. According to the data gathered in Catazo Grande, none of the street vendors wash their hands.
- 6.14 *Have you observed street vendors washing their hands with soap and water?*  
In all the communities (between 90 and 100% of the observations) street vendors aren't observed washing their hands with soap and water.
- 6.17 *How does the vendor dry his or her hands?* In Zona del Canal and Alpamalaga, 58.5% and 66.7% of the street vendors dry their hands on their clothing.
- 7.10 *At parties or other social events, is there a place to wash ones hands (near the toilet or latrine)?* In Zona del Canal, there aren't places to wash ones hands near the latrines in 52.6% of the observations.
- 7.11 *With what type of water do people wash their hands?* In Zona del Canal, 85% of the people

at community events who wash their hands do so with water from a canal or river.

- 7.16 *At parties or social events, have you observed the person serving the food washing their hands with soap and water?* In Zona del Canal and Catazo Grande, 85% and 89% of the food servers at community events aren't observed washing their hands with soap and water.
- 7.17 *How do food servers wash their hands?* Except for Catazo Grande, more than 62% of the food servers at community events that wash their hands do so in standing water.

### 3.2.2 Fecal Disposal

- 2.5 *(In the household context) how does one dispose of defecation?* Dry hole latrines are utilized in Zona del Canal (92.5%) and Catazo Grande (61%).
- 5.2 *Do children or adults defecate in the fields?* Except for Zona del Canal, 63% of observations were that children or adults defecate in the fields in all the communities.
- 7.8 *At parties or social community events, is there a toilet or latrine near the event?* At community events in Pompeya there are no toilets or latrines nearby.
- 7.9 *If there is a toilet, is it being used?* To follow up on the question above, 76.2% of those observed in Alpamalaga and 44% in Catazo Grande weren't using the nearby toilets or latrines.

### 3.2.3 Water Source and Storage

- 1.4 *What kind of containers are used to store water (in the kitchen)?* In Pompeya (22%) and Catazo Grande (37%), water is stored in large, uncovered tanks.
- 1.5 *(In the kitchen) how does a person draw water from its container?* In Zona del Canal (50%) and Catazo Grande (70%), water is drawn from its container with whatever utensil is handy.

- 6.10 *How are the dishes washed (by street vendors or in markets)?* Across all four communities (between 92 and 100%), dishes are washed with standing water.

### 3.2.4 Food and Drink Consumption

- 3.2 *(Within the household) what kinds of drinks are being consumed?* The most common drinks across all four communities (between 45.5 and 72.7%) are the oat-based *Aguel* drinks and fruit drinks.

### 3.2.5 Street Food and Community Events

- 6.3 *Are raw fruits and vegetables washed before they are sold?* In Alpamalaga, raw fruits and vegetables sold by vendors aren't washed according to 100% of the observations.
- 6.4 *If the fruits and vegetables are washed, what kind of water is used?* In Zona del Canal, 29.4% of the fruits and vegetables the vendors wash is done using water from a canal or river.
- 6.6 *How do (street vendors) maintain the prepared foods?* In Zona del Canal (55.6%) and Alpamalaga (63.6%), food served by vendors is exposed to dirt or in close proximity of the floor.
- 6.8 *What are prepared foods served in ?* In Alpamalaga 78.3% of street vendors were observed serving food on used office paper.
- 6.9 *With what kind of water are dishes washed?* In Zona del Canal (83.3%) and in Pompeya (90%), street vendors wash dishes only with water. In Catazo Grande (44%) street vendors wash dishes with a cloth only (no water). In Alpamalaga (66.7%), street vendors do not wash the dishes.
- 6.12 *Are juices prepared with boiled water?* In Alpamalaga (100%) and Zona del Canal (46.6%), juice preparation does not include boiled water.

- 6.16 *Does the vendor get rid of the trash, i.e., remove it from the vicinity of the food?* With the exception of Catazo Grande, street vendors in all the communities have high percentages (between 94.7 and 100%) of not removing trash from the vicinity of food.
- 7.3 *(At religious and community social events) how are the prepared foods maintained?* In Zona del Canal (33%) and Catazo Grande (22%) the food street vendors sell is kept warm but uncovered. In Zona del Canal (22.2%) and Alpamalaga (22.7%) of the food is uncovered and exposed to dirt or in close proximity to the floor.
- 7.15 *With what are dishes washed?* In all communities (between 77.8 and 94%) dishes washed at community events are done so with water only.
- 7.19 *After religious or other social community events, what happens to the garbage?* With the exception of Pompeya, between 35.3 and 78.3% of the observations noted that trash was left on the open ground.
- 7.20 *Do people who live outside the community attend religious and other social events?* With the exception of Pompeya where there was no data, the answer was a strong yes (ranging from 78 to 100% of responses in the three other areas).

### 3.2.6 Water Disposal and Household Environment

- 1.14 *(Re household kitchens) how do you dispose of the dirty water?* In Zona del Canal, 100% of responses were that dirty water is given to pigs.
- 4.2 *After washing clothes, how is the dirty water disposed of?* This is one of the exceptions in this data; all the communities (between 58.3 and 100% of responses or observations) practice the least risky behavior—dumping dirty water on the ground, as opposed to putting it back into a water source.

- 5.1 *What is the source of water used to water gardens?* In Zona del Canal, 100% of the water used for gardens comes from canals or rivers.
- 5.3 *Are animals enclosed in a corral?* With the exception of Alpamalaga, all the communities (between 59.2 and 72%) have animals not enclosed in corrals.
- 5.4 *Is there loose rubbish in the patio or garden area?* In all the communities with the exception of Pompeya (data lacking) there are high percentages (between 63 and 94%) of loose rubbish in the patio or garden areas.
- 5.5 *How is the majority of the (household) trash disposed of?* With the exception of Alpamalaga, in all the communities (between 50 and 68%) trash is disposed of on the open ground.

### 3.2.7 Food Preparation and Storage

- 6.7 *Regarding street vendors, at what temperature is the food sold (from very hot to cold)?* In Alpamalaga (40%) and Catazo Grande (33%), street vendors sell food lukewarm.
- 7.4 *With what (utensils) are prepared foods served?* At community events in Pompeya (20%) and Catazo Grande (23%), the food is served with the hand only—no utensil.

### 3.2.8 Miscellaneous

- 1.13 *With what do you clean dishes (in the home)?* In homes in all the communities, except Catazo Grande (data lacking) it is very common (between 74 and 91.7% of observations) that dishes are washed with water only.

# 4 RESULTS

In developing plans for the Behavior-Based Cholera Activity, EHP anticipated that communities where cholera was present could themselves identify and monitor those behaviors which are believed to provide transmission pathways and work toward the reduction of the disease among adults. The goal was to alter (or reduce) those behavior patterns which promote transmission; an observation and question survey was developed and administered in each community, thereby providing baseline information. Monitoring efforts will repeat the observations to see if education, local information campaigns, and other community interventions have had an impact on individual and community behaviors around water storage, household food preparation, handwashing, and defecation patterns.

More broadly, the aim of the program was to transfer skills and knowledge to the Regional Teams and communities so that they will be able to address additional environmental health issues in the future. Similarly, if used successfully in four indigenous rural communities, the CPI model (or participative model) would be replicated in other locales, via the RTs and NGOs now trained and experienced in its use. Thus public and private agencies would be able to use participative data collection methods to draw other communities into planning and conducting their own interventions. Attachment 2 contains the questionnaire and interview and observation data gathered in the course of BACA. These data indicate high-risk behaviors and provide a baseline for monitoring behavior change in the effort to

reduce cholera incidence. Community perceptual maps also provide baseline information which is useful for monitoring changes at the neighborhood level. (A detailed description of the process of creating perceptual maps of communities is found in Attachment 1; photocopies of the actual maps produced by the communities are found in Attachment 3.) Community Teams gathered the data and thus are in an excellent position to use it to monitor change.

In the following pages, the results of the Behavior-Based Cholera Activity are discussed in detail. The community interventions are taking place as of this writing (late 1995) and can be discussed here only as proposed actions. An evaluation of BACA should be conducted after the interventions have occurred, to measure the impact of the activity.

## 4.1 Knowledge and Beliefs

One of the goals of the project was to identify adult behaviors and beliefs associated with diarrhea. In the two Ecuadorian provinces studied, many of the beliefs about the transmission of cholera reflect biomedical knowledge acquired during recent MOH public education campaigns, while other beliefs reflect alternative sources of knowledge acquisition, such as traditional cultural beliefs about disease causation. It is noteworthy that in Ecuador, a considerable amount of biomedical information has been successfully transmitted about the causes and prevention of cholera. Translating that knowledge into behavioral

#### Soap or Pigs? A Local Dilemma

Both MOH personnel and community people recognized the need for better water systems and specific household practices to provide barriers to transmission of cholera. One of the avenues promoted by MOH was greater use of soap for washing dishes and handwashing. There was resistance to use of soap, which, at first blush, appears unreasonable. But investigation of local practices can provide an explanation: Where water is scarce and supplies unreliable, water is used several times. It may be used to prepare food, then to wash dishes, and finally, when it has been used several times and has some food scraps in it, given to the pigs. Pigs are an important part of the economy, and, in the long run, the little scraps of food given to pigs in thrice-used water benefit the entire household. If soap is added to the water, the pigs will not ingest it. Finding out this information helps to explain people's resistance to using soap in the chain of water reuse. Pigs' distaste for soapy water illustrates a specific issue to examine. It also illustrates the frictions and frustration which can arise between a national health campaign and local practices.

practices, however, remains problematic. One of the difficulties is the lack of infrastructure, such as in-home potable water or a dependable water supply, to interrupt fecal-oral transmission of cholera. Another difficulty stems from the conflict between public health knowledge and traditional cultural beliefs about causation, prevention, and cure of illnesses such as cholera.

When community members were interviewed as to their beliefs about the cause of diarrhea in adults, many responded with information acquired through the recent (1991-1993) cholera prevention campaigns, stating that diarrhea is caused by not washing hands before eating or other

unsanitary practices. Members of each of the communities studied were able to provide an accurate list of behaviors that they believed cause diarrhea. They mentioned drinking contaminated water from nearby irrigation canals, washing hands in the contaminated canal water, drinking water that is not boiled, eating food prepared and sold by street vendors, not having potable water in the house, food shared at public fiestas, and eating food that has not been reheated. This list of behaviors captures many of the activities that have already been identified by public health workers as conducive to the spread of cholera and other diarrheas.

Community members also mentioned certain behaviors not included in public health campaigns as related to the spread of diarrhea, such as the overconsumption of alcohol. Frequently community members discussed how the overconsumption of alcohol could cause diarrhea, not only through its resultant dehydration, but also because when one is inebriated one might consume food that is not clean, or might eat food served on newspapers, or might drink water that is not boiled. Another belief cited was overconsumption of food. Eating too much was believed to cause diarrhea among adults.

Dogs, children, and life stages all figured in the beliefs about diarrhea causation. The geographic as well as social landscape is incorporated into belief systems. The sierra lies at high altitudes in the mountains of Ecuador where it is often cold. Temperature and rugged terrain were seen as potentially dangerous and indicated in disease causation. Cold air, cold food, and being outside at night were listed as risky to one's health. To walk by a deep ditch (the type often filled with garbage) at night could cause diarrhea, and if the adult who passed the ditch went to a home where there is a young child, that child could become sick with diarrhea. Other ideas put forth were that getting up in the middle of the night to relieve oneself can make one vulnerable to cholera-like illnesses and

diarrhea, that diarrhea can be caused by eating heavy food late in the day, and that pregnant women are likely to have diarrhea caused by the developing fetus.

Community members also suggested that it was difficult to remain free of diarrhea. To avoid diarrhea one had to be constantly vigilant. They had to watch their behaviors and guard against eating or drinking things that could harm them. Vigilance was necessary because the physical surroundings in these communities are often contaminated and difficult to maintain free of diarrhea-causing agents. In addition, excesses such as too much drinking or eating could make one lower one's guard and result in behaviors causing diarrhea.

People in all four communities were able to relate both the biomedical and traditional causes of diarrhea. As happens throughout the world, these belief systems co-exist and are often intertwined. Treatment modalities also combine Western biomedical and indigenous practices. A doctor is consulted, and teas with special herbs are brewed.

In general, the most striking immediate effect of this project was the self-awareness the data-gathering and analysis caused. Community members said that both the map-drawing exercise and the interviews and household observations helped them recognize high-risk behaviors and the beliefs that supported them. Though both mapping and observation are time-consuming activities, they resulted in increased awareness of the relationship between beliefs and behaviors, and the lack of correlation between knowledge and actions. These conclusions were all the more powerful because they were drawn by community members based on their own insights into their behaviors. This type of recognition is the basic building block on which prevention can be established.

## 4.2 Core Behavior Clusters and Monitoring of Behavior Change

Three clusters of operationally meaningful information have been winnowed out from the qualitative and quantitative data gathered in the four communities. These (sometimes overlapping) clusters involve the following:

1. quality of stored or piped-in water
2. washing and drying of hands and washing of food and dishes
3. disposal of excreta

A fourth cluster, food preparation and consumption, is excluded from this discussion because of the many overlapping behaviors from the above three clusters

Transmission of the bacterium, *vibrio cholerae*, from excretion to oral ingestion via water, may follow a variety of pathways, each with a given probability of the bacterium infecting a new host. If all possible pathways and combinations of pathways were known, together with the transmission probabilities of each, it would be possible to derive the probability of a given member of the community becoming infected. It would also be possible to predict what effect a change in the probability of any given pathway would have on the global probability of infection.

The matrix below represents major transmission pathways. If transmission probabilities from hands, disposed feces, and stored water (the checked areas) were reduced to zero, the probability of infection would be reduced to zero. Interactions represented by checked areas in the matrix are those which will be monitored for reduction in transmission.

## Matrix of Transmission Pathways

Sites	Excreta	Hands	Clothing	Ground-water	Surface Water	Stored Water	Food
Excreta		U	U	U	U	U	U
Hands	U		U	U	U	U	U
Clothing							
Ground-water							
Surface Water							
Stored Water	U	U	U	U	U		U
Food							

The following are behaviors observed or reported in the surveys that indicated high probability of transmission of bacteria in the three clusters (numbers refer to question or observation number on the survey schedule):

### 4.2.1 Quality of Stored or Piped-in Water

- 1.3 The most desirable water for consumption is treated water, either piped or treated in storage containers. In one community most people (94%) use treated, piped water for cooking. Two communities had no treated, piped water at all. One of these relied on well water (100%), while 78% in the other community used untreated piped water. Of course the quality of groundwater obtained from springs and wells depends in large part on how excreta are disposed of and whether or not the water is treated.
- 1.5 The safest way to draw water from storage containers is through a tap or with a ladle

- used only for that purpose. Of residents observed, only 6% used one of those methods.
- 6.12 Fruit juices were prepared by street vendors with untreated water in 73% of the cases.

### 4.2.2 Washing and Drying of Hands and Washing of Food and Dishes

- 1.7 In 75% of the observations, people who did the household cooking did not wash their hands with soap and water before meal preparation.
- 1.9 Of those who washed their hands, 80% dried their hands on their clothing or a used cloth.
- 1.13 Eighty-five percent of those observed in households washed dishes without soap.
- 2.1 Half of those observed or questioned washed their hands after defecating or urinating.
- 2.3 Of those who washed their hands, between 61% and 100% washed in a container of standing water.

- 6.3 In only 30% of observed cases were raw fruits and vegetables from street vendors or markets washed before being served.
- 6.5 Of street vendors who washed their hands, 63% used a container of standing water.
- 6.14 Four percent of street vendors were observed washing their hands with soap and water.
- 6.17 Eighty-eight percent of those street vendors dried their hands on clothing or a used cloth.
- 7.11 (Regarding behavior at religious and community events, latrines, and washing after defecating or urinating) 43% washed their hands with water from a canal or river.
- 7.18 Food servers at religious and community social events scored only slightly better on the same items.

#### 4.2.3 Disposal of Excreta

- 2.5 The safest way to dispose of excreta is in a toilet connected to a treatment plant. Fifteen percent of people observed used a toilet or a latrine that was cleaned with water; 34% buried feces and 16% left the excreta on the open ground.
- 5.2 Of all adults and children observed or questioned, 69% used fields as a place to defecate, thereby creating a source of contamination for vegetables grown in the fields.

#### 4.3 Outcome Measures

The ultimate outcome measure will be the incidence of cholera, and those epidemiological

data will be gathered from the communities during the monitoring phase. Nevertheless, there are sound reasons for gathering data on the high-risk behaviors as well. To test the correctness of the model, we need to know which behaviors changed, by how much, and whether or not they co-vary with incidence of the disease. This information will guide future efforts in the event that cholera or other similarly transmitted diseases remain endemic; it will also be essential if the model is applied to other communities. If the incidence of cholera is not diminished, a survey of behaviors will indicate directions for future interventions.

The monitoring phase should focus on the three core behavioral clusters listed above, and, within those, on the outstandingly high-risk behaviors. Although the data suggest that commercial food-handling may offer the highest probability of transmitting the bacterium, the project itself dealt primarily with household-level behaviors and interventions. Thus, the consultant team does not propose follow-up on commercial food purveyors as a part of the monitoring phase. To monitor behavioral change in household and personal activities, conditions and behaviors should be assessed in the next phase of the project.

**Quality of stored or piped-in water.** The community interventions under BACA focused directly on this issue, and the team expects that it should show the greatest change. Specifically, as shown in Table 1, two items should be observed in households (and compared against the baseline data) in the four communities.

**Table 1**

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

**Washing and drying of hands and washing of food and dishes.** These critical practices can cancel out the effects of treated water. The core behaviors to monitor in this category are shown in Table 2.

**Table 2**

Behavior	Baseline	Trend	Yr 1	Yr 2
1. People engaged in food preparation wash their hands with soap and clean water first.	25%	Increase		
2. After washing their hands, food preparers air-dry their hands or dry them on clean cloths.	20%	Increase		
3. After defecating or urinating, all people wash their hands with soap and clean water.	50%	Increase		
4. Handwashing is done in running water or in a container of clean water.	37%	Increase		
5. Dishes are washed with soap and clean, treated water.	15%	Increase		
6. Raw fruits and vegetables are washed in treated water before being served.	30%	Increase		

**Disposal of Excreta.** Part of the intervention was to teach community members to clean and maintain latrines. The widespread and longstanding habit of defecating in the fields may not be easy to change. If excreta are buried, they may not pose a serious risk. Table 3 lists measures of behavior change in this category.

**Table 3**

Behavior	Baseline	Trend	Yr 1	Yr 2
1. Excrement is disposed of in a toilet or cleaned latrine.	15%	Increase		
2. Children and adults defecate in open ground (fields).	69%	Decrease		
3. Those who do defecate in open ground bury the excreta.	16%	Increase		

#### 4.4 Increased Community Power

BACA demonstrated the advantage of anchoring proactive, preventive interventions within the broad concept of environmental health. The activity specifically addressed the problem of endemic cholera, but by placing it in a research framework that included community perceptions of the environment, the effects of the activity become broad-based, integrative, and applicable to environmental health in general. Through the map exercise, community members came to recognize relationships between various types of risk factors and behaviors within their local environment. They were able to see, for instance, the relationship between contaminated water in the irrigation canals and the risk of diarrhea from washing in that water. The environmental emphasis of the maps allowed community members to transfer their knowledge about handwashing and health (often related to a household domain) to behaviors in another domain, i.e., irrigation water, and draw the crucial connection between the two.

Another result of the perceptual maps exercise was the communities-increased awareness of high-risk areas in their locality. Following the map exercise, members of each community expressed surprise and concern with the graphic presentation of information related to the spread

of disease. While comparison of the various versions of the community map (drawn by each member) engendered considerable and spirited discussion, the fact that each version included high-risk areas focused participants-attention on those specific areas. Most members of the Community Team (and community members assembled at the town meetings) had never seen a perceptual map of their community before, let alone a map showing areas of risk of disease. The map-drawing (and discussion) provided a concrete visual presentation of public health information, made particularly effective because it was presented in locally designed and understood terms.

These perceptual maps (see Attachment 3) were initially designed to elicit community perceptions of areas (both geographic and symbolic) to stimulate communication. The maps, however, became much more significant because they also provided a mechanism for the Regional Teams to gain insight into the world of the community as the CTs explained their environment to them. One unanticipated consequence of the perceptual map exercise was the validation of community-based knowledge. From the start, both Regional and Community Team members were excited about the design of this project because it gave voice to locally expressed demands of the community. The mapping exercise facilitated community ownership of the project (and participation in it) because it

gave voice to community members' ideas and validated their worth.

#### 4.5 Community Action Steps

The community-planned health interventions are just now (late 1995) occurring and have not yet been evaluated. While the long-term results are yet to be demonstrated, some changes have already occurred. The skills of the Regional Team members have been broadened through training in ethnographic methodology and qualitative analysis, supplementing their knowledge and expertise in epidemiological methods. Their ability to enter previously closed indigenous communities improved, as did their observational and interview skills. The ability to collect and analyze qualitative as well as quantitative data significantly enhances the skills members of the Regional Team can use in their work.

The CPI model is centered on training public- and private-sector health and education workers to facilitate community-based participation in community health and development projects. The open-ended, nondirective nature of the model allows it to be used for a variety of purposes, always including the entire community. It is very replicable as it seeks answers from within communities; thus communities set the parameters of their investigations.

Strengthening the public health and education infrastructure by providing training in qualitative data techniques and focusing the end product on the perceived needs of the entire community are two of the long-term benefits of the CPI model. A third strength of the CPI model stems not only from the skill base it provides, but also from the novel emphasis on state-level public-sector contributions. Many countries are going through decentralization efforts. Functions heretofore managed by national-level agencies are devolving onto state, regional, or provincial agencies, many of which are ill-equipped to administer community-based programs. State-level

employees often encounter problems common to multiple communities in their catchment areas, and yet lack training in working with communities. The CPI model allows them to replicate a tested methodology in various sites under their supervision. Regional Team members in this study became committed to the CPI methodology. They frequently said that they planned to replicate the model in other communities. Hopefully, they will, as it can be easily adapted to local needs, and as it appeared to promote local involvement and enthusiasm which are often lacking in externally initiated interventions.

Benefits from this project reach from the central MOH personnel, to members of isolated, mountainous indigenous communities. Several members of the Technical Team (including the codirector) were drawn from the central Ministry of Health. Those individuals played a pivotal role in the development and application of the CPI methodology in BACA, and they understand the processes well. In them resides the institutional memory for this project. The TT codirector can share this information with planners and policymakers in her own department; she is also in a strategic position to share her experience and information with other organizations and agencies.

In addition to these rather abstract institution-strengthening results from the BACA activity, the four sierra communities are moving ahead with specific interventions they designed. While each community designed its own intervention, all four communities requested help in securing household water storage tanks and education about their maintenance and cleaning. Several neighborhoods within the communities included latrines and health education about their cleaning and maintenance in their planned intervention. These infrastructure portions of the proposals were forwarded to appropriate national and/or international agencies for funding.

As a result of the activity, each CT prepared a list of activities they proposed to carry out. Because there was significant commonality, the activities

proposed by one community are summarized here. Water storage tanks were the primary item requested by the communities; however, both the CTs and RTs agreed that health education and communication were critical parts of a sustainable project. Therefore, the CTs proposed a series of activities to prepare the community to integrate the water tanks as a part of comprehensive changes in health beliefs and behaviors. Actions proposed (and undertaken as of December 1995) were the following:

- # Two workshops were held in which the RT trained the CT in basic information about cholera, diarrheas, and other infectious diseases. Information about nutrition, food preparation and storage, and how to use and clean the water storage tanks was included in these workshops.
- # A workshop was held in which the CT (with RT assistance) designed folders, flyers, and pamphlets about how to use and maintain the water tanks correctly, using local knowledge and linguistic terms. Drawings were based on community realities.
- # The RT gave two workshops to train the CTs in techniques of social communication and presentation of educational materials.
- # The CT presented a series of educational talks about water use and storage (and other health practices and behaviors) at community activities such as assemblies, fiestas, and communal labor work groups.
- # RT and CT designed monitoring and evaluation activities.
- # RT and CT developed and reproduced a water tank cleaning and maintenance manual.

- # Water tanks and faucets were distributed to households.
- # Both the CT and RT presented a series of educational talks about hygiene, sanitary practices, and health care to small groups such as cooperatives, clubs, associations, and community leadership committees.
- # Health demonstrations aimed at schoolchildren were given by the CT about personal hygiene, sanitary practices, and cleanliness.
- # Health pamphlets (both written materials for those who could read and messages based on pictures and drawings for those who couldn't read) were gathered together and distributed to community meeting places.
- # A competition of art murals was held, with health messages painted on public walls.
- # A health fair was held with community activities, health promotion materials, music, and art.
- # A local workshop focused on developing health information messages for the radio.
- # Follow-up home visits were conducted to observe hygienic and sanitary behaviors and practices.
- # The CT continues to monitor sanitary practices and water tank maintenance.

In sum, the immediate results of this project can be seen in the planned, community-based events. If followed through, they could have long-range consequences. Documentation of the long-term results is dependent on a program monitoring and evaluation being conducted in the future.

# 5 LESSONS LEARNED

The relative effectiveness of this behavior change effort on cholera incidence will be monitored through direct data. How many cases of cholera appear in these four communities within a set period of time. Behavior change indicators will also be used. Quality of water and its storage, handwashing and other food preparation issues, and household and personal defecation patterns.

Key lessons learned during the implementation of this activity are listed below.

## 5.1 Moving to Scale

### 1. Strong national support facilitates effective program delivery.

Projects whose impetus is nationally generated or which are collaboratively developed and reflective of national concerns will find policymakers a receptive audience. The Behavior-Based Cholera Activity demonstrates such initiative and collaboration. The activity sprung from MOH concern about cholera and, in particular, endemic pockets of cholera particularly resistant to control. The activity was generated by EHP staff and the MOH Director of Epidemiology, with the backing of the USAID Mission in Ecuador. Directors of Regional Public Health Administrative Centers in two of the states with a high risk of endemic cholera were incorporated into the planning and implementation of the activity. Their interest and support facilitated the time and energy their employees (members of the Regional Teams) gave to the activity, and greatly enhanced the effectiveness of program delivery.

### 2. Multiple contact points maximize project effect.

BACA had three levels of contact points for EHP and the Ecuadorian government: at the national level through MOH personnel assigned to the activity, at the state level through individuals recruited from regional health and education centers to be members of the Regional Teams and their State Health Directors, and at the level of the local community. Lessons learned at each of these three contact points are applicable to national policy and practice, but the synergistic effect and the coordination of knowledge and practice derived from the three levels working together greatly enhanced the impact at each level.

### 3. Technical assistance experts must respect and promote national ownership of project design and implementation.

The sustainability of any project is dependent on continued follow-up, which is usually dependent upon national government priorities. Therefore, projects should not only be developed in collaboration with, and consistent with national priorities, but also the national government should be brought into leadership roles as soon and as consistently as possible. National experts should be used, in conjunction with outside technical advisors, to provide knowledge critical to understanding the national context in which the project will occur. National ownership of a project, and its concomitant institutional memory, should include a vested interest in the project's sustainability and the necessary follow-up.

#### **4. An integrated approach to environmental health is the key to prevention.**

Prevention requires an integrated approach; no single approach is sufficient. One hundred years ago, Rudolf Virchow and John Snow described a complex of factors, both biomedical and sociocultural, implicated in the spread of infectious disease. Since then, their findings have been supported numerous times and have direct application to the lessons learned from BACA. In this case, the Ecuadorian government ran an effective anti-cholera campaign, part of which was a health education component designed to change behaviors conducive to the spread of cholera. However, in some areas of the country, new knowledge did not result in changed behaviors. In Ecuador, people learned to wash their hands to prevent the spread of cholera; however, many villages had no access to running water. Therefore, people in such villages could not wash their hands in clean water. Instead, they washed in the already-contaminated water from the irrigation canals. An integrated environmental approach focusing on disease prevention in the home, in the workplace, and in the streets incorporates an acknowledgment of the various dangers and possible shared responses to those dangers.

#### **5. Institutional capacity at the regional level is essential to addressing the well-being of the community.**

By providing the skills to community members to recognize and address local concerns about health and development, and by providing back-up support in the Regional Team, an institutional capacity to address the well-being of the community was created. As governments decentralize many of their services, district or state agencies can be overloaded with responsibilities; the CPI model recognizes the trend toward decentralization, while acknowledging that local communities are often unable to absorb the resultant extra tasks. The CPI model offers national governments, regional agencies, and local communities a way to work together toward an equitable redistribution of activities and resources. Regional Teams are trained in communication, data gathering, and analysis methods which they can apply in response to a wide variety of issues.

## **5.2 Application of Materials and Techniques Learned during Training Workshops**

### **1. The Communicative Power of Paraphrasing**

During the first workshop the Regional Team was taught how to communicate using paraphrasing. The significance of being able to translate concepts and information into terms recognizable to the intended audience was immediately grasped by members of the Regional Team. Their own experiences had already taught them that communication often fails because of the lack of shared terms, and they sought ways to improve their ability to communicate the content of the health education talks they gave. This was the first acquired and most often used skill.

### **2. The Uses of Ethnographic Methodology and Perceptual Maps.**

Ethnographic methodologies allow outside teachers/trainers/researchers to gain insight into the lives and perceptions of people with whom they are working. The map-making exercise is designed to (1) allow community people to symbolically represent their social and physical environment; (2) validate the community representation and recognize that it may well be distinctive from other, more formal maps; (3) create a community-based organizational activity; (4) provide a communication bridge between the Regional Team and the Community Team; and (5) develop a community awareness of local high-risk behaviors.

### **3. The Uses of Qualitative Methodologies**

Members of the Regional Teams were already experienced in a variety of community health and development techniques; some team members were health educators; others were teachers, health inspectors, or epidemiologists. None of them, however, had previous experience with qualitative methodologies such as open-ended questionnaires, interview schedules, or observation guides. The applicability of these techniques and their analysis were found to be useful in a number of critical areas and transferable to other activities.

#### **4. Community Development of Intervention Projects**

The CPI model provides skills to facilitate community participation, information feedback, and articulation of community issues in formulating a community-based intervention project. Critical elements in the approach are community management, project monitoring, and empowerment and community-based sustainability.

#### **5.3 Future Applications**

The CPI model developed and field tested in BACA has the potential to be adapted and applied in a variety of contexts. It assumes the primacy of the community to make decisions affecting its well-being and the supportive role of the state to facilitate the translation of plans into projects furthering community well-being. The model can be used to help identify health risks, facilitate communities in fighting infectious disease, organize for community development, and train government, private sector, and community workers. The CPI model incorporates a recognition of the critical role played by beliefs in any process of behavior change and is applicable to all adult high-risk behaviors.

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## ATTACHMENT 1

### Brief Overview of Workshop Objectives, Contents, and Products

#### **First Training Workshop**

February 21-24, 1995

**Objectives:** The workshop, lasting four consecutive days, had the following objectives:

1. Introduce the Regional Teams (RTs) to the aims, goals, and objectives of the project, and actively involve them in its development.
2. Train the RTs in how to work in collaborative teams that cross disciplinary boundaries, and create a sense of identity and cohesion among the teams.
3. Transfer knowledge and skills to the RTs so that they can replicate them in the formation of the Community-Based Teams.

**Content:** The content of the workshop was as follows:

1. Discussion of the objectives and process of the Community Participation Intervention model.
2. Techniques of cross-cultural and interpersonal communication, models of communication including paraphrasing, summarizing, question asking, and feedback.
3. Strategies for working in communities and the identification of community leaders.
4. Methodologies and techniques for creating *perceptual maps*.
5. General information about cholera.
6. Criteria for the creation of the Community-Based Teams.
7. Procedure for the development of *action plans*.

After the workshop, RT members were charged to apply the skills and techniques they

learned in the workshop. The first task was *formation of the Community-Based Teams (CTs)*. To do this, the RT assembled members in their communities to explain about cholera and the CPI model. After an explanation and a chance for members of the communities to discuss issues, volunteers were sought and the CT formed.

The first task for the CT was to create a *perceptual map of the community*. The perceptual map exercise was designed to fill two sets of needs: to provide RT with insight into how CT members perceive their communities and to increase CT members' awareness of their own communities. Then community assemblies were held at which the perceptual maps were displayed. The individual perceptual maps became a focus of animated discussion of cholera risk factors in each community. Each community then combined the various maps into a single community map to give to the RT, which in turn made an enlarged (and often colorful) rendition of the map to return to the community (see Attachment 3).

The perceptual map became a physical manifestation of the community's perceived environment and sites of health risks. The CT was asked to place on the map all of the items and places which might contribute to disease transmission. It was emphasized to the CT members that the map was to reflect their ideas about the nature of their environment and its health risks. Some maps were drawn in great detail, showing garbage dumping areas, irrigation canals, animal containment areas, latrines, and even animal defecation. Other maps were drawn with less detail but included common sources of disease transmission, such as local food vendors.

While each was unique, the maps illustrated common perceptions about the community environment, high-risk areas, and sources of contamination. The process of creating the maps focused community interest on the project, encouraged discussion, highlighted the role of the CT, and provided a tangible result of community work. In addition, the maps became a point of pride to the communities and a reference point for CT members in later discussions of disease transmission.

### **Second Training Workshop**

April 10-13, 1995

**Objectives:** The second workshop was a four-day training session during which members of the RT accomplished the following objectives:

1. Reinforce the collaborative spirit among the members of the RT for the continued use of the CPI model.
2. As a result of perceptual maps, identify high-risk behaviors in transmission of adult diarrheas and cholera.
3. Learn and apply ethnographic methods and observation instruments introduced and discussed at the workshop.
4. Become familiar with techniques for open-ended interviews and their application.
5. Review and adapt the interview guide to local needs, incorporating local terms and cultural beliefs.
6. Field test the interview guide (after observations/practices at the workshop).
7. Understand and practice methods of systematization and analysis of qualitative data.
8. Create a work plan that included an instrument for monitoring community participation.

At the end of the second workshop, the RTs were able to draw insights from the perceptual map exercise. They discussed advantages of cross-cultural interpersonal skills, such as paraphrasing ideas and using feedback to clarify information.

RTs also field-tested the open-ended interview and observation guide. Most members of the RTs had previous experience with closed-ended survey research instruments, but none had experience with open-ended questions and qualitative data. This proved to be an important element in the project since the RTs were willing to experiment and change their ideas about research procedures and to see the validity of community responses. The combination of ethnographic and epidemiology field techniques challenged and rewarded the participants. Before they left the second workshop, RT members had to create a work plan for the tasks to be completed before the next workshop. They also developed a guide for organizing and analyzing both quantitative and qualitative data.

The single most significant task undertaken in the second workshop was field-testing the interview guide and questionnaire. RT members had to be comfortable with and knowledgeable about the research instruments, since they would have to show CT members how to use them. The TT prepared the research tools, but it was up to the RTs to modify and adapt the instruments to their own understanding. The final instruments used in the communities were further changed to reflect local understandings, linguistic terms, and concerns while maintaining the same general research foci. The instrument developed by the TT (found in Attachment 2) was generated by the project goals, previous research on cholera, and information necessary to understand local behaviors and beliefs. The final instrument used in the communities was the RTs=and CTs=own creation; the instrument developed by the TT was only a guide. Both RT and CT members reinforced the idea that the instrument could be used well only if it was adapted to the local contexts.

Several days of the workshop were dedicated to introducing, discussing, adapting, and field-testing the research instruments. While the instruments were not field-tested in the actual communities in which they would be used, the field-testing exercise proved to be invaluable. TT members accompanied small groups of RT members into a

nearby community to test the instruments. The workshop group experienced greater rejection than the actual CT members eventually did, because each CT worked in its own community and neighboring homes, while the workshop group was testing the instruments where there were no established ties. Once the workshop teams returned from the community, the experience was discussed and the instruments modified. Each RT was responsible for modifying the instruments following a pre-test conducted by the CT in their own community. Thus specific modifications were made for each locality.

### **Third Training workshop**

June 13-15, 1995

**Objectives:** The third workshop occurred during three consecutive days and had the following objectives:

1. Analyze the community-based data on high-risk adult behaviors associated with cholera.
2. Discuss community knowledge, beliefs, and behaviors surrounding adult diarrheas.
3. Provide feedback about the ethnographic experience and the observation and interview guide.
4. Review qualitative data analysis methodologies
5. Conceptualize community-based projects as solutions to concrete problems identified by the community.
6. Learn and practice community intervention participation processes
7. Identify strategies for funding the community intervention projects.
8. Analyze and field-test participatory follow-up and monitoring of projects.
9. Systematize the methodological process of Community Participation Intervention (for use with other community-based problems).
10. Elaborate a work plan of community-based participative intervention and project monitoring.

While each of the workshops covered a complicated set of topics, the RTs=understanding of the topics covered in the *third* workshop laid the basis for the possibility of long-term success of the proposed interventions. The workshop opened with a discussion of activities the RTs had completed with CTs and the results (and problems) which surfaced between the second and third workshops. Results were discussed and shared among the teams and the TT, and problems identified and, hopefully, resolved. During this workshop, RT members were trained in both data analysis and proposal writing. Data analysis was critical because the proposal for a follow-on intervention must be based on an understanding of local behaviors, beliefs, perceived needs, and community willingness to contribute to the effort.

The third workshop was designed to last four days, but had to be compressed into three. Community data had already been sent to the TT for preliminary analysis. Further analysis was conducted during the workshop with the TT and the RTs. Following a discussion of the meaning of the results, the RT from each state worked on a hypothetical proposal for an intervention, to gain experience in formulating aims, objectives, materials, costs, and time required for an intervention. The exercise provided the RTs with an understanding of how to conceptualize an intervention proposal and ways to deal with conflict resolution and problem-solving.

By the end of the third workshop, participants were required to develop a plan of action for the community-based intervention that included details of activities, a budget, and timetables. Along with the plan of action, a guide for facilitating community involvement in determining an appropriate intervention was completed. The last product of the third workshop was the creation of a methodology for community-based monitoring of the proposed intervention.

RT members then returned to their CTs and passed along the information they had learned at the third workshop. They worked with the CTs to organize community assemblies in which to present the results of the community research and conduct discussions. Based on the community assemblies, CTs prepared a list of interventions that they and the community considered appropriate. The RT worked with each CT to evaluate the possible interventions and decide which was most feasible to consider, and then

wrote a proposal for it. The ideas contained in each intervention proposal reflect the CTs=access to local/community ideas and the RTs=professional training and experience.

The proposals for community-based interventions were then sent to the TT, which read and evaluated each one. The TT then decided which interventions to fund and which ones to pass along to other funding agencies, both public and private.

## ATTACHMENT 2

### Interview and Observation Survey Instrument

#### *Observations in the household*

#### 1. Observations focusing on the kitchen

1.1 Observation: What foods are prepared?  
soup, rice, fruit drinks

1.2 Observation: How are foods prepared?  
fried  
parboiled/blanched  
raw  
boiled  
reheated

1.3 Observation: Where does the water for cooking come from?  
rainwater  
treated, piped water  
well or spring  
untreated, piped water  
canal or river

1.4 Question: What kind of containers are used to store water?  
container with a small opening and a top  
container with a small opening without a top  
a jar with a lid  
large tanks with a lid  
large tanks uncovered

1.5 Observation: How does a person draw water from its container?  
from the tap in the container  
with a ladle used only for this purpose  
with another utensil (cup) used only for this purpose  
with whatever utensil  
with the hand

1.6 Observation: Are foods that are eaten raw washed beforehand?  
Yes  
No

1.7 Observation: Does the person cooking wash their hands with soap and water?

Yes

No

1.8 Observation and question: How do you wash your hands?

with running water

from a container of standing water

1.9 Observation: How does the person cooking dry their hands?

air

they don't

on a towel

on a used cloth

on their clothes

1.10 Question: From where does the person cooking get the vegetables they use?

their own garden

the market

the store (grocer)

street vendor

1.11 Observation: Where is prepared food stored?

in the refrigerator

cupboard

in a jar with a lid

in a jar covered with a cloth

in an uncovered jar

1.12 Question: Do you always reheat food before eating it?

Yes

No

1.13 Observation: With what do you clean dishes?

water and soap

water and ashes

with water only

a cloth without water

don't wash

1.14 Observation or question: How do you dispose of the dirty water?

pigs

## 2. Observations concerning human body wastes

2.1 Observation and question: Do individuals wash their hands after defecating and/or urinating?

Yes

No

2.2 Observation: How does a person wash their hands after defecating and/or urinating?

running water and soap

running water, without soap

in a basin of water with soap

in a basin of water without soap

in a container of water that is used for several things

2.3 Observation: How does an individual wash their hands?

with running water

in a container of standing water

2.4 Observation: How does a person dry their hands?

air

don't dry

with a towel

with a used cloth

on their clothes

2.5 Observation: How does one dispose of defecation?

toilet

in a latrine cleaned with water

in a dry hole latrine

by burying it

on the open ground, without burying

2.6 Observation or question: How often do people bathe?

once a week

every other week

less than twice a month

2.7 Observation or question: Where do people bathe?

a shower in the house

shower outside of the house

on the patio with water from a container

in a river

in a canal

**3. Observations concerning eating within the household**

3.1 Observation: What foods are being eaten?  
coffee, fruit drinks, rice, soup, corn on the cob

3.2 Observation: What kinds of drinks are being consumed?  
cola  
oat based drinks "gruel" and fruit drinks  
boiled water or juices made with boiled water  
water or juices prepared without being boiled  
maize liquor

**4. Observations concerning washing clothes**

4.1 Observation: What is the source of water used to wash clothes?  
rainwater  
treated, piped water  
well or spring  
untreated piped water  
river or canal

4.2 Observation and question: How is the dirty water disposed of?  
on the ground  
in a ditch  
in an aqueduct  
in the river  
in the irrigation canal

**5. Observations concerning outside areas of a household**

5.1 Observation or question: What is the source of water used to water gardens?  
rainwater  
piped water  
well  
spring  
canal or river

5.2 Observation or question: Do children or adults defecated in the fields?  
No  
Yes

5.3 Observation: Are animals enclosed in a corral?  
There are no animals  
Yes  
No

5.4 Observation: Is there loose rubbish in the patio or garden area?

- No
- Yes

5.5 Question: How is the majority of the trash disposed of?

- buried
- burned
- in a ditch
- in the river
- in a canal
- (other) on the open ground

### *Observations of nonhousehold situations*

## **6. Observations of food vendors in the street or market**

6.1 Observation: What foods are prepared?

- fish, tortillas, rice, soup, sausage and potatoes

6.2 Observation: How are foods prepared?

- fried
- boiled
- parboiled(blanching) or heated
- reheated
- raw

6.3 Observation: Are raw fruits and vegetables washed before they are sold?

- Yes
- No

6.4 Question: If the fruits and vegetables are washed, with what kind of water?

- rainwater
- pipled water
- from a well or spring
- from a water vendor
- from a canal or river

6.5 Observation and question: How do they (street vendors) wash their hands?

- running water
- in a container of standing water

6.6 Observation: How do they maintain the prepared foods?  
very hot and covered  
warm and covered  
warm and uncovered  
uncovered  
uncovered exposed to dirt or in close proximity of the floor

6.7 Observation: How is the food sold?  
very hot  
very warm  
lukewarm  
room temperature  
cold (with ice)

6.8 Observation: What are prepared foods served in?  
disposable plate  
on a wooden stick or skewer  
on porcelain or metal plate, washed  
on used office paper  
in the hand  
other

6.9 Observation: With what kind of water are dishes washed?  
water and soap  
water and ashes  
only water  
a cloth without water  
unwashed

6.10 Observation and question: How are the dishes washed?  
with running water  
in a container of standing water

6.11 Observation: What kinds of drinks are served?  
cola  
oat based "gruel" or fruit drinks  
water (boiled) or juices prepared with boiled water  
water or juices not prepared with boiling water  
maize liquor

6.12 Question: Are juices prepared with boiled water?  
Yes  
No

6.13 Question: How often are they prepared?

- several times a day
- once a day
- once every few days

6.14 Observation: Have you observed street vendors washing their hands with soap and water?

- Yes
- No

6.15 Observation and question: How do they (street vendors) wash their hands?

- with running water
- in a container of standing water

6.16 Observation: Does the vendor get rid of the trash? (remove it from the vicinity of the food)

- Yes
- No

6.17 Observation: How does the vendor dry their hands?

- air
- with used paper
- on a towel
- on a used cloth
- on her dress (clothing)

## **7. Observations at religious and other community social events**

7.1 Observation: What foods are being eaten at the event?

- rice, chicken soup, potatoes, fish

7.2 Observation: The foods that are served are:

- fried
- boiled
- parboiled (blanched)
- reheated
- raw

7.3 Observation: How are the prepared foods maintained?

- hot and covered
- warm and covered
- warm and uncovered
- uncovered
- uncovered, exposed to dirt or in close proximity to the floor

7.4 Observation: With what are prepared foods served?

- with a ladle
- with a spoon
- with a cup
- with another utensil
- with the hand

7.5 Observation and question: What drinks are served?

- cola
- oat based "gruel" and fruit drinks
- boiled water or juices prepared with such water
- water or juices prepared with unboiled water
- maize liquor

7.6 Question: Are juices prepared with boiled water?

- Yes
- No

7.7 Question: How often are they prepared?

- several times a day
- every few days
- once a week

7.8 Observation: Is there a toilet or latrine near the event?

- Yes
- No

7.9 Observation: If there is a toilet or latrine, is it being used?

- Yes
- No

7.10 Observation: Is there a place to wash ones hands nearby?

- Yes
- No

7.11 Observation: With what type of water do people wash their hands?

- running water
- piped water
- from well or spring
- from a water vendor
- from a canal or river

7.12 Observation and question: How do people wash their hands?

- with running water
- in a container of standing water

7.13 Observation: How is the food served?

- very hot
- very warm
- lukewarm
- room temperature
- cold (with ice)

7.14 Observation: In what are prepared foods served?

- disposable plates
- on wooden sticks or skewers
- on porcelain or metal plates, washed
- used office paper
- in the hand

7.15 Observation: With what are dishes washed?

- water and soap
- water and ashes
- water only
- a cloth, without water
- not washed

7.16 Observation: Have you observed the person serving the food washing their hands with soap and water?

- Yes
- No

7.17 Observation and question: How do they (food servers) wash their hands?

- in running water
- in a container of standing water

7.18 Observation: With what did the serving person dry their hands?

- air
- didn't dry
- on a towel
- on a used cloth
- on their clothing

7.19 Observation and question: After the party, what happens to the garbage?

- bury it
- burn it
- throw in a ditch
- throw in a river
- throw in a canal
- other

7.20 Observation and question: Do people that live outside the community attend parties and other social events?

No  
Yes

## ATTACHMENT 3

### Selected Interview and Observation Data

The four communities are abbreviated throughout this test as follows:

ZC= Zona del Canal

A= Alpamalaga

P= Pompeya

CG= Catazo Grande

The mean scores (MS) are percentages based on the percent scores from the four communities.

### I. Handwashing Behaviors

#### Household

*1.7 Observation: Does the person cooking wash their hands with soap and water?*

	ZC	A	P	CG		MS
Yes	48.1	36.4	6	11		25.4
No	51.9	63.6	94	89		74.6

*1.8 Observation and question: How do you wash your hands?*

	ZC	A	P	CG		MS
with running water	100	30	22	*		50.7
from a container of standing water	0	70	78	*		49.3

*1.9 Observation: How does the person cooking dry their hands?*

	ZC	A	P	CG		MS
air	8	0	17	*		8.3
they don't	12	18.2		*		15.1
on a towel	0	0		*		0
on a used cloth	48	72.7	67	*		62.6
on their clothes	32	9.1	11	*		17.4

**2.1 Observation and question:** Do individuals wash their hands after defecating and/or urinating?

	ZC	A	P	CG		MS
Yes	77	42.9	6	83		52.2
No	22	61.9	94	16		48.5

**2.2 Observation:** How does a person wash their hands after defecating and/or urinating?

	ZC	A	P	CG		MS
running water and soap	0	0	*			0
running water, without soap	50	11.1	*	66		42.4
in a basin of water with soap	31.3	22.2	*			26.8
in a basin of water without soap	18.8	66.7	*			42.8
in a container of water that is used for several things	0	0	*			0

**2.3 Observation:** How does an individual wash their hands?

	ZC	A	P	CG		MS
with running water	0	33.3	*	83		38.8
in a container of standing water	100	66.7	*	17		61.2

**2.4 Observation:** How does a person dry their hands?

	ZC	A	P	CG		MS
air	15	45.5	*			30.3
don't dry	0	0	*	71		23.7
with a towel	15	27.3	*			21.2
with a used cloth	35	18.2	*			26.6
on their clothes	35	9.1	*			22.1

**Nonhousehold**

**6.5 Observation and question:** How do they (street vendors) wash their hands?

	ZC	A	P	CG		MS
running water	26.3	0	22	0		12.1
in a container of standing water	73.7	100	78	0		62.9

**6.14 Observation:** Have you observed street vendors washing their hands with soap and water?

	ZC	A	P	CG		MS
Yes	10	0	6	0		4
No	90	100	94	100		96

**6.15 Observation and question:** How do they (street vendors) wash their hands?

	ZC	A	P	CG		MS
with running water	37.5	0	*	*		18.8
in a container of standing water	62.5	100	*	*		81.3

**6.17 Observation:** How does the vendor dry their hands?

	ZC	A	P	CG		MS
air	23.5	0	*	*		11.8
with used paper	0	0	*	*		0
on a towel	0	0	*	*		0
on a used cloth	17.6	33.3	*	*		25.5
on her dress (clothing)	58.8	66.7	*	*		62.8

**7.10 Observation:** Is there a place to wash one's hands nearby?

	ZC	A	P	CG		MS
Yes	47.4	71.4	78	94		72.7
No	52.6	28.6	22	6		27.3

**7.11 Observation:** With what type of water do people wash their hands?

	ZC	A	P	CG		MS
running water	0	25				12.5
piped water	0	75	94	94		65.8
from well or spring	15	0				7.5
from a water vendor	0	0				0
from a canal or river	85	0				42.5

**7.12 Observation and question:** *How do people wash their hands?*

	ZC	A	P	CG		MS
with running water	72.2	50	22	94		59.6
in a container of standing water	27.8	50	78	6		40.5

**7.16 Observation:** *Have you observed the person serving the food washing their hands with soap and water?*

	ZC	A	P	CG		MS
Yes	15	87.5	33	11		36.6
No	85	12.5	67	89		63.4

**7.17 Observation and question:** *How do they (food servers) wash their hands?*

	ZC	A	P	CG		MS
in running water	37.5	33.3	22	72		41.2
in a container of standing water	62.5	66.7	78	28		58.8

**7.18 Observation:** *With what did the serving person dry their hands?*

	ZC	A	P	CG		MS
Air	10.5	33.3		0		14.6
didn't dry	21.1	0		100		40.37
on a towel	0	0		0		0
on a used cloth	15.8	50	50	0		29
on their clothing	52.6	16.7	22	0		22.8

## II. Fecal Disposal

### Household

*2.5 Observation: How does one dispose of defecation?*

	ZC	A	P	CG		MS
toilet	0	0		22		7.3
in a latrine cleaned with water	3.7	12.5				8.1
in a dry hole latrine	92.5	25		61		59.5
by burying it	3.7	41.66	56			33.8
on the open ground, without burying	0	20.8	28			16.3

*5.2 Observation or question: Do children or adults defecate in the fields?*

	ZC	A	P	CG		MS
No	63	16.7	6	37		30.7
Yes	37	83.3	94	63		69.3

### Nonhousehold

*7.8 Observation: Is there a toilet or latrine near the event?*

	ZC	A	P	CG		MS
Yes	100	75	0	x		58.3
No	0	25	100			41.7

*7.9 Observation: If there is a toilet or latrine, is it being used?*

	ZC	A	P	CG		MS
Yes	78.9	23.8	N/A	50		50.9
No	21	76.2		44		47.1

### III. Water Source and Storage

#### Household

**1.3 Observation:** *Where does the water for cooking come from?*

	ZC	A	P	CG		MS
rainwater	0	13	0			4.3
treated, piped water	0	0	94	50		36
well or spring	100	8.7	0			36.2
untreated, piped water	0	78.3		50		64.2
canal or river	0	0	0			0

**1.4 Question:** *What kind of containers are used to store water?*

	ZC	A	P	CG		MS
container with a small opening and a top	48.1	0	16			21.3
container with a small opening without a top	14.8	8.7				11.8
a jar with a lid	18.5	21.7	33	37		27.6
large tanks with a lid	18.5	52.2	22			30.9
large tanks uncovered	0	17.4	22	37		19.1

**1.5 Observation:** *How does a person draw water from its container?*

	ZC	A	P	CG		MS
from the tap in the container	0	0	11			3.7
with a ladle used only for this purpose	4.2	0				2.4
with another utensil(cup) used only for this purpose	41.7	78.3	39			53
with whatever utensil	50	21.7	39	70		45.2
with the hand	4.2	0				2.4

**2.3 Observation:** *How does an individual wash their hands?*

	ZC	A	P	CG		MS
with running water	0	33.3	*	83		38.8
in a container of standing water	100	66.7	*	17		61.2

**4.1 Observation:** What is the source of water used to wash clothes?

	ZC	A	P	CG		MS
rainwater	0	13				6.5
treated, piped water	0	82.6	33	94		52.4
well or spring	22.2	0				11.1
untreated piped water	0	4.3	50			18.1
river or canal	77.8	0				38.9

**5.1 Observation or question:** What is the source of water used in gardens?

	ZC	A	P	CG		MS
rainwater	0	100	51	0		37.8
piped water	0	0	39	78		29.3
well	0	0		0		0
spring	0	0		0		0
canal or river	100	0		22		40.7

**Nonhousehold**

**6.4 Question:** If the fruits and vegetables are washed, with what kind of water?

	ZC	A	P	CG		MS
rainwater	0	0	*	*		0
piped water	0	100	*	*		50
from a well or spring	70.6	0	*	*		35.3
from a water vendor	0	0	*	*		0
from a canal or river	29.4	0	*	*		14.7

**6.10 Observation and question:** How are the dishes washed?

	ZC	A	P	CG		MS
with running water	7.7	0	0	0		1.9
in a container of standing water	92.3	100	100	100		98.1

**7.11 Observation:** With what type of water do people wash their hands?

	ZC	A	P	CG		MS
running water	0	25				12.5
piped water	0	75	94	94		65.8
from well or spring	15	0				7.5
from a water vendor	0	0				0
from a canal or river	85	0				42.5

## IV. Food and Drink Consumption

### Household

**3.1 Observation:** What foods are being eaten?

coffee, fruit drinks, rice, soup, corn on the cob
---

**3.2 Observation:** What kinds of drinks are being consumed?

	ZC	A	P	CG		MS
cola	0	18.2				9.1
oat based drinks Agruel® and fruit drinks	45.5	72.7	72	72		65.6
boiled water or juices made with boiled water	36.4	4.5				20.5
water or juices prepared without being boiled	18.2	4.5	11			11.2
maize liquor	0					0

### Nonhousehold

**6.11 Observation:** What kinds of drinks are served?

	ZC	A	P	CG		MS
cola	62.5	100	50	76		72.1
oat based Agruel® or fruit drinks	0	0	22			7.3
water (boiled) or juices prepared with boiled water	0	0				0
water or juices not prepared with boiling water	0	0				0
maize liquor	37.5	0				18.8

**7.1 Observation:** *What foods are being eaten at the event?*

rice, chicken soup, potatoes, fish
------------------------------------

**7.2 Observation:** *The foods served are:*

	ZC	A	P	CG		MS
fried	61.1	9.1		28		32.7
boiled	33.3	90.9	94	67		71.3
parboiled (blanched)	0	0				0
reheated	5.6	0				2.8
raw	0	0				0

**7.5 Observation and question:** *What drinks are served?*

	ZC	A	P	CG		MS
cola	23.5	4.2		28		18.6
oat based Agruel® and fruit drinks	0	8.3	56			21.4
boiled water or juices prepared with such water	0	0				0
water or juices prepared with unboiled water	5.9	4.2				5.1
maize liquor	70.6	83.3	27	28		45.3

## V. Street Food and Community Events

**6.1 Observation:** *What foods are prepared?*

fish, tortillas, rice, soup, sausage and potatoes
---

**6.2 Observation:** How are foods prepared?

	ZC	A	P	CG		MS
fried	70	50	38	27		46.3
boiled	25	50	61	61		49.3
parboiled(blanching) or heated	5	0				2.5
reheated	0	0				0
raw	0	0				0

**6.3 Observation:** Are raw fruits and vegetables washed before they are sold?

	ZC	A	P	CG		MS
Yes	60	0	*	*		30
No	40	100	*	*		70

**6.4 Question:** If the fruits and vegetables are washed, with what kind of water?

	ZC	A	P	CG		MS
rainwater	0	0	*	*		0
pipelined water	0	100	*	*		50
from a well or spring	70.6	0	*	*		35.3
from a water vendor	0	0	*	*		0
from a canal or river	29.4	0	*	*		14.7

**6.5 Observation and question:** How do they (street vendors) wash their hands?

	ZC	A	P	CG		MS
running water	26.3	0	22	0		12.1
in a container of standing water	73.7	100	78	0		62.9

**6.6 Observation:** How do they maintain the prepared foods?

	ZC	A	P	CG		MS
very hot and covered	0	4.5	72			25.5
warm and covered	16.7	4.5	22	44		21.8
warm and uncovered	16.7	0				8.35
uncovered	11.1	27.3				19.2
uncovered exposed to dirt or in close proximity of the floor	55.6	63.6		33		50.7

**6.7 Observation:** How is the food sold?

	ZC	A	P	CG		MS
very hot	10	5				7.5
very warm	55	55	83	33		56.5
lukewarm	15	40		33		29.3
room temperature	20	0				10
cold (with ice)	0	0				0

**6.8 Observation:** What are prepared foods served in?

	ZC	A	P	CG		MS
disposable plate	0	8.7				4.4
on a wooden stick or skewer	0	0				0
on porcelain or metal plate, washed	31.6	4.3	72	56		41
on used office paper	47.4	78.3	22	33		45.2
in the hand	0	8.7				4.4
other	21.1	0				10.6

**6.9 Observation:** With what kind of water are dishes washed?

	ZC	A	P	CG		MS
water and soap	8.3	0				4.2
water and ashes		0				0
only water	83.3	33.3	90	27		38.2
a cloth without water	8.3	0		44		17.4
unwashed		66.7				66.7

**6.10 Observation and question:** *How are the dishes washed?*

	ZC	A	P	CG		MS
with running water	7.7	0	0	0		1.9
in a container of standing water	92.3	100	100	100		98.1

**6.11 Observation:** *What kinds of drinks are served?*

	ZC	A	P			MS
cola	62.5	100	50			72.1
oat based Agruel® or fruit drinks	0	0	22			7.3
water (boiled) or juices prepared with boiled water	0	0				0
water or juices not prepared with boiling water	0	0				0
maize liquor	37.5	0				18.8

**6.12 Question:** *Are juices prepared with boiled water?*

	ZC	A	P	CG		MS
Yes	53.3	0	*	*		26.7
No	46.6	100	*	*		73.4

**6.13 Question:** *How often are they prepared?*

	ZC	A	P	CG		MS
several times a day	x	x	*	*		
once a day	x		*	*		
once every few days	x		*	*		

**6.14 Observation:** *Have you observed street vendors washing their hands with soap and water?*

	ZC	A	P	CG		MS
Yes	10	0	6	0		4
No	90	100	94	100		96

**6.15 Observation and question:** How do they (street vendors) wash their hands?

	ZC	A	P	CG		MS
with running water	37.5	0	*	*		18.8
in a container of standing water	62.5	100	*	*		81.3

**6.16 Observation:** Does the vendor get rid of the trash? (remove it from the vicinity of the food)

	ZC	A	P	CG		MS
Yes	5.3	0	0	82		21.8
No	94.7	100	100	18		78.2

**6.17 Observation:** How does the vendor dry their hands?

	ZC	A	P	CG		MS
air	23.5	0	*	*		11.8
with used paper	0	0	*	*		0
on a towel	0	0	*	*		0
on a used cloth	17.6	33.3	*	*		25.5
on her dress (clothing)	58.8	66.7	*	*		62.8

**7.1 Observation:** What foods are being eaten at the event?

rice, chicken soup, potatoes, fish
------------------------------------

**7.2 Observation:** The foods served are:

	ZC	A	P	CG		MS
fried	61.1	9.1		28		32.7
boiled	33.3	90.9	94	67		71.3
parboiled (blanched)	0	0				0
reheated	5.6	0				2.8
raw	0	0				0

**7.3 Observation:** How are the prepared foods maintained?

	ZC	A	P	CG		MS
hot and covered	16.7	68.2		22		35.6
warm and covered	22.2	0	50	50		30.6
warm and uncovered	33.3	9.1		22		21.5
uncovered	5.6	0				2.8
uncovered, exposed to dirt or in close proximity to the floor	22.2	22.7				22.5

**7.4 Observation:** With what are prepared foods served?

	ZC	A	P	CG		MS
with a ladle	38.9	83.3	72	50		61.1
with a spoon	50	16.7				33.4
with a cup	0	0				0
with another utensil	5.6	0				2.8
with the hand	5.6	0	20	23		12.2

**7.5 Observation and question:** What drinks are served?

	ZC	A	P	CG		MS
cola	23.5	4.2		28		18.6
oat based Agruel® and fruit drinks	0	8.3	56			21.4
boiled water or juices prepared with such water	0	0				0
water or juices prepared with unboiled water	5.9	4.2				5.1
maize liquor	70.6	83.3	27	28		45.3

**7.6 Question:** Are juices prepared with boiled water?

	ZC	A	P	CG		MS
Yes	86.7	95.7	33	0		53.9
No	13.3	4.3	67	100		46.2

**7.7 Question:** *How often are they prepared?*

	ZC	A	P	CG		MS
several times a day		*	*			
every few days	x	x				
once a week	x					

**7.8 Observation:** *Is there a toilet or latrine near the event?*

	ZC	A	P	CG		MS
Yes	100	75	0	x		58.3
No	0	25	100			41.7

**7.9 Observation:** *If there is a toilet or latrine, is it being used?*

	ZC	A	P	CG		MS
Yes	78.9	23.8	N/A	50		50.9
No	21	76.2		44		47.1

**7.10 Observation:** *Is there a place to wash ones hands nearby?*

	ZC	A	P	CG		MS
Yes	47.4	71.4	78	94		72.7
No	52.6	28.6	22	6		27.3

**7.11 Observation:** *With what type of water do people wash their hands?*

	ZC	A	P	CG		MS
running water	0	25				12.5
piped water	0	75	94	94		65.8
from well or spring	15	0				7.5
from a water vendor	0	0				0
from a canal or river	85	0				42.5

**7.12 Observation and question:** *How do people wash their hands?*

	ZC	A	P	CG		MS
with running water	72.2	50	22	94		59.6
in a container of standing water	27.8	50	78	6		40.5

**7.13 Observation:** *How is the food served?*

	ZC	A	P	CG		MS
very hot	0	34.8				17.4
very warm	70	56.5	83	50		64.9
lukewarm	10	0		44		18
room temperature	20	8.7				14.4
cold (with ice)	0	0				0

**7.14 Observation:** *In what are prepared foods served?*

	ZC	A	P	CG		MS
disposable plates	0	25		17		14
on wooden sticks or skewers	0	0				0
on porcelain or metal plates, washed	55.6	75	89	66		71.4
used office paper	45.6	0				22.8
in the hand	0	0				0

**7.15 Observation:** *With what are dishes washed?*

	ZC	A	P	CG		MS
water and soap	0	10	22			10.7
water and ashes	0	0	0			0
water only	77.8	90	78	94		85
a cloth, without water	11.1	0	0			3.7
not washed	11.1	0	0			3.7

**7.16 Observation:** *Have you observed the person serving the food washing their hands with soap and water?*

	ZC	A	P	CG		MS
Yes	15	87.5	33	11		36.6
No	85	12.5	67	89		63.4

**7.17 Observation and question:** *How do they (food servers) wash their hands?*

	ZC	A	P	CG		MS
in running water	37.5	33.3	22	72		41.2
in a container of standing water	62.5	66.7	78	28		58.8

**7.18 Observation:** *With what did the serving person dry their hands?*

	ZC	A	P	CG		MS
air	10.5	33.3		0		14.6
didn't dry	21.1	0		100		40.37
on a towel	0	0		0		0
on a used cloth	15.8	50	50	0		29
on their clothing	52.6	16.7	22	0		22.8

**7.19 Observation and question:** *After the party, what happens to the garbage?*

	ZC	A	P	CG		MS
bury it	5.9	4.3	28			12.7
burn it	5.9	17.4	56			26.4
throw in a ditch	0	0		44		14.7
throw in a river	0	0				0
throw in a canal	41.2	0				20.6
otherCAwind@	11.8	0				5.9
Aopen ground@	35.3	78.3		50		54.5

**7.20 Observation and question:** Do people that live outside the area attend parties and other Community events?

	ZC	A	P	CG		MS
No	0	16.7	*	22		12.9
Yes	100	83.3	*	78		87.1

## VI. Water Disposal and Household Environment

### Household

**1.14 Observation or question:** How do you dispose of the dirty water?

	ZC	A	P	CG		MS
pigs	100	X	*	*		50

**4.2 Observation and question:** How is the dirty water disposed of?

	ZC	A	P	CG		MS
on the ground	58.3	91.7	100	83		83.3
in a ditch	0		0			0
in an aqueduct	0		0			0
in the river	33.3	4.2	0			12.5
in the irrigation canal	8.3		0			4.2

**5.1 Observation or question:** What is the source of water used in gardens?

	ZC	A	P	CG		MS
rainwater	0	100	51	0		37.8
piped water	0	0	39	78		29.3
well	0	0		0		0
spring	0	0		0		0
canal or river	100	0		22		40.7

**5.3 Observation:** Are animals enclosed in a corral?

	ZC	A	P	CG		MS
There are no animals	0	0	0	0		0
Yes	40.7	100	28	33		50.4
No	59.2	0	72	61		48.1

**5.4 Observation:** Is there loose rubbish in the patio or garden area?

	ZC	A	P	CG		MS
No	37	33.3	*	6		25.4
Yes	63	66.7	*	94		74.6

**5.5 Question:** How is the majority of the trash disposed of?

	ZC	A	P	CG		MS
buried	20	66.7	33	16		33.9
burned	0	33.3				16.7
in a ditch	4	0				2
in the river	0	0				0
in a canal	8	0				4
(other) on the open ground	68	0	50	67		46.3

**Nonhousehold**

**6.16 Observation:** Does the vendor get rid of the trash? (remove it from the vicinity of the food)

	ZC	A	P	CG		MS
Yes	5.3	0	0	82		21.8
No	94.7	100	100	18		78.2

**7.19 Observation and question:** After the party, what happens to the garbage?

	ZC	A	P	CG		MS
bury it	5.9	4.3	28			12.7
burn it	5.9	17.4	56			26.4
throw in a ditch	0	0		44		14.7
throw in a river	0	0				0
throw in a canal	41.2	0				20.6
otherCAwind@	11.8	0				5.9
@open ground@	35.3	78.3		50		54.5

## VII. Food Preparation and Storage

### Household

**1.1 Observation:** What foods are prepared?

soup, rice, fruit drinks
--------------------------

**1.2 Observation:** How are foods prepared?

	ZC	A	P	CG		MS
fried	3.7	0	11	5		4.9
parboiled/blanched	0	0				0
raw	0	0				0
boiled	96.3	83.3	88	80		86.9
reheated	0	16.7				8.4

**1.6 Observation:** Are foods that are eaten raw washed beforehand?

	ZC	A	P	CG		MS
Yes	77.7	87	56	50		67.7
No	22.2	13	44	50		32.3

**1.10 Question:** From where does the person cooking get the vegetables they use?

	ZC	A	P	CG		MS
their own garden	14.8	0	17	94		31.5
the market	85.2	50	86			73.7
the store (grocer)	0	0	0			0
street vendor	0	50	0			16.7

**1.11 Observation:** Where is prepared food stored?

	ZC	A	P	CG		MS
in the refrigerator	0					0
cupboard	0	0	18			6
in a jar with a lid	71.4	100	72	78		80.4
in a jar covered with a cloth	4.5	0	11			5.2
in an uncovered jar	27.3	0	0			9.1

**1.12 Question:** Do you always reheat food before eating it?

	ZC	A	P	CG		MS
Yes	80.8	100	78	67		81.5
No	19.2	0	22	27		17.1

## Nonhousehold

**6.1 Observation:** What foods are prepared?

fish, tortillas, rice, soup, sausage and potatoes
--

**6.2 Observation:** How are foods prepared?

	ZC	A	P	CG		MS
Fried	70	50	38	27		46.3
boiled	25	50	61	61		49.3
parboiled(blanchd) or heated	5	0				2.5
reheated	0	0				0
Raw	0	0				0

**6.3 Observation:** Are raw fruits and vegetables washed before they are sold?

	ZC	A	P	CG		MS
Yes	60	0	*	*		30
No	40	100	*	*		70

**6.4 Question:** If the fruits and vegetables are washed, with what kind of water?

	ZC	A	P	CG		MS
rainwater	0	0	*	*		0
pipd water	0	100	*	*		50
from a well or spring	70.6	0	*	*		35.3
from a water vendor	0	0	*	*		0
from a canal or river	29.4	0	*	*		14.7

**6.6 Observation:** How do they maintain the prepared foods?

	ZC	A	P	CG		MS
very hot and covered	0	4.5	72			25.5
warm and covered	16.7	4.5	22	44		21.8
warm and uncovered	16.7	0				8.35
uncovered	11.1	27.3				19.2
uncovered exposed to dirt or in close proximity of the floor	55.6	63.6		33		50.7

**6.7 Observation:** *How is the food sold?*

	ZC	A	P	CG		MS
Very hot	10	5				7.5
Very warm	55	55	83	33		56.5
Lukewarm	15	40		33		29.3
Room temperature	20	0				10
Cold (with ice)	0	0				0

**6.12 Question:** *Are juices prepared with boiled water?*

	ZC	A	P	CG		MS
Yes	53.3	0	*	*		26.7
No	46.6	100	*	*		73.4

**6.13 Question:** *How often are they prepared?*

	ZC	A	P	CG		MS
several times a day	x	x	*	*		
once a day	x		*	*		
once every few days	x		*	*		

**7.3 Observation:** *How are the prepared foods maintained?*

	ZC	A	P	CG		MS
hot and covered	16.7	68.2		22		35.6
warm and covered	22.2	0	50	50		30.6
warm and uncovered	33.3	9.1		22		21.5
uncovered	5.6	0				2.8
uncovered, exposed to dirt	22.2	22.7				22.5

**7.4 Observation:** *With what are prepared foods served?*

	ZC	A	P	CG		MS
with a ladle	38.9	83.3	72	50		61.1
with a spoon	50	16.7				33.4
with a cup	0	0				0
with another utensil	5.6	0				2.8
with the hand	5.6	0	20	23		12.2

**7.6 Question:** *Are juices prepared with boiled water?*

	ZC	A	P	CG		MS
Yes	86.7	95.7	33	0		53.9
No	13.3	4.3	67	100		46.2

**7.7 Question:** *How often are they prepared?*

	ZC	A	P	CG		MS
several times a day		*	*			
every few days	x	x				
once a week	x					

**7.13 Observation:** *How is the food served?*

	ZC	A	P	CG		MS
very hot	0	34.8				17.4
very warm	70	56.5	83	50		64.9
lukewarm	10	0		44		18
room temperature	20	8.7				14.4
cold (with ice)	0	0				0

## VIII. Miscellaneous

### *1.13 Observation: With what do you clean dishes?*

	ZC	A	P	CG		MS
water and soap	25.9	8.3	11	*		15.1
water and ashes	0	0	0	*		0
with water only	74	91.7	89	*		84.9
a cloth without water	0	0	0	*		0
don't wash	0	0	0	*		0

### *2.6 Observation or question: How often do people bathe?*

	ZC	A	P	CG		MS
once a week	x	x	*	*		
every other week	x	x	*	*		
less than twice a month	0	x	*	*		

### *2.7 Observation or question: Where do people bathe?*

	ZC	A	P	CG		MS
a shower in the house	4.2	0		67		23.7
shower outside of the house	0	8.7				4.4
on the patio with water from a container	75	91.3	88	22		69.1
in a river	8.3	0				4.2
in a canal	12.5	0				6.3

Notes concerning the tables: Some percentages may not equal 100; there are many that are less and a few that are slightly more. The percentages were calculated by dividing the number of individuals observed doing a particular action by the total number of individuals observed for each specific question.

An asterisk indicates that either no observation was made or none was noted.

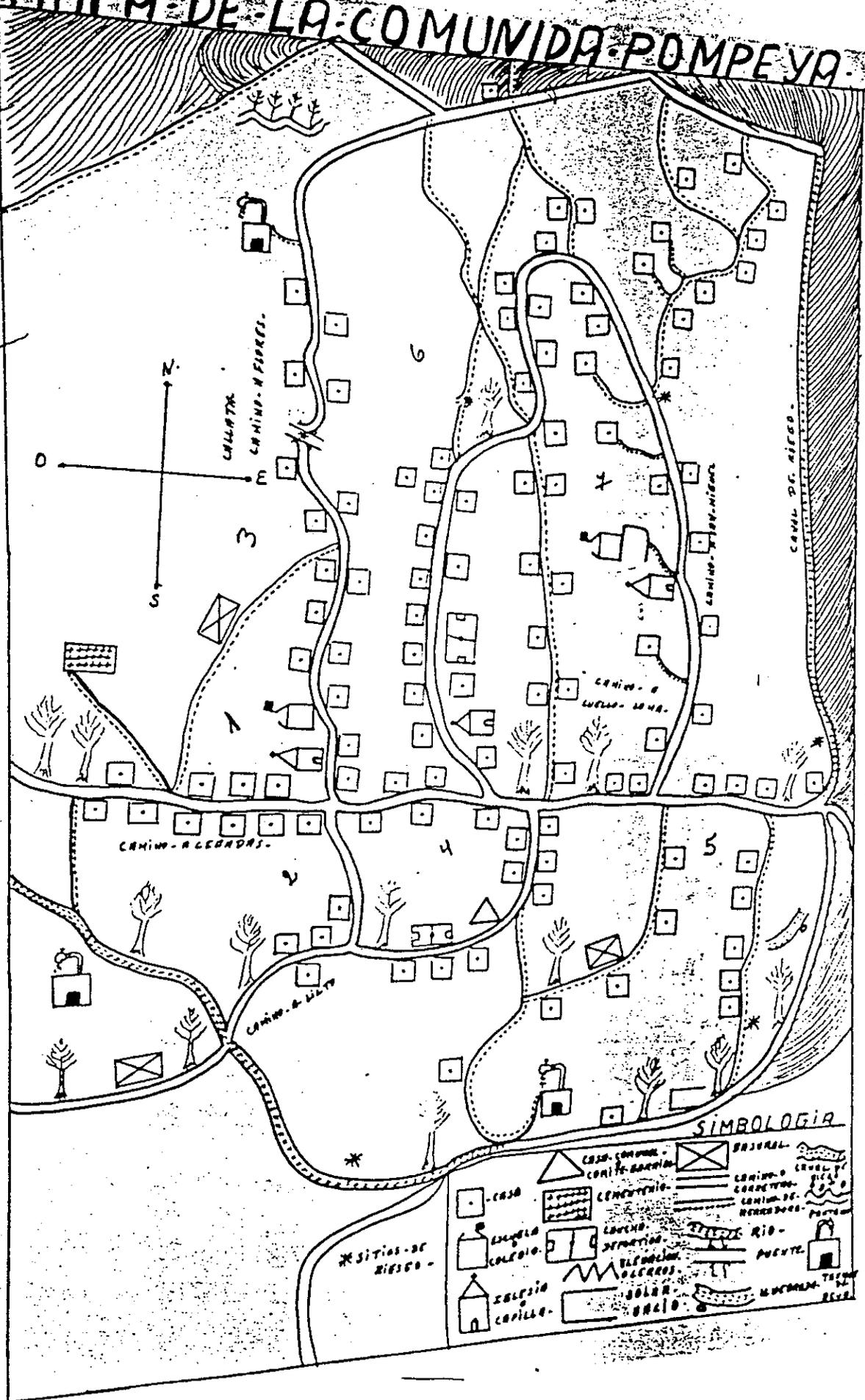
X's are used when an answer to a open-ended question was given but no numbers of individuals were noted.

ATTACHMENT 4

## **Perceptual Maps of Communities**

Presented at Workshop III  
June 13-15, 1995

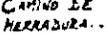
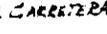
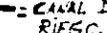
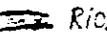
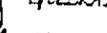
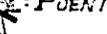
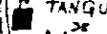
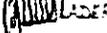
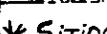
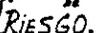
# MAPA DE LA COMUNIDAD POMPEYA

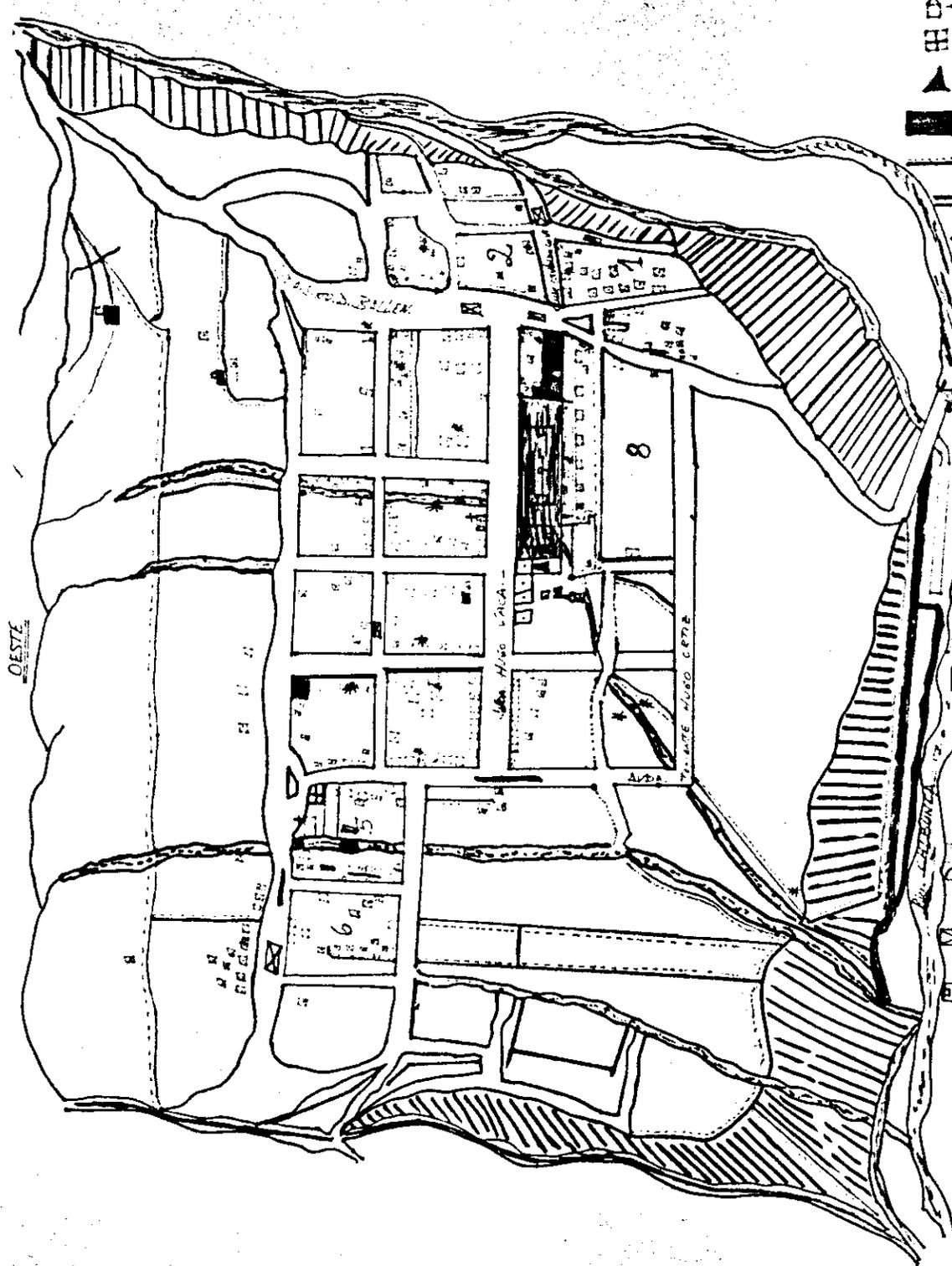


# "GATAZO GRANDE"

NORTE

## SIMBOLOGÍA.

-  - CASAS.
-  - ESCUELAS.
-  - CENTRO DE SALUD.
-  - CASA COMUNAL.
-  - PLAZA CENTRAL.
-  - CAMINO DE HERRADURA.
-  - CARRETERA.
-  - CANAL DE RIESGO.
-  - RIO.
-  - QUEBRADA.
-  - PUENTE.
-  - TANQUE DE AGUA.
-  - LADERA.
-  - IGLESIA.
-  - SITIOS DE RIESGO.
-  - CEMENTERIO.
-  - BASURAL.
-  - CANCHA.



SUP



