

ENVIRONMENTAL HEALTH PROJECT

ACTIVITY REPORT

No. 2

**EVALUATION OF THE SUCHITEPEQUEZ
IVERMECTIN DISTRIBUTION PROGRAM
IN GUATEMALA**

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December 1994

**Prepared for the Bureau for Global Programs,
Field Support and Research
Office of Health and Nutrition
U.S. Agency for International Development
under the Environmental Health Project
Activity No. 021-CC**

**Environmental Health Project
Contract No. HRN-5994-C-00-3036-00, Project No. 936-5994
is sponsored by the Bureau for Global Programs, Field Support, and Research
Office of Health and Nutrition
U.S. Agency for International Development
Washington, DC 20523**

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ACKNOWLEDGMENTS

The evaluation team consisted of Gilbert Burnham, M.D., Ph.D., an Environmental Health Project (EHP) consultant from the Johns Hopkins University, and Charles Oliver, Ph.D., M.P.H., from USAID's Office of Health and Nutrition, Bureau for Global Programs, Field Support and Research.

The evaluation team would like to acknowledge the kind people in Guatemala who helped them during this visit. In particular, appreciation is expressed to Dr. Ricardo Luján for his tireless efforts in making the arrangements for this evaluation. His energy in providing materials, arranging appointments, and accompanying them throughout the evaluation is deeply appreciated. The team expresses its gratitude to Dr. Guillermo Zea-Flores for taking time to accompany them to the field sites; to Dr. R. Trabanino for his willingness to take part in the evaluation; to Dr. Eduardo Alvarez for spending his first two weeks as the new IEF Guatemala Director accompanying the team; to Dr. Julio Castro of the Ministry of Health for his time in extended discussions; to Dr. Rodolfo Zea-Flores for sharing his field experience with the team; to Dr. Christine Witte for helping the team with project background information; and finally to the Honorable Dr. Gustavo Polanco, Minister of Health, Dr. Jacobo Finkleman and Dr. Loyola of PAHO, and Dr. Patricia O'Connor of USAID/Guatemala for kindly receiving members of the evaluation team, and the cooperation of the USAID/Guatemala Director, W. Stacey Rhodes.

In Washington, the team would like to express its appreciation to Steven Ault and Ann Hirschey of the Environmental Health Project for their management of this activity, support, and attention to details that made this evaluation a success. We also thank Carole Thompson for her professional editorial efforts, and the publications staff of EHP for their assistance in editing and production.

ACRONYMS

CHW	community health worker
CMFL	community microfilarial load
CONACO	National Council on Onchocerciasis
DEC	diethylcarbamazine
DOMOH	Ministry of Public Health
EHP	Environmental Health Project
GIS	geographic information system
HIS	health information system
H/MIS	health/management information system
IDP	Ivermectin Delivery Program
IEF	International Eye Foundation
JICA	Japan International Cooperation Agency
MERTU/G	Medical Entomology Research and Training Unit/Guatemala, U.S. Centers for Disease Control
Mf	microfilaria
MMFL	microfilarial load among positives
MOH	Ministry of Health
NCBD	National Committee for the Blind and Deaf
NGO	nongovernmental organization
NPEO	National Plan for the Elimination of Onchocerciasis in Guatemala
OEPA	Onchocerciasis Elimination Program of the Americas
PAHO	Pan American Health Organization
PVO	private voluntary organization
REA	Rapid Epidemiological Assessment
SC	sentinel community
SNEM	Department of Onchocerciasis of the Division of Malaria, MOH
USAID	United States Agency for International Development
UVG	Universidad del Valle de Guatemala
WHO	World Health Organization
WHO-TDR	World Health Organization/Special Program for Research and Training in Tropical Diseases

EXECUTIVE SUMMARY

Overall, the Suchitepequez Ivermectin Distribution Program and its successor, the National Plan for the Elimination of Onchocerciasis, were a success. In four rounds of treatment, the program distributed 130,289 doses of ivermectin to persons living in isolated and often difficult to reach locations where onchocerciasis is hyperendemic. It demonstrated that a collaborative program, supported by organizations very different in nature, can work.

The program showed that ivermectin can be distributed in Guatemala without fear about serious adverse physical reactions. Community-based distributors were effective agents for a public health mass-distribution program. This experience could be applied to other health activities, such as tuberculosis or helminth control.

The program documented the prevalence and intensity of onchocerciasis in a variety of geographic areas through an extensive epidemiology and health information system.

Perhaps most importantly, the program stimulated the development of a National Plan for the Elimination of Onchocerciasis in Guatemala (NPEO). At the end of the second year, the Suchitepequez project became the basis for the National Plan, using its basic infrastructure. Lessons learned from the first two years helped in the subsequent reorganization of the program.

However, the project did have significant problems. Leadership difficulties impaired the efficiency of the project and reduced its effectiveness. Participating organizations often did not work smoothly as a team. Communication between these organizations was universally identified as the weakest area.

Another problem included the health information system, which collected too much

information. Much of this information was not processed or communicated in a way that was useful for project decision making. The problem lay in both the form of its dissemination and the capacity of managers to interpret and use it.

Other difficulties noted:

- The full potential of community-based distributors was not realized.
- Supervision and in-service training for the *brigadistas* was difficult.
- Training materials for community-based distributors were insufficient.
- Delivery of ivermectin was not efficient; there was over-centralization, with many treatment personnel not living near or in the treatment area; there was excessive dependence on brigadistas; and the integrating of diagnostic, motivation, and treatment elements was slow.
- Quality control measures were instituted late and incompletely.
- Community mobilization and awareness about onchocerciasis could have been stronger; only minimal educational materials were available; attempts to sensitize *finca* (agricultural estate) managers and owners about onchocerciasis seemed weak.

Had funds allowed, an entomological component to study the effects of a mass-distribution program on transmission of infection would have been most instructive.

At the conclusion of this report, various recommendations are made concerning approaches to strengthening the National Plan, which will begin functioning in a new structure shortly.

1 INTRODUCTION

1.1 Global Dimension of Onchocerciasis

Onchocerciasis is a widespread parasitic disease that causes much human suffering and grave socioeconomic problems over large areas of tropical Africa and Latin America. About 17.5 million people are afflicted with onchocerciasis and 340,000 have serious visual impairment because of the disease. An estimated 78.3 million are at risk of infection in 35 countries (WHO 1985). In Guatemala, an estimated 441,000 are at risk of infection; 40,000 are infected; and 600 are blind as a result of onchocerciasis (WHO 1987).

Although the disease itself is not life-threatening, the World Health Organization (WHO) estimates that the adult human life span is reduced by 15 years as a result of blindness. The economic repercussions of onchocerciasis are severe because this chronic condition often strikes the economically productive.

The disease is caused by the microscopic filarial nematode *Onchocerciasis volvulus*, which is transmitted by the female black flies of the genus *Simulium*. The larval stage entering the human develops into an adult worm. Adult worms are found in 2-5 centimeter subcutaneous nodules most commonly found over the bony prominences, such as around the hip and over the ribs. In the Americas, and in children in all endemic foci, nodules are also commonly found on the head. After a period of time, which may last up to a year, the adult worms begin to produce microfilariae. The microfilariae find their way to the skin, where they may be picked up by biting *Simulium* flies.

They may also be found in the eye where they may cause permanent eye damage. In the fly, a cycle takes place whereby the microfilariae become infective larvae. In heavy infections, the parasite load may cause the death of the *Simulium* flies before infective larvae can develop.

The microfilariae in the skin, if not taken up by a biting fly, will die in about two years. In the process of dying, acute inflammatory reactions develop. In the skin this may cause itching, thickening of the skin, and with time, atrophy and depigmentation. In the eye, the death of microfilariae causes opacities of the cornea and eventual blindness if the microfilarial load is high.

Until about 1990, the main hope for control of the disease lay with control of *Simulium* through larvaciding breeding spots in fast-flowing rivers and streams. This method was most widely used in the Volta River basin of west Africa and contiguous areas. The only treatment available, diethylcarbamazine (DEC), provoked intense immune reactions that impeded mass distribution. Nodules were widely practiced in Central America, but their effectiveness in preventing blindness is difficult to assess. The availability of ivermectin (Mectizan) in 1990, the microfilaricidal drug donated by Merck, Sharp, and Dohme Inc., offered the first hope for a chemotherapeutic control of this disease. In the past five years, mass treatment programs have developed in almost all areas of the world where the disease is endemic. This report concerns attempts to control onchocerciasis by mass treatment with ivermectin in Guatemala.

1.2 Onchocerciasis and Ivermectin

The introduction of the drug ivermectin has had a dramatic effect on the modern management of human onchocerciasis (summarized by Taylor and Greene 1989). Ivermectin has now replaced diethylcarbamazine as a microfilaricidal agent in the treatment of onchocerciasis. The death of microfilariae following the use of ivermectin causes fewer and less severe side effects than those after the use of DEC. Population-based chemotherapy programs using ivermectin are now feasible and offer a different approach to the control of onchocerciasis. In the past, the programs have concentrated on expensive vector control programs that were difficult to sustain. Distribution of the drug to affected communities is further stimulated by the donation of ivermectin by Merck, Sharp, and Dohme, Inc. to approved programs in endemic countries. Ivermectin, however, is not effective against the adult stages of *Onchocerca volvulus*, and thus is a suppressive, not a curative therapy. A standard dose of 150 micrograms/kilogram body weight has been established as the optimum dose to control microfilarial loads. This has been given as a single dose every 6-18 months to all persons in good health over five years of age or 15 kilograms. The shorter treatment interval is more appropriate to programs attempting to contain transmission. Doses of 400 micrograms/kilogram are now being tested to determine if this dose has any destructive effect on adult worms.

The required duration of such therapy is unknown. If eradication of the disease is the goal, then treatment for about 15 years, the estimated maximum life of the adult worm, would be required. If prevention of blindness is the goal, and complete eradication of disease or elimination of transmission is not sought, then an intensive period of several years of treatment would be possible, followed by a maintenance phase, perhaps integrated into primary health care programs. In this case, treatment would

have to be continued at some level indefinitely. Thus, ivermectin distribution is not a short-term option, and ideally, will ultimately need to be integrated into the existing health care delivery system.

The dramatic shift in onchocerciasis control possibilities and the Merck, Sharp, and Dohme, Inc. offer present the public health community with an opportunity and a number of challenging programmatic decisions and operational questions. The successful use of ivermectin on a national scale requires a broad public health program designed to ensure appropriate distribution, monitoring, community education, and record keeping. In Latin America, and specifically Guatemala, additional opportunities to control onchocerciasis exist since recent research indicates that interruption of transmission, eventually resulting in local elimination of the disease, could be feasible (Cupp et al. 1986; Cupp et al. 1992; Collins et al. 1992).

The Ivermectin Delivery Program (IDP) in Suchitepequez was designed to serve as a pilot for developing a national strategy that aims to eradicate onchocerciasis in Guatemala. The project was integrated into the National Plan for the Elimination of Onchocerciasis in Guatemala on June 1, 1993, the official starting date of the National Plan.

1.3 Onchocerciasis in Guatemala

Onchocerciasis was discovered in Guatemala in 1915 by Robles, and there has been controversy over whether it was indigenous or introduced (for example, by the African slaves). The Guatemalan Ministry of Public Health estimates that 450,000 Guatemalans live in regions endemic for onchocerciasis (Suzuki 1983). The disease is found almost exclusively in areas between 500 and 1,500 meters in altitude. Much of these areas is given over to the growing of coffee, and to a lesser extent, rubber trees. The numbers of

infected persons give Guatemala the largest onchocerciasis problem in Latin America. Among all persons in the region at risk of infection with onchocerciasis, 35 percent live in Guatemala.

The World Health Organization estimates that only about 600 Guatemalans may have become blind as a result of onchocerciasis. Although a larger number may have experienced visual impairment or ocular damage, blindness is clearly not a main feature of the disease in Guatemala as it is in some hyperendemic foci of sub-Saharan Africa (WHO 1987).

Four distinct pockets of onchocercal infection in Guatemala have been identified. The central or Chisolosui focus is the principal focus and contains 1,921 square kilometers in the Chimaltenango, Sololá, Esquintla, and Suchitepequez departments. It is in this focus that the project concentrated the delivery of ivermectin. Census data available in 1991 indicated that more than 150,000 people lived in this region, making this the largest of the Guatemalan onchocerciasis foci. Further details of this focus and the other three foci in Guatemala are contained in Annex A.

In Guatemala, studies by Cupp et al. (1992) suggested among coffee workers studied, a six-monthly treatment with ivermectin could successfully interrupt transmission in coffee finca areas on the southern slopes of the Sierra Madre range. This model for elimination of onchocerciasis is based on biannual distribution of ivermectin to eventually all persons at risk in endemic foci for a period of 15 years or more, depending on the lifespan of the adult worm. The Suchitepequez collaborative effort was designed to serve as a pilot scheme in the development of a national strategy to eliminate onchocerciasis from all foci in Guatemala.

Control of onchocerciasis in Guatemala has traditionally been the responsibility of the Department of Onchocerciasis of the Division of Malaria (SNEM) within the Ministry of Public Health (DOMOH). Until 1989, the removal of

nodules and limited vector control activities constituted the major efforts to combat this disease.

The first ivermectin mass distribution program was launched in 1989 in Chimaltenango, Guatemala. By 1991, the DOMOH, Universidad del Valle de Guatemala (UVG), International Eye Foundation (IEF), and the National Committee for the Blind and Deaf (NCBD) had begun distributing ivermectin in the departments of Chimaltenango, Esquintla, Sololá, and Suchitepequez, through three discrete, ongoing treatment programs. By the end of 1991, the IEF estimated that 32,000 tablets had been delivered in this central focus before this project became part of the Suchitepequez ivermectin delivery program.

Other institutions are active in onchocerciasis control and research in the Central Focus. In the municipalities of Acatenango (Chimaltenango Province) and Chicacao (Suchitepequez Province), investigators at the Centro de Investigaciones en Enfermedades Tropicales, Universidad del Valle de Guatemala (Drs. Ricardo Luján, Rodolfo Zea-Flores, and Frank Richards) have been collecting epidemiological and immunological data in five hyperendemic communities for several years as part of an ongoing research program.

The neighboring Patulul municipality (Suchitepequez Province) was the site of a Ministry of Health project sponsored by the World Health Organization/Special Program for Research and Training in Tropical Diseases (WHO-TDR). Investigators included Drs. Ed Cupp and Richard Collins (University of Arizona) and Drs. Guillermo Zea-Flores, Julio Castro, and Onofre Ochoa (MOH). From 1988 to 1990, the project distributed ivermectin to the inhabitants of five hyperendemic communities (total population of about 1,500). Results indicated that the mass distribution of ivermectin interrupted transmission of onchocerciasis in these communities.

2 PROJECT DESCRIPTION

2.1 Goal and Objectives

The project goal was to establish an effective, safe, and locally sustainable model for the biannual distribution of ivermectin in endemic communities. This model was designed to be replicated on a national scale. Through the distribution of the drug, the project hoped to significantly reduce the intensity of onchocercal infections in the entire Suchitepequez Province.

Objectives of the three-year project were as follows:

1. To undertake baseline epidemiological studies using indicator groups, school surveys, and study communities to determine and/or reconfirm the prevalence and intensity of onchocerciasis infection, at the community level, in all communities of Suchitepequez Province that are located between 500 and 1,500 meters above sea level.
2. To survey each treated community epidemiologically at least once more during the course of the project to facilitate evaluation of the effect of ivermectin treatment on parasitologic indices of onchocerciasis.
3. To develop a system for processing and disseminating of information collected over the course of the project.
4. To assess the project by a set of defined indicators.
5. To enable project staff, as well as at least 60 members of affected communities, to motivate the communities and distribute ivermectin.

6. To educate all affected communities to increase the level of public awareness about the disease and the distribution program and to achieve high acceptance of the treatment.

7. To deliver the appropriate dose of ivermectin biannually to at least 85 percent of the eligible population of all communities endemic for onchocerciasis, including those located within a 5-kilometer radius of endemic communities.

8. To develop a distribution plan that can be extended to the whole nation and can be sustained by local structures for as long as it is required to interrupt transmission (at least 10-15 years).

2.2 Project Design and Its Subsequent Evolution

The Suchitepequez project was designed to run for three years, from October 1991 through September 1994. The Suchitepequez project was a follow-on project to the Yepacapo project, a pilot ivermectin-distribution project conducted by the IEF/NCBD. In June 1993, a National Onchocerciasis Control Plan, developed by the Ministry of Health, incorporated the Suchitepequez project. In the year since the National Plan began, it was felt that management could be simplified. In August 1994, a new administrative structure was put into place. These three evolutionary phases are described below.

Phase 1. IDP in Suchitepequez Province, 1991-1993 (before the National Plan)

The IDP in Suchitepequez Province was designed to be implemented in a sequence of steps:

A. Establishing baseline epidemiological data in all communities suspected of having onchocerciasis. This was achieved by implementing surveys designed to establish prevalence and intensity of infection in the Suchitepequez Province. A small number of communities (seven) were initially evaluated in detail for morbidity and transmission baseline indices of morbidity. The Universidad del Valle de Guatemala held the primary responsibility for this component of the project.

B. Training of IEF/NCBD and SNEM staff for community education and motivation and ivermectin distribution. These personnel constituted the mobile teams. Community-based volunteer distributors were selected and trained in the second year of the project. The NCBD was in charge of the training component.

C. Establishing a distribution plan that delivered ivermectin to all persons eligible. Persons eligible to receive ivermectin were those in good health, women not pregnant or in the first week of lactation, and children aged five years or over 15 kilograms body weight, in all communities in which onchocerciasis was prevalent, as well as in any community within 5 kilometers of an infected community. Based on population distribution, it was felt that 85 percent of infected persons would be covered.

D. Conducting community education and motivation to prepare the communities for their participation in the upcoming distribution campaign. During the first year, i.e., the first two rounds of treatment, mobile distribution teams were responsible for the education and motivation campaign. During subsequent rounds of treatment, community-based health workers (CHWs) conducted the campaign in at least 50

percent of the communities. The CHWs received training by members of the mobile teams and a modest incentive (per diem) during the training, but this worked on a voluntary basis. SNEM and NCBD implemented the motivation, as well as the distribution component described below.

E. Distribution of ivermectin and monitoring of adverse reactions. Mobile teams were assigned to distribute the drug during the first two rounds of treatment and then train CHWs for the task. Starting during the third round of ivermectin delivery, CHWs, under the supervision of members of the mobile teams, assumed distribution activities in some villages. CHWs learned how to recognize adverse reactions, treat mild cases, and refer more severe cases to health personnel of the mobile team, who were available for several days after the treatment.

F. Management, treatment, and epidemiological indices were evaluated routinely. Baseline epidemiological data were compared to data collected in repeated surveys. Monthly, midterm, and final reports were prepared.

Phase 2. The current (July 1994) status (i.e., after integration of the project into the National Plan)

On June 1, 1993, the IDP in Suchitepequez Province became fully integrated in to the NPEO. The original objectives of the Suchitepequez project were revised and expanded to be appropriate for a national program. All original Suchitepequez IDP objectives were represented in this revision. These objectives are set out in Annex C.

Phase 3. The National Plan after August 1994

As of August 1, 1994, a new structure for the National Plan was adopted. The organogram for this is set out in Annex D. The new distribution scheme was based on stratification by endemicity and size of community. Furthermore, the Central Focus was divided into six geographical areas. A team of two promoters (one from MOH plus one from IEF) will be responsible for all

activities in each of the six geographical zones, except for epidemiological aspects (e.g., health education, motivation, CHW training and supervision, distribution in non-CHW communities, and quality assurance).

Communities with more than 75, but fewer than 1,000 inhabitants will be treated by CHWs who will be trained and supervised by the two promoters. Small communities (<75) and towns (>1,000) will be treated by the promoters.

Additionally, one mobile team of four promoters will assist all promoters of the six zones with the treatment of large communities, problem communities, or those that lag behind the treatment schedule for any other reason. The six multipurpose teams and the mobile team will be supervised by two field supervisors.

Under the new structure, the treatment schedule will take into account the endemicity level of a community and peak transmission rates. This schedule is set out in Annex E.

The epidemiological component will have four teams of two promoters. These teams will also carry out the field work for the entomological component. They will catch flies during the peak biting season, October to February.

A Project Manager will be hired as soon as funds are available. He or she will replace the Field Coordinators II - IV of the old National Plan, who will not exist under the new structure.

The technical component, i.e., epidemiology, entomology, and health information system/geographic information system (HIS/GIS), will be managed by a Field Coordinator and two supervisors. One supervisor will be responsible for the epidemiology and entomology component and eight promoters. The second supervisor will be responsible for the HIS including the GIS and two data entry clerks.

The total staff of the National Plan under the new structure will be less than the number of staff

at present, reducing the overall cost of ivermectin delivery.

Once a distribution schedule has been well established, the promoters will start providing other services to the communities. Several identified services include distribution of an antihelminthic drug (albendazole) and vitamin A capsules to improve nutritional status. Also, a primary eye care component might be included, although details for such an activity were unavailable.

2.3 Project Location

The project set out to establish an ivermectin delivery system in all endemic communities of the Suchitepequez Province. While at project start, there were no reliable data concerning the number of people living in areas endemic for onchocerciasis, it was estimated that as many as 40,000 persons may require treatment.

Suchitepequez Province was chosen as the project area for a number of reasons. It is part of the Central Focus, the largest contiguous area endemic for onchocerciasis in Guatemala, and it had a history of local collaboration. Further, the Ministry of Public Health had specifically requested that this site be considered. IEF in collaboration with the NCBBD, had established an IDP in the adjacent Province of Chimaltenango, which forms another part of this focus. The new project could build on the successes of this ongoing Chimaltenango distribution program.

2.4 Project Funding

To implement the three-year IDP in Suchitepequez Province, the IEF received a grant from the United States Agency for International Development (USAID) for \$420,202. In the first year, \$29,521 was provided by the River Blindness Foundation. The NPEO, which began in June 1993, 20 months after the start of the IDP in

Suchitepequez Province, received an additional \$205,000 from the Onchocerciasis Elimination Program of the Americas (OEPA), coordinated by the Pan American Health Organization (PAHO). The limited funding level made it necessary to cancel some of the planned project activities, e.g., KAP surveys, entomologic studies, and cost-effectiveness analyses.

2.5 Personnel

In this section, the personnel arrangements are set out by phases of the project: the Suchitepequez IDP, the National Plan June 1993-July 1994, and the National Plan from August 1994. (See Annex F.)

Phase 1. Personnel for the Suchitepequez IDP

During the first 20 months of the project, the project personnel consisted of the Project Manager (Dr. Ricardo Luján), the Field Coordinator (Dr. Rodolfo Zea-Flores), and 10 field workers, called *promotores*. Because at that time, the IEF did not have status as an official Guatemalan nongovernmental organization (NGO), the promoters had a work contract with the NCBD, a long-time partner of the IEF. Additionally, through a subcontract from the IEF, the UVG contributed staff for the epidemiological component (three field and laboratory technicians), as well as one programmer and one data entry clerk for the health/management information system (H/MIS).

The head of the Department of Onchocerciasis, Dr. Julio Castro, and his staff participated in this project in the areas of epidemiology, community motivation, distribution of ivermectin, and data management.

Phase 2. The National Plan, June 1993-July 1994

With the beginning of the National Plan in June 1993, the entire staff of the Suchitepequez project was absorbed into the National Plan. All five promoters of IEF's first IDP in the Chimaltenango Province joined the effort. The director of the Department of Onchocerciasis, Dr. Castro, became the technical director of the entire Plan. He also assumed the position of one of the four Field Coordinators, supervising the eight mobile team members and their Field Supervisor, all of them MOH employees. Three more Field Coordinator positions were created. Dr. Ricardo Luján was responsible for all technical aspects, such as epidemiology, entomology, and H/MIS. Dr. Estuardo Recinos was responsible for KAP qualitative data, and Dr. Rodolfo Zea-Flores supervised training and evaluation.

Phase 3. The National Plan from August 1994

In reaction to managerial problems, the structure of the National Plan was streamlined. Three of the four Field Coordinator positions were eliminated and the total number of field workers reduced to 18, including two Field Supervisors. Most importantly, the position of an overall Program Manager was created to be responsible for the implementation of all field operations.

3 REVIEW OF PROJECT OBJECTIVES, ACTIVITIES, AND ACCOMPLISHMENTS

3.1 Procurement and Logistics

Objective: To purchase, ship, and deliver all the supplies needed for operating the project.

Although this program element in the Detailed Implementation Plan mainly concerned procurement, the observations below also related to the management of the project.

1. *Procurement.* Acquiring equipment was not difficult. The capital purchases made with this project were motorcycles, a computer and printer, and office equipment. Project management generally functioned well, ensuring the availability of required supplies, the requisition and accountability for ivermectin tablets, the handling of project funds, and the arrangement for required transportation. These activities were divided among the partners in the project, whose responsibilities shifted during the life of the project. Universidad de Valle de Guatemala assumed much of the responsibility for project management and logistics, with Dr. Ricardo Luján playing the key role. Vehicles were hired to the project from UVG. Vehicles belonging to the MOH (SNEM) and the NCBD provided transportation for field personnel.

2. *Accounting Procedures.* The International Eye Foundation dispersed funds to UVG, where they were handled by the administrative office of the Institute of Research. Two accounting staff handled all transactions. Between the first and the tenth of each month, they sent their request for funds to IEF, along with financial reports from the previous month. This was set up along the lines outlined by IEF, a copy of which appears in Annex G. OEPA funds for the National Plan were channeled through IEF and

handled in accordance with the IEF procedures. Checks were written by the university as requested from the onchocerciasis accounting team. Petty cash was kept by Dr. Luján and by the field supervisors to replace funds expended by field staff. These funds were replenished by check.

There was no external financial audit procedure for the project. UVG had a high-level external audit each year and its own internal auditor. The Bethesda, Md., IEF office monitored funds drawn by the UVG project accounts team to ensure those conformed with the budget and the funds available.

3. *Project Budget.* The project budget was set in the first year by IEF Headquarters. As the project developed during the first year, modifications were required. The budget for the second year was closer to actual expenditures. Nevertheless, substantial shifts between line items were required during the year. More funds were required to supplement the Ministry of Health (SNEM) activities than had originally been budgeted. Some savings were achieved because of fluctuations in the exchange rates. With the beginning of the third project year, the Suchitepequez project was absorbed into the National Plan for the elimination of onchocerciasis. Project funds, along with additional funds from OEPA, helped sustain ivermectin delivery into the third year. As of July 1994, activities were cut back to conserve funds to ensure that ivermectin delivery continued in priority areas through September 1994, when additional funds might be available to the National Plan.

4. *Ivermectin Tablets*. The ordering of ivermectin tablets from Merck, Sharp, and Dohme, Inc. as well as accountability was handled by NCBD initially. The most recent shipment of tablets was handled through the Onchocerciasis Division of SNEM (MOH). That particular shipment attracted a heavy customs levy which required considerable effort to reverse.

5. *Project Management*. Although the project goals and objectives were mostly achieved, the management process was fraught with difficulties. Due to individual internal constraints, it was often difficult for the various partners to work together for the overall good of the project. Some difficulties might have been prevented had individual responsibilities for each organization been clearly delineated at the beginning. Of the difficulties experienced on the project, communication problems were clearly the most important. The respective activities of the individual partners were often carried out independently, and the results not shared. The achievements of the project, in spite of problems with internal coordination and communication, are testimony to the skills, perseverance, and goodwill of all persons involved. Lessons learned on this initial delivery project include the need to establish a team approach, a clear vision of individual and organizational responsibilities, and strong central program leadership in a national program that transcends individual and organizational interests; and the need to more effectively harness the information system to improve decision making for project management at all levels.

3.2 Epidemiological Studies

The epidemiological investigations were clearly the most organized and efficient component of the project, and by far the most technologically sophisticated of all of the ivermectin distribution projects to date. The high level of scientific capability available locally in Guatemala, at the

Universidad del Valle in particular, contributed to this sophistication. The work was complemented by a long history of partnership with researchers from collaborating institutions in the United States. At the same time the amount and types of information collected, such as blood types and languages spoken, considerably exceeded the project's need in facilitating ivermectin delivery. The protocols for the epidemiological studies are described in both the Detailed Implementation Plan and the mid-term evaluation. For a detailed description of these approaches, see Annex G. Section A summarizes these findings and discusses the compelling issues that remained at the close of the project and the continuation of the NPEO.

Objective: To undertake baseline epidemiological studies using indicator groups, school surveys, and study communities to determine and/or reconfirm the prevalence and intensity of onchocerciasis infection at the community level in Suchitepequez.

The primary method for establishing onchocerciasis endemicity was the rapid epidemiological assessment (REA), which consisted of examination of a sample of up to 30 males of at least 15 years of age (the indicator group). Skin biopsies were taken using a sclerocorneal punch to determine the prevalence and intensity of infection. On the basis of the REA, 149 communities were surveyed in the department of Suchitepequez, with a population estimated at 91,169 (as of 1992). Of the 149 target communities, 99 (66 percent) had positive microfilaria and/or nodule prevalence rates in 1992.

Communities having at least a 30 percent microfilarial prevalence rate based on skin biopsies were targeted as "sentinel communities." In-depth surveys in these areas were conducted by UVG under the supervision of the Director of the Center for Health Studies. In 1993, in-depth epidemiological studies, which included identification of superficial nodules, were conducted in four sentinel communities of the

Chicacao area. Two communities, Monte Carlo and Las Armonias, were hyperendemic with microfilariae (Mf) prevalence rates greater than 75 percent; two communities, Valle de Oro and Mercedes, mesoendemic with Mf prevalence rates > 30 and < 60 percent. Hyperendemic communities had significantly more nodules (54 percent and 50 percent vs. 31 percent and 22 percent, respectively).

Ophthalmologic studies were performed by the NCBD in three sentinel communities to determine the presence of ocular damage. Results of these analyses were not available, although it was anecdotally reported that some degree of ocular damage was commonly found. However, the NCBD estimated that only about 166 cases of blindness in Guatemala to date may have been associated with onchocerciasis. Clearly, blindness is not a common feature of onchocerciasis in Guatemala, as it is in hyperendemic areas of sub-Saharan Africa.

Objective: To survey each treated community at least once more during the course of the project to facilitate evaluation of the effect of ivermectin treatment on parasitologic indices of onchocerciasis.

These surveys were carried out according to plan, although some delays occurred on the part of MOH mobile teams as a result of an employee strike in 1993. Final surveys of target communities were completed during the last quarter of project activities when the final evaluation was being conducted. Both Mf prevalence rates and intensity of infection decreased in target communities during the course of multiple treatments. Overall prevalence was reduced by 44 percent, and intensity (community mean microfilarial load) was reduced by 63 percent. Although microfilarial counts were reduced as expected, these will rebound if ivermectin treatment is not continued until adult worms die off naturally. As a result of the epidemiological baseline established by UVG for the department of Suchitepequez, future rounds

of treatment will be ranked using the stratification model developed by UVG of the endemic communities.

3.3 Health Information System/ Management Information System (H/MIS)

Objectives:

- 1. To develop a system for processing and disseminating information collected over the course of the project.**
- 2. To provide routine reports to the project participants and USAID.**
- 3. To assess the project with a set of defined indicators.**

A health/management information system (H/MIS) was successfully developed and implemented during the course of the project. This was a sophisticated FoxPro®-based system developed by a VBC consultant. It provided information for quarterly reports to NGO headquarters and USAID, and information about ivermectin distribution and adverse reactions as required by the Mectizan Expert Committee. In fact, it provided a plethora of additional data, much of which was not easy to access or use. Thus, one constraint was the complexity of the system: it contained a large number of indicators, including names of persons at the household level, files to track migrant workers, and the capacity to be exported into a geographic information system for the mapping of the data. Annex H shows the formidable scope of the system.

Another constraint of the system was that only one person, a highly skilled computer programmer at UVG, was able to fully use and maintain the integrity of the system, in terms of its input, validation, output, and de-bugging requirements.

A duplicate database was given to the malaria division of the MOH, although it appears not to

have been actively used, probably because of its complexity and its disinclination to shift from a previous Lotus-based system. The user must be familiar with basic FoxPro programming language, and most of the routines required for validation and report generation have to be accomplished manually, all of which can be both difficult and time consuming.

A simplified menu-driven H/MIS, later developed by VBC using R-base (another relational database), was developed for the Ivermectin Delivery Program (called IDMS). Introduced to UVG for trial use, the program had some advantages in terms of ease of use, but it was discontinued because data entered into this platform could not be exported to other programs for more sophisticated epidemiological analyses, or to the complementary geographic information system. Also, the IDMS program was a static program, in that it could not be modified without the use of an R-base programmer to meet the evolving needs of the end user.

Sufficient indicators have been developed (and will undoubtedly continue to be used) to assess the technical efficacy of project activities: treatment and coverage rates, prevalence and intensity rates, and number of training sessions. However, a new indicator to be considered (if cost-effectiveness is an objective) would be developing a formula to measure the direct cost for the successful treatment of one onchocerciasis case with ivermectin, i.e., the cost in terms of personnel, transportation, and so forth of moving an ivermectin tablet from point A (program warehouse) to point Z (the client's mouth). This could then be used to compare it with other modes of distribution. In the future, if as much attention is paid to the technical aspects of the process of delivery of ivermectin as has been paid to the epidemiological aspects of the disease, the prospects for the eventual elimination of onchocerciasis in Guatemala (and the Americas) will be more effective.

3.4 Training

Objective: To capacitate project staff as well as at least 60 members of affected communities to motivate communities and distribute ivermectin.

1. *Persons Trained.* Training was provided to both voluntary promoters (*promotores voluntarios*, sometimes called community health workers) as well as brigadistas. By the end of the project, the program design called for a shift of much of the actual ivermectin distribution from the brigadistas to promoters. Training was required for the promoters, as well as new brigadistas recruited by IEF, to supplement those working for the Department of Malaria, Division of Onchocerciasis. Recruitment of promoters started early in the project, and by the second round of treatment, 29 were being trained.

The voluntary promoters were recruited from fincas where they were employees. They were frequently selected by finca administration, and in that sense perhaps were not truly volunteers. The fincas on which promoters were to be used had populations of fewer than 1,000 to enable promoters to complete distribution within one week. Potential promoters had to speak Spanish, be literate, and have lived in the area for several years.

2. *Training Sessions for Promoters.* Training sessions for voluntary promoters were conducted in a three-day workshop conducted by Dr. Rodolfo Zea-Flores and Argentina Velásquez. During the second round of treatment (January-July 1993), 29 promoters out of 60 potential promoters received training. From experience during the first year, a 25-percent annual attrition rate was expected among promoters, making it necessary to have several training workshops for new promoters each year. During the first half of 1994, 40 promoters were trained in one workshop.

Workshops started with a history of onchocerciasis, followed by the importance of voluntary promoters in the National Plan, a description of onchocerciasis, and its treatment with ivermectin. Exclusion criteria, adverse reactions, record keeping, and health education were covered on the second day. On the third day, field work was undertaken, supervised by a brigadista. Once fully trained, the voluntary promoters work under supervision of or with the brigadistas.

3. *Training Sessions for Brigadistas.* The brigadistas recruited by IEF and NCBD participated in an initial training session, along with brigadistas from SNEM, from March 2-6, 1992. Covered in this workshop were the basics of onchocerciasis and ivermectin training. This was followed by training on community motivation and health education. Speakers were drawn from three organizations: SNEM, UVG, and NCBD.

Following training, the newly recruited IEF brigadistas were paired with experienced SNEM brigadistas to provide field experience. A subsequent workshop covering community motivation, health education, distribution of ivermectin, and treatment of adverse reactions was held June 6-8, 1992. There were tensions between brigadistas paid by IEF/NCBD and those employed by SNEM, many of whom had long experience with onchocerciasis. As a result, those employed by SNEM were reluctant to take part in training activities organized from outside the Ministry and resisted evaluation by the Project Field Coordinator, Dr. Rodolfo Zea-Flores. With the development of the National Plan in mid-1993, it finally became possible to use standard training and evaluation methods for SNEM and non-SNEM brigadistas.

The in-service training of brigadistas from late 1993 onward consisted of monthly evaluations. These were in the form of questionnaires concerning onchocerciasis and could be used as a starting point for detailed discussions on areas identified to be weak. Although these were

carried out, the results had not been analyzed by the time of this visit.

4. *Training Materials.* The paucity of training materials remained a problem throughout the life of the project. This matter was dealt with extensively in the mid-term evaluation. Some materials were developed but not reproduced in adequate amounts. Other materials were never reproduced at all. Although the project experienced financial constraints, other reasons for training problems included failure in communication and the failure of the component organizations to work as a team. Unfortunately, training materials available elsewhere were not adapted to use in the Suchitepequez project.

3.5 Community Education and Motivation Campaign

Objective: To educate all affected communities to increase the level of public awareness about the disease and the distribution program and to achieve high acceptance of the treatment.

Although community motivation to ensure adequate coverage was a major objective, this remained a weak area throughout the life of the project. The strategy set out in the detailed implementation plan was never realized. The mid-term evaluation identified this area as a major problem and made a number of suggestions. Budgetary reasons were given as the main reason why community education was always weak, and why recommendations of the mid-term evaluation were not implemented. Materials developed by the Yepacapo ivermectin delivery project were not used in the Suchitepequez project.

1. *Methods for Community Motivation.* Methods of community motivation and sensitization evolved during the course of the project. Initially, motivation was carried out mainly by those brigadistas responsible for this component. Later, as brigadistas responsible separately for diagnosis,

motivation, and distribution were integrated, all brigadistas took on motivation responsibilities. As the project developed and community-based distributors were trained, those took a larger role in community motivation. Originally, it was planned that brigadistas would return regularly to assist community-based promoters in year-round sensitization and motivation of the community for onchocerciasis treatment. Funds were inadequate to support this original intent.

The process of motivation started with a meeting with the mayor or other local authorities to discuss onchocerciasis and explain the ivermectin distribution project. For the coffee and rubber fincas, the motivators met with managers. In some cases, management would not allow the motivation and treatment process to take place, evidently fearing a loss in production. Following meetings with top-level personnel, other community leaders, including nurses and clergy, were sought out and the discussions and explanations repeated.

The next stage was house-to-house visits by brigadistas. The purpose of the program was discussed with the head of household, and the census data updated. In all, about 25 minutes was spent per household. Household members were invited to community meetings. These meetings started with an entertainment video. Part way through the video an intermission occurred, during which onchocerciasis and its treatment was discussed. Over the course of the next several weeks treatment was provided.

2. *Community Perceptions.* Although no direct qualitative evidence exists from the Suchitepequez area, it seems clear that onchocerciasis is not perceived as major health problem by the population. Published evidence (Richards et al. 1991) from elsewhere in Guatemala confirms this. The long-standing nodulectomy programs in Guatemala have built up concepts of *la filaria*, an idea clearly associated with nodules and blindness. It appears that the absence of a KAP study in the project hampered the ability to build a perception

of onchocerciasis in the community and to develop treatment-seeking behavior. Health education has introduced *la microfilaria* into local vocabulary and has established this as the target for ivermectin. However, it is uncertain how microfilaria are perceived in relationship to the wider context of symptomatic onchocerciasis. It seems unlikely that ivermectin-seeking behavior can be established without serious attention to developing community perceptions of need.

3. *Materials.* The project had one handmade flip chart that, for reasons that varied with the person interviewed, was never reproduced. Trainers also used a set of 35mm slides and other teaching materials. No leaflets for distribution, or wall charts for ivermectin promotion or onchocerciasis awareness, were developed or used. There was only one set of community education materials.

The project developed fliers to announce Mectizan treatment, particularly in urban areas with literate populations. Annex I contains a copy of these. Materials developed in the Yepacapo project were not used in Suchitepequez.

3.6 Distribution of Ivermectin and Monitoring of Adverse Reactions

Objective: To deliver the appropriate dose of ivermectin biannually to at least 85 percent of the eligible population of all communities endemic for onchocerciasis, including those located within a 5-kilometer radius of endemic communities.

1. *Methods of Delivery.* Treatment was given according to a census roster for each area. This enabled coverage to be calculated. Lists were updated before each round of treatment. The migration of seasonal labor in and out of coffee fincas from lowland areas and the movement of labor between fincas complicated calculations of coverage. With the collapse of world coffee prices, there was a substantial movement of people out of fincas, and this is reflected in the population figures for the fourth round of

treatment in 1994. The recent rebound in coffee prices may change out-migration before the next round of treatment.

As noted earlier, the ivermectin treatment project started using brigadistas, with the intent to convert to voluntary promoters to handle the bulk of distribution by the fourth round of treatment. Building an effective team using the brigadistas was the first hurdle. At the beginning, 10 new IEF/NCBD brigadistas were hired and trained. These were integrated into a delivery system that used veteran SNEM brigadistas who were still functioning in a very vertical manner. The activities associated with diagnosis, mobilization, and treatment each rested with a different cadre of SNEM brigadistas. Furthermore, management and chain of command for the SNEM brigadistas clearly rested with the Ministry of Public Health rather than with the project. There were also differences in per diem, which the project eventually equalized through augmentation. By virtue of their experience, the SNEM brigadistas were reluctant to participate in the same evaluations as the newly trained members, until the advent of the National Plan in 1993.

Strike action in October 1993 sidelined the SNEM workers but not the other project staff. This did have some effect on ivermectin delivery; however, the project's nonunion (mainly IEF and NCBD) employees picked up much of the additional work load. The devotion to duty of these workers is highly commendable.

Voluntary promoters began distributions in mid-1993, in collaboration with the brigadistas. Two promoters were selected from each community that had a population of at least 250 and fewer than 1,000. Very small and large communities were treated exclusively by mobile teams of brigadistas. It was envisioned that two voluntary promoters could treat the residents of their finca in one week. Brigadistas would deliver medicines and scales at the beginning of the week

and collect them again at the end of the week. Because promoters were delivering treatment outside of regular working hours, it usually required more than a week to treat persons living in their finca area. To adhere to a rather tight schedule and finish treatment within the week, brigadistas often worked alongside promoters.

2. *Numbers of Ivermectin Recipients.* Set out in Table 1 below are extracts from project reports detailing the population in project areas, the numbers eligible for treatment, and those actually treated. Those excluded from treatment included those under age five or weighing less than 15 kilograms, women pregnant or breast feeding newborns, and those in poor health.

The large drop in total population for round four was related to migrations out of the coffee fincas during early 1994. This was most likely owing to low coffee prices on the international market.

3. *Supervision and Quality Control.* Field Coordinators worked with field teams on a rotating basis, so that each team should have the coordinator working with them at least one day a week. Supervision checklists were introduced with the National Plan in 1993. There was considerable resistance to their use. Feedback was provided to workers, but not systematically. It was planned to analyze these reports, but this had not been done at the time the Field Coordinator's employment was terminated owing to a lack of funds. Similar forms were developed for voluntary promoters. Annex J contains copies of these forms.

Attempts were also made to judge the effect of the program on perceptions among community leaders and community members through a survey conducted by Dr. Rodolfo Zea-Flores. In a small sample (n=55), most persons interviewed knew about microfilaria, from where they came, and how they were cured. This was a very good start, and its continued use should be encouraged.

Table 1
Numbers of Ivermectin Recipients

treatment round	dates	total population	population eligible	number treated	% eligible treated	% population treated
1	May-Dec. 1992	58,515	50,362	30,790	61.1	52.6
2	Feb.-June 1993	63,152	55,385	35,565	64.3	56.3
3	Aug.-Dec. 1993	61,957	55,241	35,474	64.2	57.3
4	Jan.-June 1994	49,185	44,650	28,460	63.7	57.9

4. *Adverse Reactions and Their Management.* It is important to note here that severe adverse reactions to ivermectin are practically non-existent in Guatemala. This information is based on data from all distribution projects to date. This may have implications on future data collection efforts of the National Plan, which may wish to simplify the monitoring and reporting process. The frequency and nature of adverse reactions by round of treatment are set out in Table 2. The majority of these were mild or moderate and could be handled with symptomatic treatment. A survey of 55 persons treated by brigadistas found that two thirds had the possibilities of reaction to ivermectin explained, but only 14 percent noted any type of reaction to treatment. The field staff felt that reactions were both more severe and more common during the first round of treatment in a

community. The frequency of reported reactions in Table 2 would appear to confirm this impression.

The field staff felt that the frequency and intensity of Mazzotti-type reactions (edema and pruritus) after ivermectin were a good measure of the prevalence and intensity of infection. Several times they mentioned their puzzlement when these occurred frequently in areas where epidemiological information had indicated low infection. On the other hand, Dr. Luján felt he could predict the amount of symptomatic medications required in an area by using information on intensity and prevalence of infection. A good record has been kept on the symptomatic medications required.

Table 2**Adverse Reactions to Ivermectin**

treatment round	total number of adverse reactions	edema	itching	pain	other
1	3,326 (10.8%)	1,298	1,291	495	242
2	2,351 (6.6%)	824	879	399	249
3	1,595 (4.5%)	505	557	330	203
4	1,591 (5.6%)	500	529	399	163

5. *Compliance.* Set out in Table 3 are compliance figures for rounds two and three. Between 11 and 16 percent of persons who were treated in a previous round were not treated during the next round of treatment. This is of concern since it is unlikely to be accounted for by pregnancy or intercurrent illness. Although various reasons

were given, it is uncertain how much value should be placed in these statements. As the program progresses, compliance will become an increasingly important component of the program, if interruption of transmission is to be sustained.

Table 3**Compliance with Treatment during Rounds Two and Three****

treatment round	treated this round and previous round	treated this round but not previous round	not treated this round but treated previous round	not treated this round or in previous round
2	10,210	3,534	4,878	8,359*
3	11,657	3,686	3,961	10,225*

*includes ineligibles and refusals

**Figures for the fourth round of treatment were not available at the time of writing.

3.7 Plan for Sustainability and National Strategy

Objective: To develop a distribution plan that can be extended to the whole nation and can be sustained by local structures for as long as it is required to interrupt transmission (at least 10-15 years).

This was an extremely ambitious plan from its inception, since to date no other NGO-managed ivermectin delivery project considered such a far-reaching objective. Considering the relatively short timeframe for this pilot project, it was indeed highly admirable that IEF (with the active collaboration of other Guatemalan institutions—UVG, NCBD, and MOH) was able to have its IDP merged into a National Plan. That this took place a year before the project was to be completed (in terms of USAID funding) was all the more remarkable, and a strong indicator of its ability to coordinate with the diverse local institutions involved in the delivery of the program, in spite of its limited financial resources. However, the lack of sufficient resources probably caused many of the management problems faced by the project, since the local capacity to implement the project was clearly greater than the resources available. Again, clearer terms of reference for each organization participating could have lessened some problems experienced in coordinating activities.

Whether the NPEO can meet the second half of the objective, to eliminate onchocerciasis, will depend in part on how it uses its limited resources, how effectively it can distribute ivermectin to endemic communities, its ability to adequately monitor over a long time the effect of its intervention, and its willingness to test alternative, more cost-effective approaches to the distribution of ivermectin.

That onchocerciasis is not considered a priority disease in Guatemala (it is ranked 13th out of 14 as a local priority in one study) could be advantageous, at least in terms of the MOH

decision to decentralize its operations and allow an NGO to manage the program. It would have little to lose in the process (besides the inherent difficulties of administering such a program), and would inevitably share in the successful outcome of elimination of a parasitic disease in the Americas, only achieved before on a more limited basis with the elimination of malaria from the Panama Canal Zone.

Thus, considering the ambitious scope of the NPEO mandate, it would be prudent to consider field-testing innovative, alternative approaches to the distribution of ivermectin, e.g., ivermectin or DEC-medicated salts. In terms of sustainability, the cost-effectiveness of distributing a single drug for a marginal disease over 10-15 years has not been adequately addressed (nor was it in the original scope of work the NGOs engaged in the pioneer work of ivermectin distribution). However, such bottom-line approaches will become increasingly prominent in the health sector.

Currently, Ministries of Health in many developing countries are making policy initiatives toward the decentralization and integration of primary health services. Ideally, one benefit of training CBDs is that they have the potential to be the multivalent primary health care workers of the future. After all, once onchocerciasis has been eliminated, what would be the role of this trained cadre of community workers? Yet, it is not likely that all of these CBDs would eventually become future MOH personnel considering both MOH budgetary constraints, and the move to privatizing the health sector. That many of these CBDs actually work or reside on private fincas would seem to suggest that they could conceivably remain as part-time primary health care workers at the fincas. However, this would assume that finca owners have plans to provide primary health care services for their employees. To date, little evidence confirms that such services will be provided. Perhaps with considerable persuasion from MOH, several of the more enlightened fincas might consider providing

limited services to serve as a model to the other fincas.

Sustainability with regard to health intervention in developing countries is still very much a concept in progress by all organizations and institutions involved in the delivery of health care interventions and/or services. In practice, much work lies ahead in making *sustainable development* an actionable term. It is very important to realize that field-based NGOs are providing the bulk of the new insight in this formative process. Both IEF and Africare participated in a workshop one year ago in Cameroon, which was an early attempt to address some of the intransigent issues regarding sustainability. The workshop resulted in a mid-term report. (*Beyond the End of the Road: Report of a Workshop on Sustaining the Ivermectin*

Distribution Program. Garoua, Cameroon, 1993. VBC Report No. 81505-C.) Many of the major lessons learned by these NGOs were shared in the process. This sharing could be a start in the right direction to better understanding (and appreciation) by donor agencies such as USAID of the obstacles and opportunities that lie ahead toward achieving sustainable development. Finally, it is also hoped that role of the NGOs (particularly indigenous NGOs) will be realized as an essential intermediary in this process.

It is important to note here that the options for sustainability discussed in this report proceed on a scope beyond what was originally mandated for the NGOs involved in the delivery of ivermectin. It is clear that they have done more than their job originally entailed in the process.

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 General Observations

Overall, in spite of the difficulties that occurred in the implementation and evolution of the National Plan, the Suchitepequez Ivermectin Delivery Project was a success. In four rounds of treatment, it distributed 130,289 doses of ivermectin to persons living in isolated and often difficult-to-reach locations where onchocerciasis is hyperendemic. It demonstrated that a collaborative program supported by very different organizations can work. It also showed the potential for use of community-based distributors and the need for involving finca owners and managers in a sustainable distribution system. The program did not reach the objective of 85 percent coverage of eligibles as originally targeted, but this target was probably unrealistic.

The Suchitepequez program clearly met the USAID goal of using a U.S.-based nongovernmental organization (IEF) to strengthen ivermectin delivery. The NPEO was based on the experience of the Suchitepequez project during its first two years. The project also contributed to development of the regional onchocerciasis elimination program, OEPA, that has been established with its headquarters in Guatemala.

The project had its share of difficulties. Some of these could be expected in the start of a major collaborative undertaking, but others arose because of organizational structure and communication problems among its component organizations. The other major areas of weakness were in training and community motivation. The method of delivering ivermectin proved to be expensive and inefficient. The experiences gained from the difficulties that occurred hold important

lessons for the NPEO, which will face even more challenging administrative and distribution problems.

4.2 Management (Including Procurement and Logistics)

Management of the project was fraught with difficulties. Much of this can be explained by the nature of the various component organizations and their tradition or propensity for working independently. Poor communication between the players, identified as the major problem by most of the project personnel interviewed, prevented a strong team being developed.

To avoid similar problems for the National Plan, the Ministry of Public Health should vest the responsibility for the National Onchocerciasis Program with a board of directors or trustees. On this board, parties with an interest in the elimination of onchocerciasis in Guatemala would be represented. The board would ensure that the terms of reference and the responsibilities of all organizations involved in this onchocerciasis program were clear, to avoid many of the misunderstandings that occurred during the Suchitepequez project. This board would then appoint an organization or agency to be responsible for the actual management of the program. This responsibility would be for a specified period, after which the arrangement would be renewed or changed according to a decision of the board of directors.

As it presently stands, the distribution of ivermectin is not particularly resource-efficient, which is a problem at all levels. A more decentralized system could increase management

efficiency.

The financial management was not examined in great detail, but it appears that the IEF accounting system is simple and well suited to the Suchitepequez project. The team was concerned about the lack of an external audit provision, not so much from concern about misuse of funds, but about allocation according to budgetary estimates, adherence to USAID requirements, and the confirmation that accepted accountancy procedures were followed.

Recommendations:

1. A board of trustees or directors should be appointed by the Ministry of Health to oversee direction of the National Onchocerciasis Plan. This board would be constituted of organizations, public and private, with an interest in elimination of onchocerciasis in Guatemala.
2. The management of the onchocerciasis elimination program in Guatemala should be delegated to an agency or organization that can implement the decisions of the trustees or directors of the NPEO and demonstrate strong leadership and efficiency in doing so.
3. A detailed five-year strategic plan for the NPEO should be developed as soon as possible by the principle partners involved in the program: IEF, UVG, NCBD, and MOH. The NPEO may want to consider finding an objective external facilitator for the strategic plan design process.
4. A major effort should be undertaken to improve communication among the component organizations to avoid the difficulties observed in the Suchitepequez project. The communication of information about onchocerciasis delivery activities is important.
5. As part of the strategic planning process, the roles and responsibilities of the component organizations must be clearly defined and a more effective mode of communication developed among these groups.

6. Innovative approaches to the decentralization of management and the distribution mode of ivermectin must be pursued by the NPEO and the Ministry of Health.

7. A financial audit should be conducted regularly.

4.3 Epidemiological Studies

A detailed epidemiological component was an important part of the Suchitepequez project. In retrospect, it collected considerably more information than was necessary for ivermectin delivery. Nevertheless, much of this information served to complete the picture of onchocerciasis in Guatemala. A serious assessment of the types and extent of data necessary for decision making within the National Plan should be determined. The assistance of OEPA would be valuable in ensuring that this is congruent with information being collected in other areas of the region.

Recommendations:

1. Epidemiological monitoring of a cross-section of endemic communities should be conducted annually. The indicator group should be shifted from the individual to the community. Rapid epidemiological assessment of all communities should be reduced to once every three years.
2. Considering that severe adverse reactions to ivermectin are practically nonexistent in Guatemala, prospective monitoring of adverse reactions might be limited to coincide with the above suggested activity (if MOH and the Mectizan Expert Committee agree).
3. After an entomologic baseline is established, entomologic monitoring could coincide with the above suggested epidemiological monitoring during the peak transmission season, October to February.
4. Given compelling concerns about the cost-effectiveness and sustainability of current modes of drug delivery for onchocerciasis, UVG has the

- epidemiological and socio-anthropological research capability to field-test alternative modes of drug distribution, e.g., ivermectin or DEC-medicated salts. If such studies were approved by MOH and the Mectizan Expert Committee, the results could have profound implications, not only for the regional program for elimination of onchocerciasis in the Americas, but also for Africa, where the bulk of onchocerciasis remains, and fewer resources are available.
5. Additional attention will need to be given to distribution modes in nonconfined communities, such as migrant families or nomadic groups (e.g., Yanomami in Brazil and Venezuela).
 6. Field tests of other novel (and less invasive) diagnostic tools, such as assays to measure exposure to *Onchocerca volvulus* recombinant antigens via a sample derived from a finger prick of blood, need to be supported.
 7. Correlative entomologic studies had been planned under the original project design in order to determine the prevalence of *Onchocerca volvulus* among the primary black fly vector, *Simulium ochraceum*. These studies and other studies on cost-effectiveness could not be conducted because of budgetary constraints. Their renewed importance is highlighted by the stated objective of the NPEO, which is the elimination of onchocerciasis in Guatemala.
 8. During the course of the project, the epidemiological baseline and monitoring system developed by UVG generated more information than required for planning the delivery of ivermectin to onchocerciasis-endemic communities. For the most part, delivery took place according to plan, as well as during the first year of the NPEO, into which the project had been successfully integrated. However, as the NPEO enters its second year, it faces severe budgetary constraints, which may affect the continuation of epidemiological studies and the mode of distribution of ivermectin. New resources have been identified from OEPA via the Inter-American Development Bank that should enable the NPEO via UVG to continue the necessary basic epidemiological monitoring, as well as to develop an entomologic baseline to determine the level of transmission among the Simuliid vectors. Considering these constraints, a more simplified sampling method for epidemiological monitoring should be considered, using the stratification model already developed by UVG. This would be complemented by similar simplification of the emerging health information system for the NPEO.
 9. MOH has engaged in nodulectomies since 1935. Although the local population anecdotally appears to derive some benefit from this procedure, it is a debatable procedure, considering the reproductive capacity of adult worms in nodules and whether this practice actually contributes to any reduction in the prevalence of infection. Although superficial nodules may be removed, remaining cryptic (unobserved) nodules would be capable of breeding sufficient quantities of microfilariae to maintain a positive Mf prevalence. Thus, although MOH may wish to continue this tradition, it may prove to be less effective than the newly established method of reducing Mf prevalence using biannual treatment with ivermectin. Other problems that support the decision to discontinue nodulectomies are the possibility of transmission of blood-borne diseases (e.g., HIV/AIDs and Hepatitis B).
 10. Currently, MOH is rapidly decentralizing and integrating its health care delivery system. As a result, it is considering the transfer of its resources for onchocerciasis control to the NPEO to be executed by an indigenous Guatemalan private-sector or nonprofit organization, while maintaining overall authority in policy considerations and personnel hired by the Guatemalan government. Such an approach is highly laudable, and indicative of their serious commitment to the process of decentralization. If this occurs, it is likely that a more efficient mode of distribution of ivermectin can be envisioned (e.g., using community-based distributors rather

than mobile teams), and innovative alternative approaches to distribution may be field-tested.

11. The NPEO calls for the elimination of onchocerciasis from Guatemala rather than the control of the disease. This is clearly an ambitious plan, yet considering the marginal focus of the disease in Guatemala and the obvious high degree of technical capacity already established by local institutions in-country, the attainment of such a goal is feasible (assuming the necessary resources are available and efficiently managed). However, mechanisms need to be developed well in advance with the appropriate agencies, e.g., PAHO, to determine the methods and means of verification of elimination, based on both epidemiological and entomological indices.

4.4 Health/Management Information Systems

The collection and use of information is vital to a smoothly functioning National Plan. It is important that a sound information-based decision-making process be established from the beginning. In the Suchitepequez project, information was collected effectively, though not enough thought was given at the beginning to *what* information should be collected. The flow of information from the field was managed well, and information was entered into the computerized data base efficiently. At the same time, there was difficulty in using information by decision makers and its feedback to the field level.

Recommendations:

1. The current H/MIS project information system is too complex, unwieldy, and inaccessible to field staff and decision makers to be a viable template for the National Plan or OEPA. However, a simplified, open, accessible system can be developed easily (e.g., the Epi-Info-based systems already developed by EHP for similar national programs involving surveillance of tropical diseases) so that all key staff in the NPEO

will actually use the system.

2. Data from the previous system could still be used in an Epi-Info-based system. Such a system should enable any user (using a menu-based approach) to automatically generate customized reports and graphical output of the data. Also, data from such a system could continue to be exported to complementary statistical (e.g., SPSS) and geographic information systems already in existence. Submodules for other tropical diseases of importance in the region, e.g., leishmaniasis, Chagas' disease, dengue, and malaria, could be easily incorporated into the system when needed.

3. Other advantages of such a system are that Spanish versions of Epi-Info are currently available; the software is essentially free (from CDC/WHO); it can be installed quickly and at low cost; and the learning curve for such a system would decrease. Its sustainability in the future is secure considering that CDC/WHO will continue to upgrade and support the software. By contrast, FoxPro has been recently acquired by Microsoft and could be discontinued in lieu of its other Windows-based Access data base platform. Finally, the user-friendliness of such a system would increase the likelihood that it would be used as an effective tool for program management at all levels.

4. Whatever system is eventually adopted by the National Plan, it should be consistent with the standard set of variables adopted by OEPA. Since such a system will need to be maintained for more than a decade, there should be some consideration for the gradual integration of this system with the overall national H/MIS, which is currently under development.

4.5 Training

The importance of a training program for health workers was stressed from the beginning. However, fragmented responsibilities and interpersonal and interorganizational tensions

prevented full realization of objectives. The establishment of the National Plan in June 1993 solved some of these problems. Efforts to improve supervision and on-the-job training seemed to improve considerably in the preceding year. The lack of a clear chain of command also contributed to difficulties, especially in the beginning.

Health worker training materials are needed on two levels: for community-based distributors and for brigadistas or a similar level. Training materials that were developed consisted of one booklet, which community-based distributors were given on completion of their training, and nothing was provided for the brigadistas. In most ways, the community distributor materials were appropriate; however, considering the wealth of materials now being developed, it seems unfortunate that some, which were already available in Spanish from elsewhere in the Americas, were not also used. Messages for community-based distributors, such as exclusion criteria and the treatment of adverse reactions, lend themselves well to illustration with wall charts or pocket handbooks.

An additional set of materials needs to be developed for the brigadista-level health worker. These materials should have considerable detail about onchocerciasis, and also include a section dealing with such items as recordkeeping, basic interpretation of performance data, and supervision. Providing good training materials is not a difficult undertaking, considering what is now available.

By the time the National Plan was developed, a training schedule and knowledge assessment mechanism was in place. Conflicts between SNEM and IEF/NCBD personnel hampered developing a really effective training program in the earlier stages.

Recommendations:

1. Develop a competency-based training program for all cadres of personnel delivering ivermectin or supervising distribution.
2. Develop training materials suitable for each level of ivermectin-delivery personnel. For these, local ideas augmented by materials already available should be considered. Consider developing wall charts for community-based distributors.
3. Examine the supervision materials presently in use to see how these may be strengthened.
4. A simple Epi-Info database should be established to record results from supervision visits. These data could be tallied for information about performance.

4.6 Community Education and Motivation Campaigns

Community motivation was, in general, less active than anticipated, although the integration of community motivation with the other activities of the brigadistas was an important step. A consistent program did not seem to develop, which is a surprise considering that this was evidently a key component in the Yepacapo project. Undoubtedly, budgetary constraints played a role. This seems to have been especially true for the absence of a KAP study, which could have given some important information for the development of health messages.

Although videos were used effectively in attracting people to the teaching sessions, it would have been interesting to determine how much of the onchocerciasis message was absorbed and retained. Again, with the videos being developed in other parts of the world, a short video could be developed appropriate to Guatemala.

Residents of municipalities had a more vigorous approach to motivation than did rural residents, with fliers announcing services as well as loudspeakers mounted on roving vehicles

broadcasting announcements. The team also noted banners.

Some approach to agricultural owners and managers was undertaken, but the general impression was that of a limited response. Under the National Plan, this could be seen as a very important and perhaps neglected area. Some evidence links onchocerciasis to lowered productivity in oil palm estates in Cameroon and on coffee plantations in Ethiopia. An approach based on increasing productivity and decreased days lost to illness might be successful. Shifting some responsibility for ivermectin distribution to finca managers would be an appropriate goal for the next phase of the program. A short video targeted to this group might be considered.

Recommendations:

1. A study of perceptions of onchocerciasis would help design a health education message that would determine what perceptions could be addressed by educational messages as well as devise an ivermectin-seeking educational strategy. This is an important consideration in promoting compliance with subsequent treatment rounds.
2. The development of community motivational materials should be a priority for the National Plan. Materials in use elsewhere should be evaluated for suitability. Especially needed are materials that can be used by community-based distributors.
3. Designing an easily identified logo might help improve program recognition.
4. In the interests of long-term sustainability, consideration should be given to developing a motivational approach for agricultural owners and managers.

4.7 Distribution of Ivermectin and Monitoring of Adverse Reactions

This program was successful in delivering quite good coverage to many isolated locations. It

achieved this in spite of strikes, insurgency, and a migratory labor force. Although the program did not achieve its coverage targets as originally set, these were probably unrealistically high given the difficulties in treatment. It is unfortunate that there was no entomological component to judge what the effect of transmission actually was, given the coverage achieved.

Some time was required to establish a cohesive delivery system. Again this is not surprising considering the history of onchocerciasis treatment in Guatemala. The treatment was not highly efficient. Many of the brigadistas lived in Guatemala City and returned from the treatment areas on the weekend. This should be decentralized so that brigadistas live close to their work sites. Although the intent was to shift much of treatment to the community distributors in communities between 250 and 1,000 by the fourth round of treatment, this shift was slow. There are multiple reasons for this, and a reexamination of the time allotted to volunteers to carry out a round of treatment, as well as their recruitment and compensation, is needed.

The use of a detailed census and recording system that records and enters in the database the name of each ivermectin recipient is inefficient. This could be replaced by enumerating residents at the time of each round of treatment and recording the numbers rather than the names of persons treated for a calculation of coverage. The advantages of recording the individual names of recipients is far outweighed by the complexity this introduces into the information system.

Adverse reactions seem to have been handled well by project personnel. There is some concern that delayed reactions (onset greater than one week) are missed by the present system of checking. With time, as fewer numbers of persons with heavy infection take ivermectin for the first time, this problem may diminish. It still should be considered. Community-based volunteers should have little difficulty in handling the majority of reactions; however, some referral

system should be established to help deal with these.

Recommendations:

1. Almost all ivermectin delivery in agricultural areas should be done by community distributors. A detailed look at how treatment is provided should be carried out to determine if only one week is a reasonable length of time for treatment of a specific area.
2. Brigadistas should be used principally as supervisors in the agricultural areas and in other areas where community distributors could be used.
3. Establishing fixed areas of responsibilities for the brigadistas, rather than their serving as mobile teams, would help create a sense of responsibility or ownership for a specific area. Using motorcycles rather than four-wheel-drive vehicles could cut costs as well.
4. Although working in teams may have a psychological benefit, it could be more effective to have a team responsible for an area, with actual treatment supervised or dispensed individually.
5. In areas where skin snips are taken to measure the prevalence and intensity of infection, it is important that skin punches are suitably sterilized to prevent transmission of hepatitis B, HIV, and other blood-borne pathogens.
6. An entomological component of the National Plan is very important to document baseline information and reduction of transmission. This could be done in a few communities, and the costs would not be excessive.
7. Shifting responsibility for distributing ivermectin, as much as possible, to the agricultural sector is an important sustainability issue. The National Plan would still be responsible for training, supervision, and support.

4.8 Plan for Sustainability Issues

An objective of the National Plan is to develop a distribution plan that can be extended to the whole nation and can be sustained by local structures for as long as it is required to interrupt transmission (at least 10 to 15 years).

The MOH plan to decentralize its activities in the malaria division and transfer the management of the NPEO to an indigenous Guatemalan private-sector nonprofit organization such as IEF or the NCBD should be supported and take place as soon as possible. MOH would maintain overall authority for policy considerations. It is hoped that the newly appointed Guatemalan director of IEF (and the eventual director of the NPEO) both take into serious consideration the sustainability issues raised in this evaluation, particularly those concerning developing cost-effectiveness measures and field-testing innovative approaches to ivermectin distribution.

Although OEPA has provided modest funds to the NPEO, they will not be sufficient to sustain current levels of activity. Because of the prospects for funding (or, more accurately, the likely insufficiency of funding), it remains unclear what NPEO's minimum level of effort will be. With these realities in mind, a number of potential options need to be explored.

Recommendations:

1. The fincas should be encouraged in assuming a greater ownership of ivermectin implementation. This will be difficult; previous attempts to leverage the finca owners to buy-into the program were unsuccessful. Although a professionally mounted promotional campaign was not attempted, a recently appointed ad hoc committee will begin soon.
2. Consideration could be given to a service-delivery charge as a means of supplementing

community-based workers. This would require supervision; the amount needed could be insufficient under the current set up. However, local individuals do have a history of paying for health services they consider a priority. It may be unlikely that onchocerciasis would meet this criteria.

3. Innovative distribution approaches should be considered, particularly in light of the peripheral and focal nature of the disease, e.g., the field-testing of ivermectin or DEC-medicated salts at a

few target fincas of comparable endemicity. Of course, this would require the endorsement of MOH and the Mectizan Expert Committee, if ivermectin or DEC were to be used in table salt. If ivermectin were to be used in salt, it would probably have to be reformulated to withstand cooking heat. However, this procedure has already been endorsed by WHO for the precursor to ivermectin, diethylcarbamazine, for prevention and control of lymphatic filariasis, and currently is in use extensively in India.

BIBLIOGRAPHY

- Beyond the End of the Road: Report of a Workshop on Sustaining the Ivermectin Distribution Program, Garoua, Cameroon.* VBC Report No. 81505-C. 1993.
- Brandling-Bennett A., Anderson J., Fuglsang H., and Collins R. Onchocerciasis in Guatemala: epidemiology in fincas of various intensities of infection. *Am. J. Trop. Med. Hyg.* Vol. 30, pp. 970-981. 1981.
- Collins R., Gonzales-Peralta C., Castro J., Zea-Flores G., Cupp M., Richards F. and Cupp E. Ivermectin: reduction in prevalence and infection intensity of *Onchocerca volvulus* following biannual treatments in five Guatemalan communities. *Am. J. Trop. Med. Hyg.* Vol. 47, No. 2, pp. 156-169. 1992.
- Cupp E., Bernardo M.J., and Kiszewski A.E. et al. The effects of ivermectin on transmission of *Onchocerca volvulus*. *Science.* 231:740-42. 1986.
- Cupp E., Ochoa J., Collins R., Cupp M., Gonzales-Peralta C., Castro J., and Zea-Flores G. The effects of repetitive community-wide ivermectin treatment on transmission of *Onchocerca volvulus* in Guatemala. *Am. J. Trop. Med. Hyg.* Vol. 47(2), pp. 170-180. 1992.
- First Annual Report for the Mass Distribution of Ivermectin to Control Onchocerciasis in Suchitepequez Province, Guatemala.* IEF/G. January 1993.
- Gelband H. Diethylcarbamazine salt in the control of lymphatic filariasis. *Am. J. Trop. Med. Hyg.* Vol. 50, No. 6, pp. 655-662. 1994.
- Hawking F. and Marques R. Control of bancroftian filariasis by cooking salt medicated with diethylcarbamazine. *Bulletin of the World Health Organization.* Vol. 37, pp. 405-414. 1967.
- Ivermectin Delivery Program Suchitepequez Department, Guatemala, Midterm Evaluation Report.* USAID/VBC Report No. 81422. May 1993.
- Luján R. et al. *Plan Nacional para la Eliminación de la Oncocercosis en Guatemala*, Formularios. Universidad del Valle de Guatemala, Centros de Estudios en Salud, Instituto de Investigaciones, September 1993.
- Mass Distribution of Ivermectin to Control Onchocerciasis in Chimaltenango Province, Guatemala: A Report on Year 1 and a Detailed Implementation Plan for Year 2.* International Eye Foundation, Guatemala. 1991.
- Mass Distribution of Ivermectin to Control Onchocerciasis in Suchitepequez Province Guatemala, A Detailed Implementation Plan.* IEF/G. March 1992.
- Mass Distribution of Ivermectin to Control Onchocerciasis in Suchitepequez Province Guatemala; The First 6-Months Report.* IEF/G. March 1992.
- Oliver C. and Sonnemann J. *Talking Drums: A Communication Handbook for Field Managers of River Blindness Prevention Programs.* USAID/Office of Health and Nutrition. n.d.

- Quarterly Reports for the Mass Distribution of Ivermectin to Control Onchocerciasis in Suchitepequez Province, Guatemala.* IEF/G.
- Raghavan, N. Basu P. and Putatunda. A pilot study on the use of diethylcarbamazine in common salt in a village endemic for *W. bancrofti* filariasis, Parpatpur, Varanasi, Uttar Pradesh, India. *WHO/FIL/68.82.* 1968.
- Richards F. Use of geographic information systems in control programs for onchocerciasis in Guatemala. *Bulletin of PAHO.* Vol. 27(1), pp. 52-55. 1993.
- Richards F., Klein R., Conzales-Peralta C., Zea-Flores R., Zea-Flores G., and Castro Ramirez J. Knowledge, attitudes and perceptions (KAP) of onchocerciasis: a survey among residents in an endemic area in Guatemala targeted for mass chemotherapy with ivermectin. *Soc. Sci. Med.* Vol. 32. 11, pp. 1275-1281. 1991.
- Scrimshaw S. and Hurtado E. *Rapid Assessment Procedures for Nutrition and Primary Health Care.* United Nations University, Tokyo. 1987.
- Second Annual Report for the Mass Distribution of Ivermectin to Control Onchocerciasis in Suchitepequez Province, Guatemala.* IEF/G. December 1993.
- Seymour J. *Ivermectin Delivery Program, Workshop Report.* VBC Report No. 81239. 1991.
- Strategies for Sustainable Development,* USAID, Washington. March 1994.
- Suzuki T. *A Guidebook for Guatemalan Onchocerciasis (Robles disease).* The Guatemala-Japan Cooperative Project on Onchocerciasis Research and Control. Japan International Cooperation Agency (JICA), Tokyo. 1983.
- Taylor, H. and B. Green. The status of ivermectin in the treatment of human onchocerciasis. *Am. J. Trop. Med. Hyg.* Vol. 41, pp. 460-466. 1989.
- World Health Organization. Report of the eleventh meeting of the SWG on filariasis held jointly with the onchocerciasis chemotherapy project. TDR/FIL-SWG (11) 85.3. 1985.
- World Health Organization Expert Committee on Onchocerciasis. Technical Report Series 752. Geneva: p. 19. WHO 1987.
- Workshop on Future Direction in Health Education for Ivermectin Delivery Programs,* VBC Report No. 81340.

ANNEX A

Description of the Four Onchocerciasis Foci in Guatemala

1. *A zone of 1,921 square kilometers covering adjoining parts of Chimaltenango, Sololá, Esquintla, and Suchitepequez Provinces (referred to as the Chisolosui focus).*

This is the largest known endemic zone of onchocerciasis in Guatemala. Existing census data indicate that more than 150,000 people live in this region.

The first pilot ivermectin mass distribution program was launched in 1989 in Chimaltenango, Guatemala. DOMOH, UVG, IEF, and the NCBD, are currently distributing ivermectin in the departments of Chimaltenango, Esquintla, Solola, and Suchitepequez, through three discrete, ongoing treatment programs (see maps at the end of this annex). At the end of 1992, more than 100,000 treatments had been delivered in this central focus.

Other institutions are active in onchocerciasis control and research in the Central Focus. In the municipios of Acatenango (Chimaltenango Province) and Chicacao (Suchitepequez Province), investigators at the *Centro de Investigaciones en Enfermedades Tropicales (CIET)*, *Universidad del Valle de Guatemala*, (Drs. Ricardo Luján, Rodolfo Zea-Flores, and Frank Richards) have been collecting epidemiological and immunological data in five hyperendemic communities for several years as part of an ongoing research program.

The neighboring Patulul Municipio (Suchitepequez Province) was the site of a Ministry of Health project sponsored by the World Health Organization/Special Program for Research and Training in Tropical Diseases (WHO-TDR). Investigators included Drs. Ed Cupp and Richard Collins (University of Arizona) and Drs. Guillermo Zea-Flores, Julio Castro, and Onofre Ochoa (MOH). The project, for the last three years (1988-1990) distributed ivermectin to the inhabitants of five hyperendemic communities (total population of about 1,500). Results published in the *American Journal of Tropical Medicine*, indicated that mass distribution of ivermectin interrupted transmission of onchocerciasis in these communities.

2. *A zone of 1,468 square kilometers on the down-slope of the volcano of Pacaya in Esquintla Province (San Vicente Pacaya focus).*

A minimum of 160,000 residents are thought to live in this densely populated zone. However, the majority of the communities are hypoendemic for onchocerciasis. Between 1975 and 1983, the DOMOH collaborated with a research program sponsored by the Japanese government's Japan International Cooperation Agency (JICA) to control black fly breeding through seasonal application of the non-residual pesticide Temephos to the local rivers in the San Vicente Pacaya focus. Although the chemical is biologically effective, the program has come to a halt because the Ministry cannot afford the Temephos, and its application in remote mountain streams is logistically difficult. DOMOH has been distributing ivermectin to 4,000 residents in 50 endemic communities in this zone.

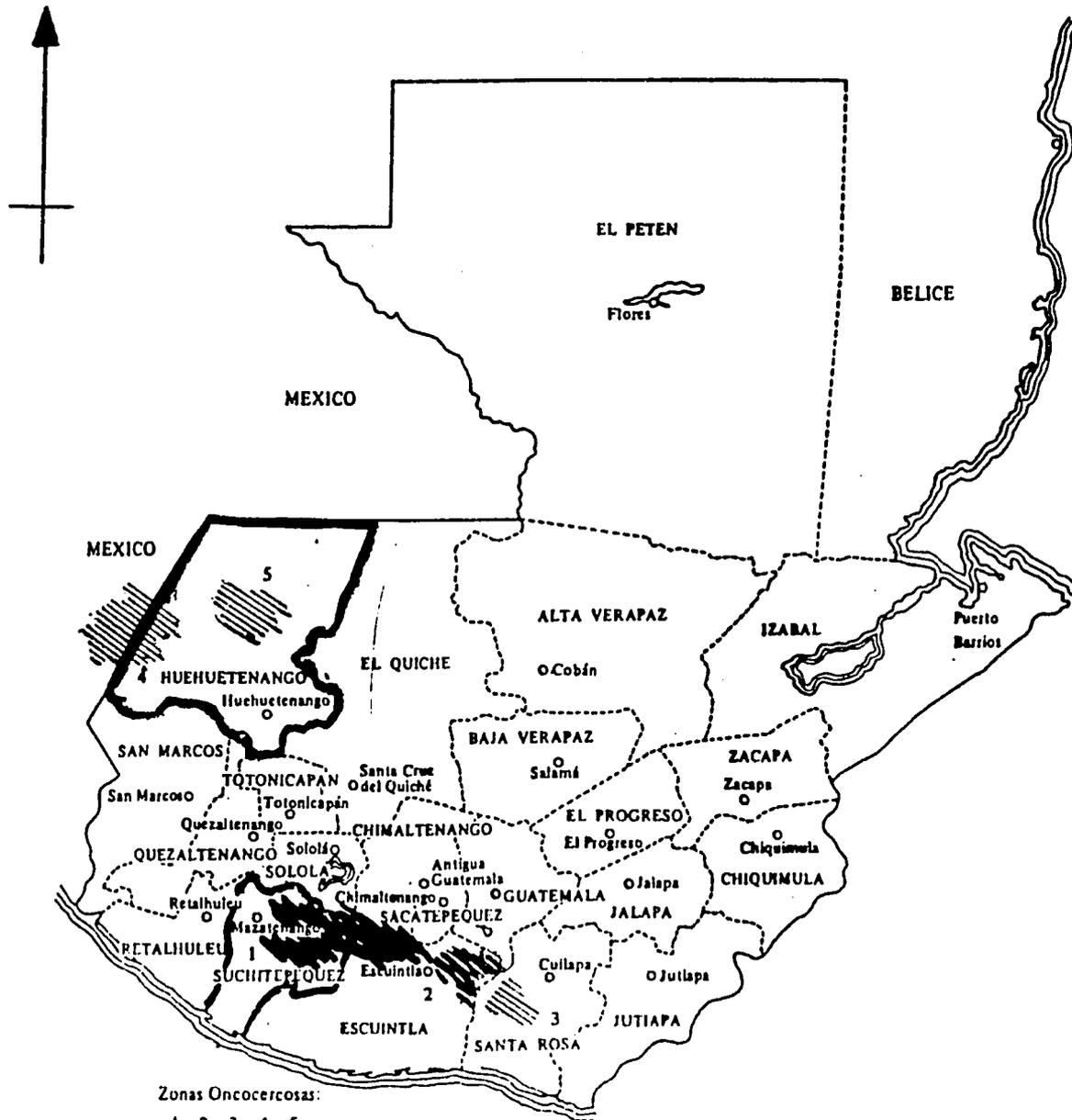
3. *A lowland zone of about 590 square kilometers around and south of Guanagazapa in the Province of Santa Rosa.*

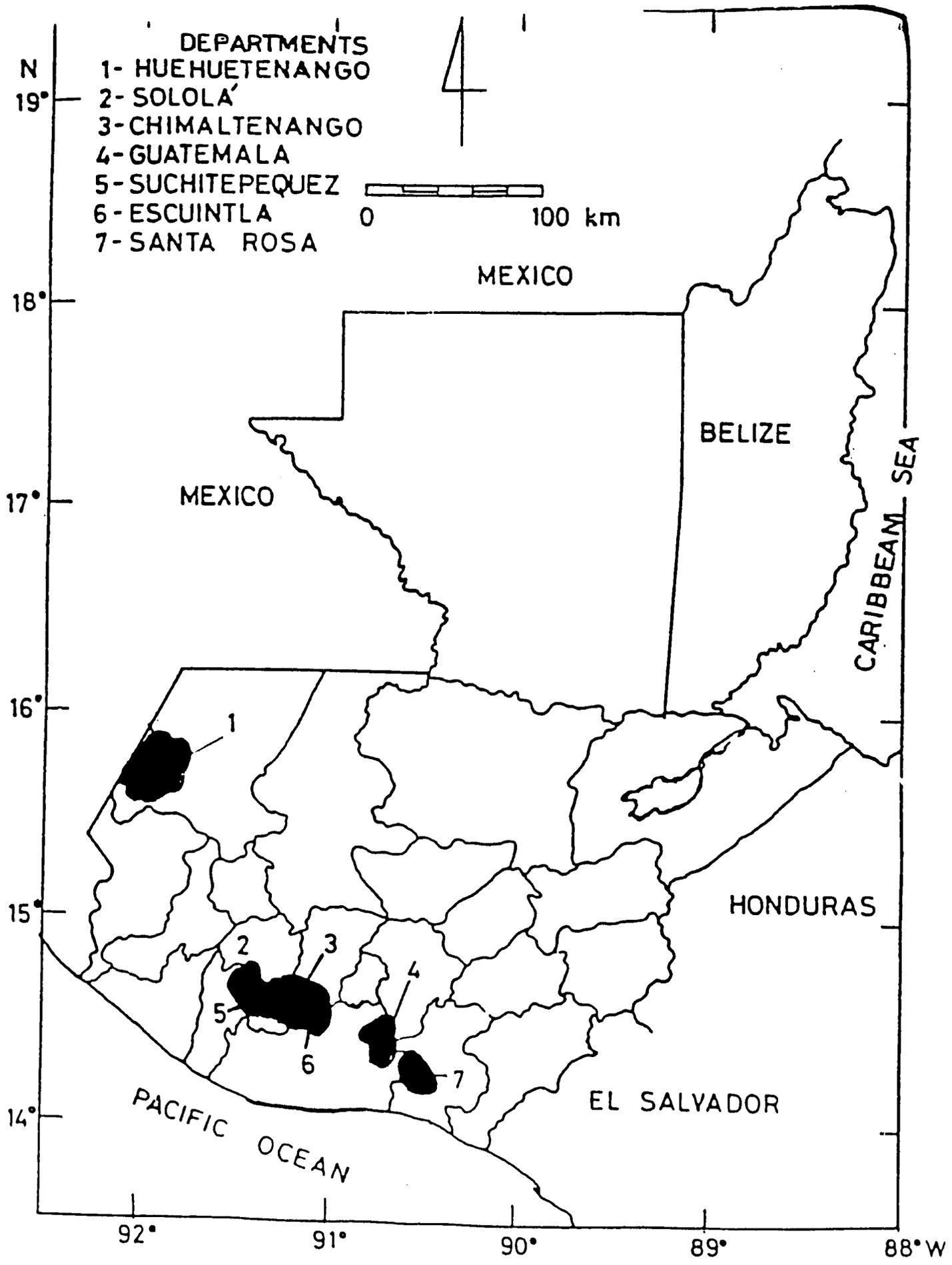
An estimated 70,000 people are thought to live in this area. Current data suggest that this zone is hypoendemic and does not warrant mass distribution of ivermectin (Dr. Guillermo Zea-Flores, personal communication). Plans for a clinic-based distribution scheme are under consideration as part of the National Plan, pending further epidemiological surveillance.

4. *The territory adjacent to the Mexican border covering 729 square kilometers in the Huehuetenango Province (this is contiguous with an endemic area in Chiapas on the Mexican side of the border).*

As many as 70,000 people may live in this area, but civil conflict has interfered with efforts to gather accurate census figures or disease prevalence data. Some of the population migrates back and forth across the international border. Meanwhile, the Mexican government has begun a program to mass distribute ivermectin on its side of the border. With a grant from the River Blindness Foundation, IEF, DOMOH, and UVG conducted an epidemiological survey of the area in 1992. The data analysis showed that the majority of the communities are hypoendemic.

**DISTRIBUCION GEOGRAFICA DE LA ENFERMEDAD DE ROBLES
(ONCOCERCOŠIS) EN GUATEMALA**





ANNEX B
Implementing Organizations

1. *The Division of Malaria, Department of Onchocerciasis (DOMOH, also referred to as SNEM)*

The Department of Onchocerciasis is a part of the Division of Malaria of the *Ministerio de Salud Pública y Asistencia Social* (MOH). The department was created in the 1970s specifically to combat onchocerciasis. The chief of this section is Dr. Julio Castro. Since 1935, MOH has collected data and carried out an ambitious program to surgically remove the nodules caused by onchocerciasis infection.

DOMOH has also conducted WHO-funded ivermectin trials and collaborated with the *Universidad del Valle*, Guatemala (UVG) and the University of Arizona on research to determine the effective use of ivermectin in Guatemala. The results have recently been published (Cupp et al. 1992) and have demonstrated the potential of ivermectin to interrupt transmission of onchocerciasis in Guatemala.

2. *The International Eye Foundation (IEF)*

The International Eye Foundation (IEF) is a private voluntary organization dedicated to the prevention and cure of blindness in developing countries. IEF field operations provide training, equipment and medicine, clinical services, operational research, and development of community-based programs through support for indigenous eye care organizations in 12 countries of Latin America, the Caribbean, Africa, and Eastern Europe. A headquarters staff in Bethesda, Maryland, provides support to the IEF personnel in the field.

The IEF was the first American PVO to distribute ivermectin, beginning in 1989, and is actively involved with projects to control onchocerciasis in Guatemala, Nigeria, Cameroon, and Malawi. In Guatemala, the IEF has been recognized as one of the leading agencies in onchocerciasis control.

3. *The National Committee for the Blind and Deaf (NCBD)*

(Comite Nacional Prociegos y Sordomudos)

The NCBD was founded in 1950 as a Guatemalan nongovernmental organization. It is currently the leader in the delivery of services to the blind and deaf in Guatemala. It has been given the mandate by the Government of Guatemala to provide all services for the prevention and cure of blindness in over one third of the country (including all four foci endemic for onchocerciasis). The NCBD operates Robles Eye and Ear Hospital, a specialty center in Guatemala City that trains residents in ophthalmology from Guatemala and other Latin American countries. The NCBD also has three branch hospitals in the interior of the country and a total of five peripheral clinics throughout the Republic. In addition, through its Program of Blindness Prevention/Eye Health, it reaches out to communities by direct campaigns and by training teachers and health promoters in primary eye care.

The NCBD's teaching hospital is named after Dr. Rodolfo Robles, the Guatemalan scientist who is credited with having first described the epidemiology of onchocerciasis in Central America. Thus, the committee considers that it has a special mandate to promote the treatment and control of this disease. The Committee, through its primary eye care programs, has supported efforts to diagnose and control onchocerciasis for decades through a program to remove nodules caused by the disease.

In 1980, the NCBD organized a National Council on Onchocerciasis (CONACO) made up of key members of government, multinational organizations, local universities, and private industry. This Council, though inactive since 1985, has recently been reconvened by the MOH to assist in national policy and decision making.

4. *Universidad del Valle de Guatemala (UVG)*

Created in 1966 as an outgrowth of the American School of Guatemala, the UVG is a leading university in Guatemala specializing in sciences, medicine, social and behavioral studies, and education. The *Centro de Investigaciones en Enfermedades Tropicales* (Center for Research in Tropical Diseases, CIET) is internationally known for its research activities in parasitic diseases, including onchocerciasis. CIET is equipped with state-of-the-art laboratories and has a number of well-trained technicians to assist with survey work.

Dr. Ricardo Luján, as Director of the Center, and Dr. Rodolfo Zea-Flores from the UVG have been involved in research in the Central Focus. Dr. Luján has played a key advisory role in most onchocerciasis activities in Guatemala over the past years. Dr. Zea-Flores served as the supervisor of hospital and field activities for Phase III clinical trials of ivermectin in Guatemala (1985-1987) before joining CIET.

The Medical Entomology Research and Training Unit/ Guatemala (MERTU/G) is the Guatemalan research unit of the Division of Parasitic Diseases, Centers for Disease Control in Atlanta. Housed within the UVG, MERTU has maintained a U.S. national professional staff, office space, research facilities, and a national technical staff at UVG for the last 13 years. MERTU has provided support in the areas of computer mapping of the endemic areas.

5. THE ONCHOCERCIASIS ELIMINATION PROGRAM IN THE AMERICAS PROGRAMA DE ELIMINACION DE LA ONCOCERCOSIS EN LAS AMERICAS (OEPA)

OEPA represents a multi-national, multi-agency and multi-donor effort to eliminate onchocerciasis as a public health threat in the six countries where it is endemic--Mexico, Guatemala, Ecuador, Colombia, Venezuela and Brazil. Prior to the formation of OEPA and leading to its creation in January 1993, two critical activities took place. The first was the mobilization of the public health community to address onchocerciasis in Latin America, and the second was the development of national strategies to distribute ivermectin (Mectizan[®]) on a massive scale to individuals infected or at risk of infection. OEPA is a ten-year regional program which builds on earlier individual national activities by seeking long-term financing of the regional program, and implementation of a coordinated, regional onchocerciasis elimination strategy.

Goal: OEPA's primary goal is to eliminate onchocerciasis as a menace to public health in the Americas. Working directly with the governments and agencies responsible for the implementation of national plans, OEPA provides technical, financial and management support to complement each country's onchocerciasis elimination effort, within the framework of the regional strategy.

History Of OEPA: The impetus for a regional program began in 1991 with the involvement of the Ministries of Health in the six affected countries, PAHO/WHO, the Carter Center, and local and international non-governmental organizations (NGOs) committed to combatting onchocerciasis. In the Spring of 1991, representatives of the Ministries of Health and a diverse group of interested organizations met at the first Inter-American Conference on Onchocerciasis (IACO'91). Participants at this landmark meeting concluded that onchocerciasis could be eliminated in the Western Hemisphere if the at-risk population was treated with Mectizan for 10 to 15 years.

PAHO's Commitment: This conclusion went before the Executive Committee of PAHO in June 1991, and in September of the same year it adopted a resolution committing PAHO and the six countries to strive to eliminate onchocerciasis by the year 2007. PAHO then convened the onchocerciasis Strategic Planning Council (SPC), composed of onchocerciasis experts and representatives of NGOs, international agencies and Ministries of Health. At the first SPC meeting in March 1992, participants developed the initial guidelines for a regional elimination strategy. Subsequent SPC task force meetings and a major financial commitment by the River Blindness Foundation, led to the decision to create a unique international partnership known as the Onchocerciasis Elimination Program in the Americas (OEPA).

The Campaign to Eliminate Onchocerciasis: OEPA began a true regional assault on onchocerciasis after its formation in January 1993. The first step was the creation of the Program Coordinating Committee (PCC) consisting of internationally known experts to guide OEPA, and to employ a Director and Expert Advisor. Meeting in February and April, 1993 at PAHO headquarters, the PCC and OEPA staff reviewed the six national plans and formally established the role of OEPA. This process resulted in the allocation of funding for programs in Brazil, Ecuador, Guatemala, Mexico and Venezuela.

At IACO '93 in Puerto Ayacucho, Venezuela, OEPA committed additional funds towards the 1994 annual plans of all six countries.

During the first 18 months of the program , the OEPA staff, operating from its regional base in Guatemala, has worked closely with local officials and professional staff in each endemic country to provide ongoing support to national plans.

Funding for OEPA :The funds needed to complete the ten-year regional effort are estimated at \$10 million. With the formal approval of national plans, the River Blindness Foundation granted \$1 million for regional onchocerciasis activities. The Inter-American Development Bank has recently committed \$4 million and USAID another \$225,000. In-country fund raising campaigns have generated over \$100,000 with pledges from many local donors to provide additional support in the future. Thus OEPA has already secured more than 50% of the funding for the 10-year plan.

Conclusion: To-date, significant progress has been achieved through: the development and incorporation of national plans into a coordinated regional strategy; the willingness of the many participating experts, institutions and agencies to devote time and expertise to the program; the positive political will manifested by the six governments; the dedication of the health professionals working at all levels within the affected countries; and the on-going commitment of donors like the Merck and Co., the Inter-American Development Bank and the River Blindness Foundation. OEPA, for its part, will continue to coordinate regional activities and assist fund raising efforts to achieve the program goal of eliminating onchocerciasis from the list of endemic diseases threatening the Western Hemisphere.

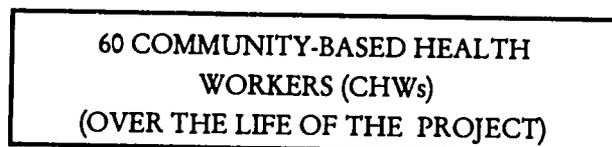
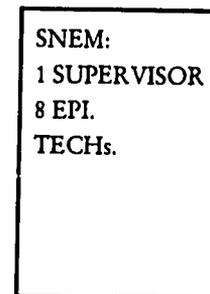
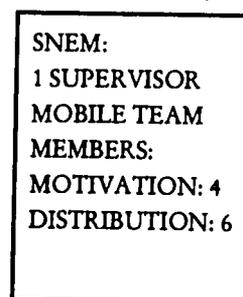
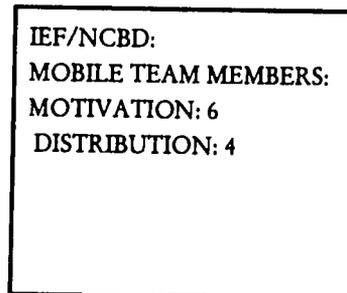
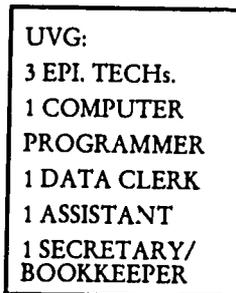
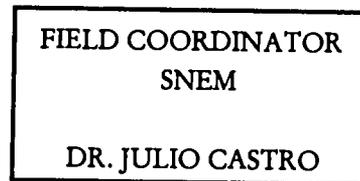
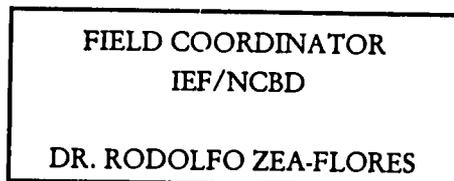
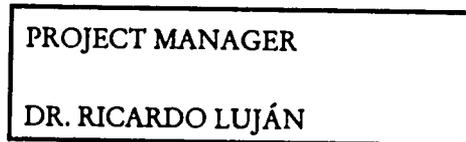
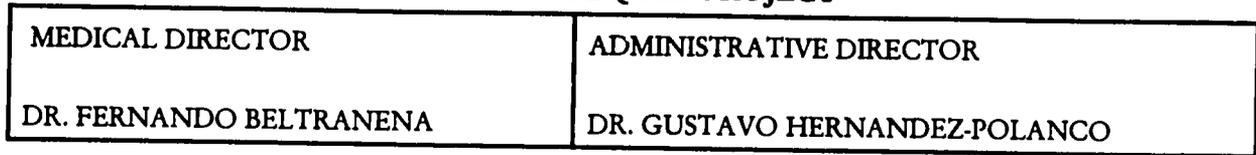
ANNEX C
Objectives of the National Plan

When it was created in 1993, the following were set out as objectives for the National Plan for the Elimination of Onchocerciasis in Guatemala:

1. To undertake annual, in-depth epidemiological surveys in 15 sentinel communities (SCs), as well as rapid epidemiological assessment surveys (REA) every other year in the remaining 549 communities, to determine and monitor the prevalence and intensity of onchocerciasis infection.
2. To conduct an entomological baseline study, as well as follow-up surveys (every other year), in each of the nine eco-zones found in the endemic areas to assess the effect of ivermectin distribution on parasite loads in the black fly population as a direct measure of transmission potential. The communities selected within these zones will be the same as the 15 sentinel communities whenever possible.
3. To conduct an annual ophthalmologic assessment in the 15 sentinel communities to determine the effect of the program on community ocular health.
4. To determine local community knowledge and beliefs through KAP surveys, focus groups, and so forth, in order to develop appropriate health education methods and materials and to evaluate the effect on community motivation.
5. To develop a system for processing and dissemination of information collected over the course of the project. This information system will also provide indicators for the evaluation of the National Plan.
6. To capacitate a core staff of 48 brigadistas, as well as at least 600 members of affected communities, to educate the communities and promote the elimination plan, and to distribute ivermectin, including handling of adverse reactions.
9. To educate all affected communities to increase the level of public awareness about the disease and the distribution program and to achieve high acceptance of the treatment for at least 10 years.
10. To deliver the appropriate dose of ivermectin on a biannual basis (first three years, single annual dose thereafter) to at least 85 percent of the eligible population of all 564 communities estimated endemic for onchocerciasis, including those located within a 5 kilometer radius of endemic communities.

ANNEX D
Field Staff Organogram

SUCHITEPEQUEZ PROJECT



ANNEX E

Treatment Schedule for the National Plan

Under the new structure, the treatment schedule will take into account the endemicity level of a community and peak transmission rates. Therefore, the schedule will be as follows:

ENDEMICITY LEVEL	1st TREATMENT ROUND	2ND TREATMENT ROUND
Hyperendemic	Oct., Nov.	Feb., Mar.
Mesoendemic	Aug., Sept.	Apr., May
Hypo-/non-endemic	June, July	Dec., Jan.

Furthermore, the frequency of treatment, as well as the frequency of epidemiological assessment, will be influenced by the endemicity level:

ENDEMICITY LEVEL	TREATMENT SCHEDULE	EPIDEMIOLOGICAL SURVEY SCHEDULE
Hyperendemic	2/year for 5 years	each year (most are sentinel communities anyway)
Mesoendemic	2/year for 3 years, 1/year for 2 years	once in 2 years
Hypoendemic	2/year for 2 years 1/year for 3 years	once in 3 years
Non-endemic	2/year for 2 years, 1/year for 3 years	once in 5 years

For the epidemiological component, four teams of two promoters will be necessary. These teams will also carry out the field work for the entomological component. They will catch flies in the peak biting season, October and November.

A Project Manager will be hired as soon as funds are available. He or she will replace the Field Coordinators II - IV of the old National Plan who will not exist any more under the new structure.

The technical components, i.e., epidemiology, entomology, HIS, and GIS, will be managed by a Field Coordinator and two supervisors: one for epidemiology/entomology, who will supervise eight promoters; the other, for HIS/GIS, who will supervise two data entry persons.

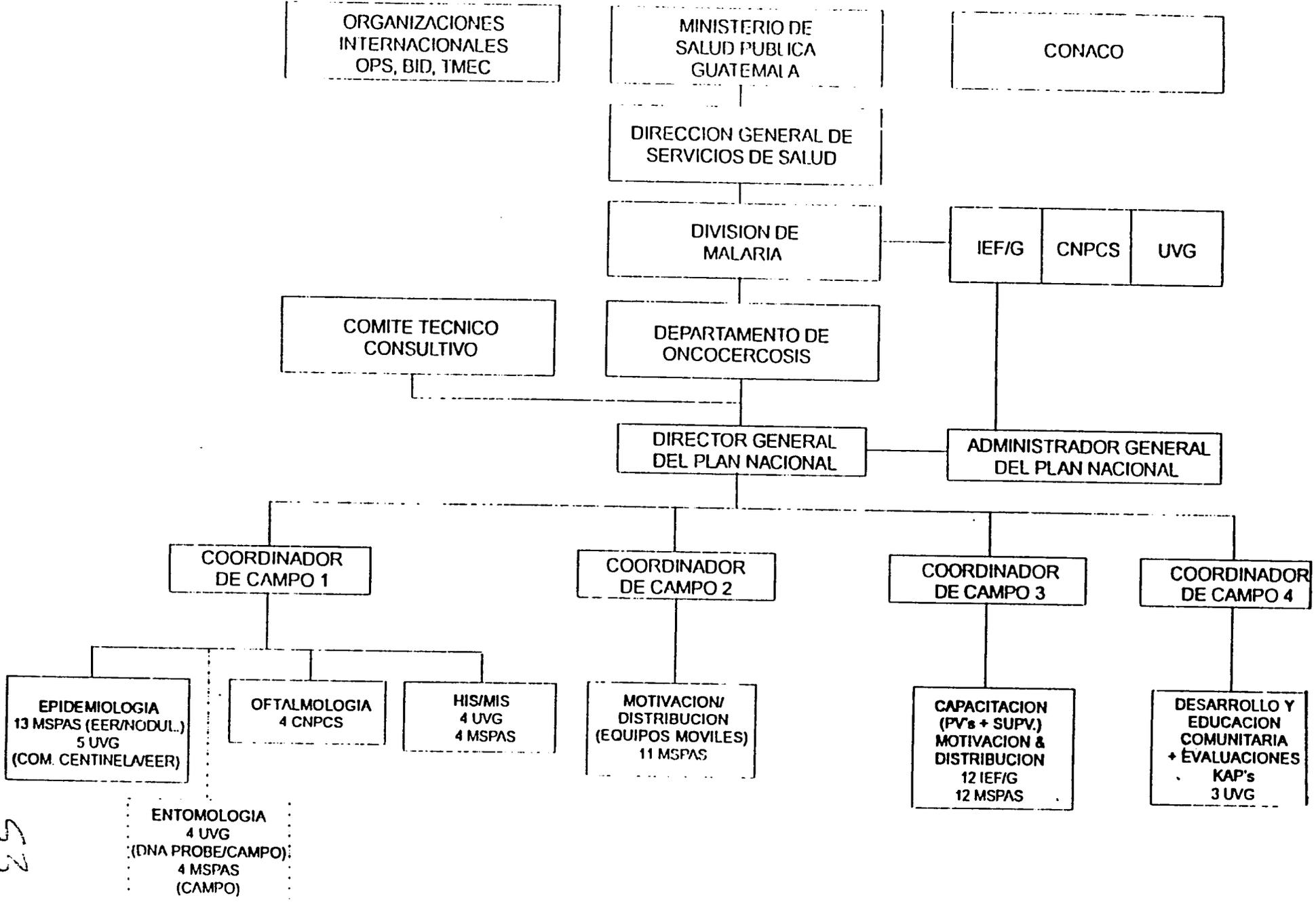
The total staff of the National Plan under the new structure will be reduced. This reduction will reduce the overall cost considerably (compare the two organograms found in Annex D).

Finally, once a distribution schedule has been well established, the promoters will provide other services to the communities. Possible services include deworming with albendazole, Vitamin A capsules, and so forth. Furthermore, a primary eye care component could be included. With the infrastructure available, identifying modest funding for these additional activities should not be too difficult.

ANNEX F

Structure of Onchocerciasis Control in Guatemala

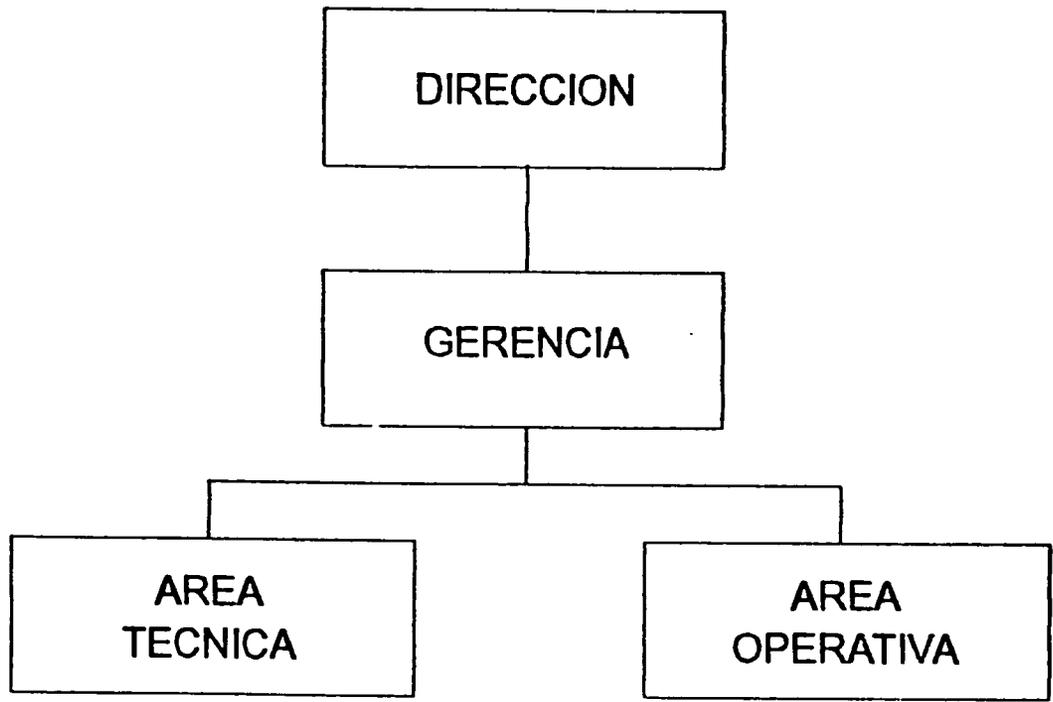
PLAN NACIONAL PARA LA ELIMINACION DE LA ONCOCERCOSIS - GUATEMALA (1993 - 1994)



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PLAN NACIONAL PARA LA ELIMINACION DE LA ONCOCERCOSIS - GUATEMALA
(1994 -)

ORGANIGRAMA FUNCIONAL
(Foco central)



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PLAN NACIONAL PARA LA ELIMINACION DE LA ONCOCERCOSIS - GUATEMALA
(1994 -)

ORGANIGRAMA DE PERSONAL
(Foco central)

DIRECTOR NACIONAL

GERENTE

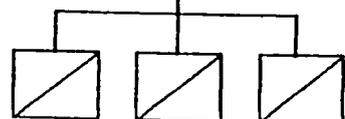
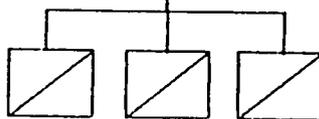
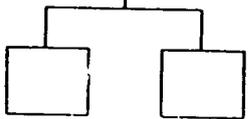
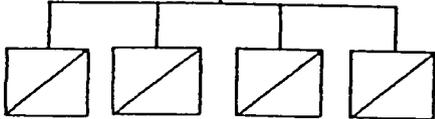
COORDINADOR TECNICO

SUPERVISOR EPI/ENT

SUPERVISOR HIS (GIS)

SUPERVISOR AREA I

SUPERVISOR AREA II



SS

ANNEX G

Annotated Summary of Epidemiologic Studies and H/MIS Activities as Described in IEF's Detailed Implementation Plan

A. Epidemiologic Studies Planned

Epidemiological survey activities will be constant and wide-reaching throughout the project area. Mobile teams will perform the evaluations using three techniques:

1. All communities in the department of Suchitepequez lying between 500-1,500 meters above sea level will be considered "at risk." These are the elevations where the *Simulium ochraceum* vector densities are greatest. All communities at risk will be classified by endemicity; we know of at least 142 such communities in the department of Suchitepequez.

Communities will be epidemiologically classified as follows: First, a thorough review will be made of SNEM data collected over the last five years. After the review, the field visits will then be directed to all communities at risk for which we have no recent epidemiologic information. Visits will also be made to those communities where available data is judged to be incomplete. During the visit, which should last no more than a day in each community at risk, a rapid assessment of onchocerciasis endemicity will be performed, which is described in detail below. This process will be called rapid epidemiological assessments (REAs).

REAs will consist of an examination of a sample consisting of 20-30 males, 15 years of age and above (the so-called "indicator group"). The indices of the REA will be the geometric mean microfilarial density of the indicator group (total microfilarial density-indicator group, or TMFD-IG), the geometric mean microfilarial density of just the positives in the group (positive microfilarial density-indicator group, or PMFD-IG), and the microfilarial prevalence among the indicator group (microfilaria prevalence-indicator group, or MP-IGMP-IG). This team will also perform examinations for nodules, which will be expressed as a percentage figure (nodule prevalence-indicator group, or NP-IG). There are three reasons for limiting the sample to older males: (1) age-sex adjustments are unnecessary to compare results between communities or between treatment rounds, (2) older males are most affected by onchocerciasis, and (3) women are more reluctant to be snipped and examined.

The REAs will be performed by two field workers during late afternoon and evening hours after the men have returned from the fields. The collected skin snips will be placed in microtiter plates, incubated for 24 hours, fixed, and returned to the laboratory at CIET for reading. Skin samples from different communities will be kept separate. Further details on processing of samples are given later in this section. A special form will be completed for each REA and returned weekly to the CIET office.

All communities treated with ivermectin will be evaluated by rapid assessment at least once more over the course of the project. Rapid epidemiological assessments will allow evaluation of program effect on the prevalence and intensity of infections among the population strata most affected by onchocerciasis, adult males.

2. The same team responsible for REAs will also perform school nodule surveys (SNS). These will be completed by visiting schools in communities at risk during school hours and examining the children under 15 years of age for nodules on head and thorax. Children will be asked their age and if they have ever had a nodulectomy; the site of the operation will be confirmed during the

examination. A specialized form will be completed for each SNS and returned weekly to the CIET office. A small talk on *la filaria* should be given in each school visit that focuses on what the nodule is (the adult worm) and introduces the term *microfilaria*. The talk should also mention the transmission cycle of onchocerciasis and the role of ivermectin. The indices produced by the SNS will include age-specific prevalence rates of nodules among all children and among those without a previous history of nodulectomy. These data will be used to evaluate the transmission effect as a result of ivermectin distribution. Although we will probably not see a change in this indicator over the life of the project, SNSs may be invaluable over the long term, and can provide continued surveillance activities through the CHWs, who will be taught the technique in the final year of the project.

3. In-depth surveys will be performed annually during the project in seven meso- and hyperendemic communities (e.g., more than 30 percent of the population skin-biopsy positive). These will be known as the Study Communities (SC). The surveys will strive to examine all individuals for onchocerciasis (e.g., presence of palpable nodules and microfilarial skin densities); evidence of ocular disease (visual acuity test, exam for ocular lesions, and counting of microfilaria in the eye) and dermal disease (physical examination). Given the depth of the studies, surveys of the SCs will require the presence of a laboratory technician and a physician, as well as an ophthalmologic resident or technician. The indices produced by the SCs will include both age-sex standardized and stratified values for community microfilarial load (CMFL), the mean microfilarial load among positives (MMFL), microfilarial prevalence, and nodule prevalence. The SCs will provide data to evaluate the program's effect on morbidity (visual acuity and dermal disease) and transmission (age-specific prevalence rates and incidence among previously negative persons). Other special studies directed to answering important research issues may be undertaken in the SCs using outside funds. In these cases, written protocols must be submitted for review by the participating institutions, ethics committees (when necessary), with final approval by the project director.
4. All biopsy samples will be processed according to standard procedures: skin biopsies (skin-snips) weighing 1-2 milligrams are taken from over the left scapula and left posterior superior iliac crest with a corneo-scleral punch (Holth type; 2.0 mm). Between patients, the instruments are washed sequentially with 2 percent glutaraldehyde, water, and alcohol, and then air dried. Alternatively, instruments may be soaked for 20 minutes in 90 percent alcohol. Skin snips are placed in individual wells of polystyrene microtiter plates, each well containing 0.2 milliliters of RPMI 1640 with antibiotics added. After being incubated for 24 hours at room temperature, two drops of 2 percent formalin were added to each well. In the case of the SCs, after the 24-hour incubation, the snips are removed, and two drops of 2 percent formalin were added to each well. The snips are passed to a corresponding microtiter plate and fixed in Schulz-Key solution. Later they are blotted dry on smooth filter paper and weighed individually on an analytical balance. Microfilaria (Mf) are counted at 100X magnification. Mf counts are expressed per snip in the REAs and both per snip and per milligram in the SCs. Geometric means (mfd) are calculated using the $\log n + 1$ method.

B. Health/Management Information System Activities Planned

A health information system (HIS), management information system (MIS), and geographic information system (GIS) will be developed during the life of the project. All programs and databases will be developed for IBM-compatible microcomputers. These files and programs will help target program resources, delivery services, determine drug coverage, and evaluate the effect of the elimination effort.

To facilitate the process of data collection, Dr. Eckard Kleinau, an expert on health information systems subcontracted by VBC, has developed a set of forms. Of these, 18 were selected by project staff and the Onchocerciasis Program Coordinator of IEF during a meeting in March 1992. It should be noted, however, that these forms are still subject to change, both the number of forms as well as their content. Dr. Kleinau will spend two weeks with the project in April 1992 to provide templates for the forms in the appropriate database (FoxBase). At this point, he and the project staff will make the final decisions about the number and content of the forms.

The processing and analysis of the collected data will be carried out by the UVG in consultation with professionals from the MERTU and Tulane University. The majority of the work for this project will be done on the UVG campus, although an office will be maintained at SNEM during the first year of the project to facilitate retrospective review of MOH files. Data generated by the project and their analyses will be shared with all parties involved in this project.

Activities

1. Review of MOH Service Statistics: We will review the SNEM statistics generated by the nodulectomy brigades going back at least five years (1987-1991). Using a standardized form, we will extract from the MOH records the date of the brigade visit, the community name, municipality, department, population size (by age and sex groupings), number of persons examined during the visit, microfilaria rates in skin snips (when available), and nodule rates. We will also extract counts of microfilaria in skin snips for the first 30 males (aged 15 and above) registered for that community visit. We will then enter into the computer the information recorded on the standard forms and regularly print those files so that the hard copy may be checked against the standard forms for accuracy. The computer file will be an important source of baseline information that will allow evaluation of the ivermectin control program and direct epidemiological and distribution activities and priorities.
2. Ongoing Data Management and Entry System: Once the review of MOH data is completed, routine data entry for the program will be provided to help schedule treatment activities, maintain census, determine coverage and participation rates, and monitor the epidemiological effects of distribution. Access to data will be improved by developing a series of user friendly HIS and MIS programs in collaboration with Dr. Kleinau. We also will evaluate the usefulness of a microcomputer GIS (ATLAS-GIS®) that can directly access data files and dynamically represent activities in operational areas (e.g., local prevalence, transmission indices, and schedules of retreatment). The HIS/GIS applications have already been developed to a great extent by Dr. Frank Richards (MERTU/CDC). He will continue to serve as consultant/advisor to the project in these areas.

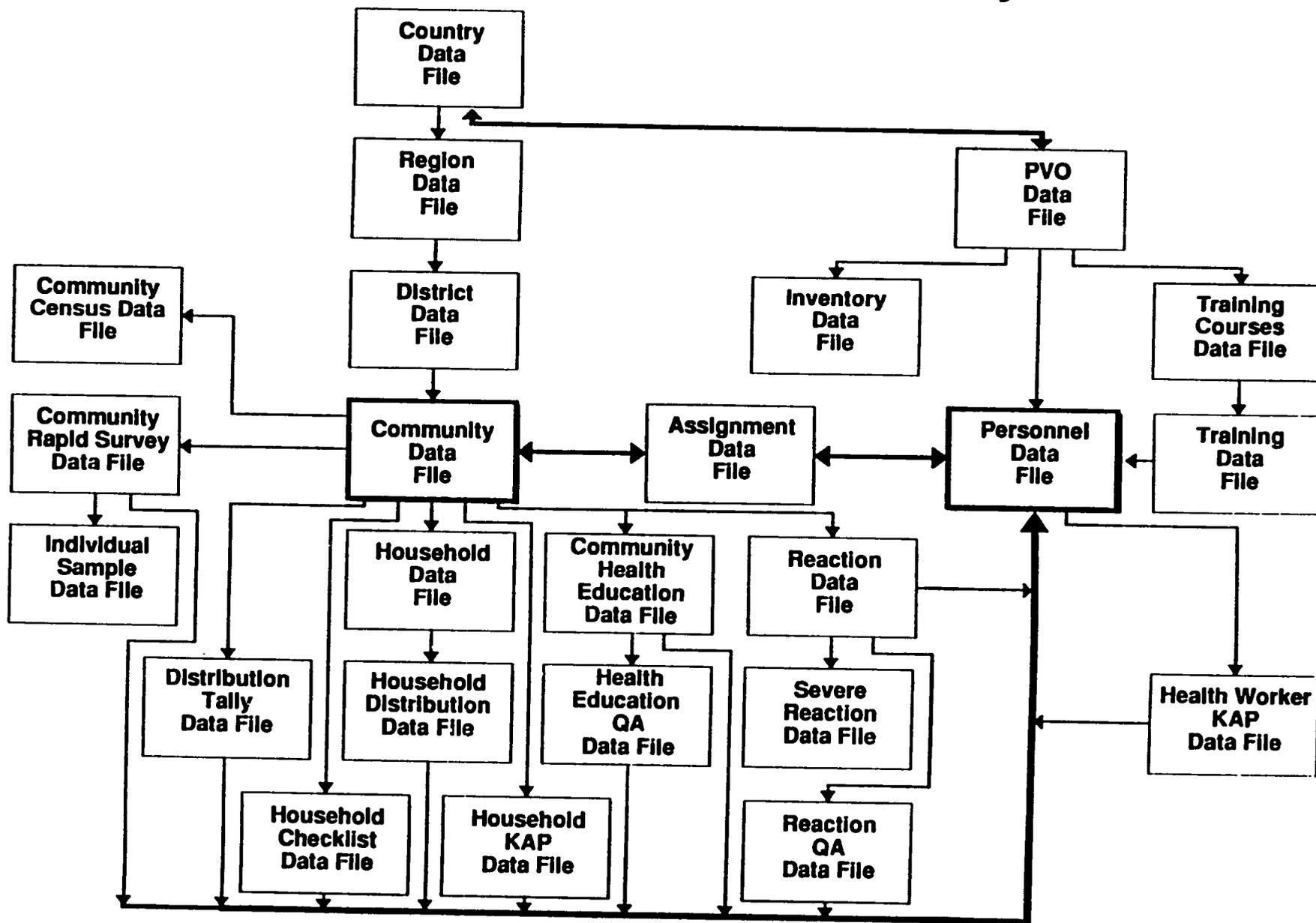
3. **Monitoring and Evaluation:** The project will be monitored on an ongoing basis, and the Project Director will produce monthly reports to the Onchocerciasis Program Coordinator at IEF/Bethesda. The information collected for monitoring and evaluation will include a standard set of indicators, yet to be provided by Dr. Kleinau. These will be determined for each round of treatment. Correlation analyses of these indicators will be possible (when appropriate) between community, mode of distribution (CHWs or mobile teams), and distribution round.

Using the MIS, the Project Field Coordinator will prepare monthly financial reports. Reports to USAID will be provided on a quarterly basis. The format for these has been developed by Dr. Kleinau. In addition to the quarterly reports, the Project Manager will prepare a very detailed annual report in which he will report on past year's activities as well as evaluate the project's achievement of objectives and long-term goals. As for the quarterly reports, Dr. Kleinau developed a format for the annual report. A mid-term project review at the 18-month point and an end-of-project evaluation at the end of three years will be conducted using a team selected by USAID. The implementing parties request that Dr. Guillermo Zea-Flores, former director of the SNEM *Departamento de Enfermedad de Robles*, be invited to participate as an outside evaluator of the program. An economic evaluation will be performed with the assistance of Dr. Kleinau and, possibly, a Tulane health economist, who will assist in developing the conceptual framework (Scope of Work) for an externally funded consultant to address economic issues relevant to onchocerciasis control in the Guatemalan context.

Members of the implementing parties may be associated with the evaluation, and the results will be made accessible to the local organizations who will be able to integrate the results into workplans for a national strategy. Publication, by outside evaluators, of data collected by project information systems, will be forbidden without the written consent of participating parties.

ANNEX H
H/MIS System Using FoxPro®

Ivermectin Delivery Program H/MIS System



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**PROGRAMA DE DISTRIBUCION DE IVERMECTINA
SISTEMA DE INFORMACION COMPUTARIZADO**

Para el Manejo y Evaluación del Programa

IOP-CIS

Versión 1.0 - Abril 1992

**INTERNATIONAL EYE FOUNDATION (IEF)
CENTRO DE ESTUDIOS EN SALUD - UNIVERSIDAD DEL VALLE
GUATEMALA**

Figura 2: Estilo de las ventanas del menú principal y del primer nivel de sub-menús

File	Edit	View	Reports	Graphics	Lists	Options	Help
Open	Browse	Existing report	Tabulate	Prevalence	Locations	Language	PDI-SIC use
Close	Field browser	Sort	Generate	Intensity	Personnel	Configure	HMIS structure
Save	Duplicate	Query	Free report	Coverage	Community	Form text	Indicator
Save As	Replace	Locate			Other	Menu text	About
Backup	Cut ^X	Free query				Select forms	Editor
Print	Copy ^C	Layout of form				Move ^F7	Calculator
Printer	Paste ^V					Size ^F8	Calendar
Export	Recall deleted					Zoom 1 ^F10	Special Characters
Exit	Erase deleted					Zoom 1 ^F9	ASCII Chart

Change options and text of forms

ANEXO 1
PROYECTO ONCOCERCOSIS, SUCHITEPEQUEZ, GUATEMALA
EVALUACION EPIDEMIOLOGICA RAPIDA *

ID LAB: _____

ID MAPA SNEM: _____

ID MAPA UVG : _____

FECHA : ___/___/___

HORA INICIO: _____

LOCALIDAD: _____

MUNICIPIO: _____

DEPARTAMENTO: _____

HORA FINAL: _____

* ADULTOS HOMBRES \geq 15 AÑOS (INCLUYENDO A LOS DE 15 AÑOS)

NOMBRES / APELLIDOS

	EDAD	NACIO AQUI? S/N	AÑOS VIVIR AQUI?	# NODULOS		# PLACA		PARA LLENAR EN LABORATORIO			
				CABEZA	CUERPO	BIOP.1	BIOP.2	# MF		PESQ	
								BIOP.1	BIOP.2	BIOP.1	BIOP.2
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											

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ANNEX I

Announcement of the Mectizan Treatment

**¿ SABIA USTED QUE LA MICROFILARIA ES UNA ENFERMEDAD
MUY DAÑINA QUE ATACA LA VISTA
DEJANDO CIEGAS A LAS PERSONAS ?**

!!! PREVENGALA !!!

**TOME EL MEDICAMENTO MECTIZAN CONTRA LA MICROFILARIA
QUE ESTA DANDO EL MINISTERIO DE SALUD PUBLICA**

COMPLETAMENTE GRATIS

ASISTA CON TODA LA FAMILIA LOS ESPERAMOS

LUGAR: Centro de Salud
FECHA: del 18-7-94 AL 22-7-94

**PROGRAMA PARA LA ELIMINACION DE LA ONCOCERCOSIS
EN EL DEPARTAMENTO DE SUCHITEPEQUEZ**

ANNEX J
Supervision and Quality Control Forms

PLAN NACIONAL PARA LA ELIMINACION DE LA ONCOCERCOSIS EN GUATEMALA

Selección y Evaluación

Promotores Voluntarios

Fecha: ___/___/___ día mes año	Nombre: _____
Localidad: _____	
Municipio: _____	
Departamento: _____	
1. ¿Desde cuándo vive en la comunidad? _____	
2. ¿Qué cargo o puesto desempeña en la comunidad? _____	
3. ¿Sabe qué es la filaria? Si ___ No ___	
4. ¿Sabe cómo se enferma de filaria? Si ___ No ___ Explique: _____ _____	
5. ¿Sabe cómo se llama la enfermedad que produce la filaria? _____ _____	
6. ¿Sabe qué daña? Si ___ No ___ Explique: _____	
7. ¿Sabe si hay alguna medicina para curar la filaria? Si ___ No ___ ¿Cuál? _____	
8. ¿Considera que se curan las personas? Si ___ No ___ ¿Por qué? _____ _____	
9. ¿Considera que la población le da importancia el tener filaria? _____ _____	
10. ¿Qué ha visto que hace la población cuando tiene filaria? _____ _____	
11. ¿Le han dado alguna vez medicina para la filaria? _____	
12. ¿Cómo considera que podría participar la población en el tratamiento de la filaria? _____ _____	
13. ¿Cómo podrían participar las autoridades o representantes de la comunidad en el tratamiento de la filaria? _____ _____	
Observaciones: _____	
Entrevistador: _____	Vo.Bo. Supervisor: _____
Codifica: _____	Fecha: ___/___/___
Ingresa: _____	Fecha: ___/___/___
Verifica: _____	Fecha: ___/___/___

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PLAN NACIONAL PARA LA ELIMINACION DE LA ONCOCERCOSIS EN GUATEMALA

Supervisión

Evaluaciones para Control de Calidad

Fecha: ___/___/___ Nombre: _____
 día mes año

Localidad: _____

Municipio: _____

Departamento: _____

		Si	No
1. ¿Se realiza censo o recenso en la localidad?			
2. ¿Se solicitan documentos de identificación?			
3. ¿Se corroboran los integrantes de la familia?			
4. ¿Hay cambios mayores en los listados actuales?			
5. ¿El brigadista mantiene la capacitación del promotor voluntario?			
6. ¿El brigadista o el promotor voluntario visita a las autoridades?			
7. ¿La explicación dada a las autoridades es satisfactoria?			
8. ¿La relación que existe con las autoridades es buena?			
9. ¿El trato con la comunidad por parte del personal de salud es satisfactoria?			
10. ¿El personal de salud explica sobre la enfermedad, tratamiento y sus posibles reacciones en la visita?			
11. ¿El personal de salud explica a la población en donde encontrar medicina para contrarrestar las reacciones?			
12. ¿Hay higiene por parte del personal de salud para la entrega del medicamento?			
13. ¿Son revisadas las pesas antes de su uso?			
14. ¿Es corroborado el peso de la persona previo a medicarlo?			
15. ¿Son pesados los niños menores de 5 años?			
16. ¿Se toma la temperatura de toda persona que presenta reacciones secundarias?			
17. ¿Las dosis de los tratamientos corresponden a lo establecido?			
18. ¿Las reacciones secundarias son correctamente diagnosticadas?			
19. ¿Considera que su relación con el personal es buena?			
20. ¿El trabajo que usted realiza es del todo satisfactorio?			

Recuento de preguntas contestadas afirmativamente _____ preguntas: Calificación: _____ X 100 =
20

Observaciones: _____

Vo.Bo. Supervisor: _____

Codifica: _____ Fecha: ___/___/___

Ingresa: _____ Fecha: ___/___/___

Verifica: _____ Fecha: ___/___/___

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PLAN NACIONAL PARA LA ELIMINACION DE LA ONCOCERCOSIS EN GUATEMALA

Evaluaciones para Control de Calidad

Promotores de Oncocercosis (Brigadista)

Fecha: ___/___/___ Nombre: _____
día mes año

Localidad: _____

Municipio: _____

Departamento: _____

	Si	No
1. ¿Ha corroborado que el listado sea de la población?		
2. ¿Vuelve a preguntar el nombre completo de la persona?		
3. ¿Vuelve a preguntar la edad de la persona?		
4. ¿Le pregunta a la persona si ha tomado el medicamento (ivermectina) con anterioridad?		
5. ¿Le pregunta a la persona si tiene alguna enfermedad?		
6. ¿Reconfirma quienes son los miembros de la familia?		
7. ¿Explica la importancia de tomar el medicamento (ivermectina)?		
8. ¿Está seguro de la dosis de medicamento (ivermectina) administrada?		
9. ¿Revisa su pesa diariamente?		
10. ¿Explica a las personas sobre las reacciones secundarias?		
11. ¿Informa en dónde buscar auxilio para el tratamiento de las reacciones secundarias?		
12. ¿Está conforme con los casos reportados como ILEGIBLES?		
13. ¿Está conforme con los casos reportados como RENUENTES?		
14. ¿Está conforme con los casos reportados como AUSENTES?		
15. ¿Corroboró los numeros de identificación (ID) por persona?		
16. ¿Cree que el supervisor le ayuda a resolver problemas?		
17. ¿Cree que el coordinador le ayuda a resolver problemas?		
18. ¿Considera que la dirección del Plan Nacional le ayuda en el desempeño adecuado de su trabajo?		
19. ¿Está satisfecho del trabajo realizado?		
20. ¿Cree que el trabajo se puede mejorar?		

Recuento de preguntas contestadas afirmativamente _____ preguntas: Calificación: _____ X 100 =
20

Observaciones: _____

Entrevistador: _____ Vo.Bo. Supervisor: _____

Codifica: _____ Fecha: ___/___/___

Ingresar: _____ Fecha: ___/___/___

Verifica: _____ Fecha: ___/___/___

PLAN NACIONAL PARA LA ELIMINACION DE LA ONCOCERCOSIS EN GUATEMALA

Autoridades Locales

Evaluaciones para Control de Calidad

Fecha: ___/___/___ Nombre: _____
día mes año

Puesto o Cargo: _____

Localidad: _____

Municipio: _____

Departamento: _____

Si | No

- | | | |
|--|--|--|
| 1. ¿Conoce qué es la oncocercosis? | | |
| 2. ¿Conoce al personal de salud (brigadistas) que trabaja actualmente en la localidad? | | |
| 3. ¿Le han visitado antes de entrar a trabajar en la localidad? | | |
| 4. ¿Le han explicado cuál es el trabajo que realizan? | | |
| 5. ¿Le han pedido su colaboración para realizar el trabajo? | | |
| 6. ¿Conoce qué es la filaria? | | |
| 7. ¿Conoce qué es la microfilaria? | | |
| 8. ¿Conoce el nombre del medicamento que ellos administran? | | |
| 9. ¿Sabe qué otros beneficios da el medicamento (ivermectina)? | | |
| 10. ¿Ha tomado el medicamento (ivermectina)? | | |
| 11. ¿Cree que la población acepta a nuestro personal de salud (brigadistas)? | | |
| 12. ¿Le han explicado qué es un promotor voluntario? | | |
| 13. ¿Sabe cuáles son las reacciones secundarias que da el medicamento (ivermectina)? | | |
| 14. ¿Sabe que la enfermedad puede dejar a la persona ciega? | | |
| 15. ¿Considera que nuestra función en la localidad y el tratamiento es importante? | | |
| 16. ¿Está satisfecho con el trabajo del personal de salud (promotores)? | | |
| 17. ¿Cree que la población colaborará mejor cada vez? | | |
| 18. ¿Tomará usted el medicamento la próxima vez? | | |
| 19. ¿Pagaría usted por tomar el medicamento? | | |
| 20. ¿Seguirá colaborando con nosotros? | | |

Recuento de preguntas contestadas afirmativamente _____ preguntas: Calificación: _____ X 100 =
20

Observaciones: _____

Entrevistador: _____ Vo.Bo. Supervisor: _____

Codifica: _____ Fecha: ___/___/___

Ingresa: _____ Fecha: ___/___/___

Verifica: _____ Fecha: ___/___/___

PLAN NACIONAL PARA LA ELIMINACION DE LA ONCOCERCOSIS EN GUATEMALA

Personas de la Localidad

Evaluaciones para Control de Calidad

Fecha: ___/___/___ Nombre: _____
día mes año

Localidad: _____

Municipio: _____

Departamento: _____

	Si	No
1. ¿Conoce a la persona del Ministerio que lo(a) visitó?		
2. ¿Sabe lo que él (ella) está haciendo?		
3. ¿Le informó él (ella) cuánto tiempo va a permanecer en la localidad?		
4. ¿Le ha informado él (ella) qué enfermedad está curando?		
5. ¿Son las personas del Ministerio amables con usted?		
6. ¿Van usted y su familia a escuchar las pláticas que dan?		
7. ¿Está satisfecho (a) con la información que se le dá?		
8. ¿Se comportan bien las personas del Ministerio?		
9. ¿Tomó el medicamento (ivermectina) en esta ocasión?		
10. ¿Cree en lo que el medicamento (ivermectina) cura?		
11. ¿Le explicaron para qué sirve el medicamento (ivermectina)?		
12. ¿Le informaron en dónde podría tomar el medicamento (ivermectina)?		
13. ¿Le dijeron qué reacciones secundarias podría ocasionar el medicamento (ivermectina)?		
14. ¿Le explicaron en dónde podía encontrar tratamiento para las reacciones secundarias que presentara?		
15. ¿Le (la) visitan después de darle el tratamiento?		
16. ¿El tratamiento que le dan es bueno?		
17. ¿Quisiera que el personal que da el medicamento fuera mejor?		
18. ¿Le gustaría a usted ayudar a administrar el medicamento en la comunidad?		
19. ¿Tomaría otra vez el medicamento?		
20. ¿Tomaría su familia otra vez el medicamento?		

Recuento de preguntas contestadas afirmativamente _____ preguntas: Calificación: _____ X 100 =
20

Observaciones: _____

Entrevistador: _____ Vo.Bo. Supervisor: _____

Codifica: _____ Fecha: ___/___/___

Ingresa: _____ Fecha: ___/___/___

Verifica: _____ Fecha: ___/___/___

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PLAN NACIONAL PARA LA ELIMINACION DE LA ONCOCERCOSIS EN GUATEMALA

Evaluaciones para Control de Calidad

Promotores Voluntarios

Fecha: ___/___/___ Nombre: _____
día mes año

Localidad: _____

Municipio: _____

Departamento: _____

	Si	No
1. ¿Ha corroborado que el listado sea de la población?		
2. ¿Vuelve a preguntar el nombre completo de la persona?		
3. ¿Vuelve a preguntar la edad de la persona?		
4. ¿Le pregunta a la persona si ha tomado el medicamento (ivermectina) con anterioridad?		
5. ¿Le pregunta a la persona si tiene alguna enfermedad?		
6. ¿Reconfirma quiénes son los miembros de la familia?		
7. ¿Explica la importancia de tomar el medicamento (ivermectina)?		
8. ¿Está seguro (a) de la dosis de medicamento (ivermectina) administrada?		
9. ¿Revisa su peso diariamente?		
10. ¿Explica a las personas sobre las reacciones secundarias?		
11. ¿Informa en dónde buscar auxilio para el tratamiento de las reacciones secundarias?		
12. ¿Está conforme con los casos reportados como ILEGIBLES?		
13. ¿Está conforme con los casos reportados como RENUENTES?		
14. ¿Está conforme con los casos reportados como AUSENTES?		
15. ¿Corroboró los numeros de identificación (ID) por persona?		
16. ¿Considera que el promotor de oncocercosis (brigadista) le ayuda en el desempeño adecuado de su trabajo?		
16. ¿Cree que el supervisor le ayuda a resolver problemas?		
17. ¿Cree que el coordinador le ayuda a resolver problemas?		
19. ¿Está usted satisfecho (a) del trabajo realizado?		
20. ¿Cree que el trabajo se puede mejorar?		

Recuento de preguntas contestadas afirmativamente _____ preguntas: Calificación: _____ X 100 =
20

Observaciones: _____

Entrevistador: _____ Vo.Bo. Supervisor: _____

Codifica: _____ Fecha: ___/___/___

Ingresa: _____ Fecha: ___/___/___

Verifica: _____ Fecha: ___/___/___

PLAN NACIONAL PARA LA ELIMINACION DE LA ONCOCERCOSIS EN GUATEMALA

RENDIMIENTO PERSONAL - PROMOTOR ONCOCERCOSIS

Nombre: _____ Brigada # _____

Fecha período de evaluación: del día / mes / año al día / mes / año

Localidades trabajadas: _____

	Día de la semana	L	M	M	J	V
Area personal						
Puntualidad						
Vocabulario						
Higiene						
Area administrativa						
Manejo de papelería						
Manejo de ivermectina						
Manejo de medicamentos contra reacciones						
Colaboración a realizar programación de actividades						
Tratamiento activo						
Tratamiento pasivo						
Area comunitaria						
Relación interpersonal						
Relación con la comunidad						
Relación con el promotor voluntario						
Relación con el supervisor						
Relación con el coordinador						

E:\FLW\EF\RENDPERS.PRE
25.09.93 RZ/BM

Formulario 3.3.6

Observaciones: _____

A = Muy Bueno B = Bueno C = Aceptable D = Deficiente E = Malo X = No Evaluado I = Inasistencia

Firma Supervisor

Firma Coordinador

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ANNEX K

Scope of Work for the Evaluation

SCOPE OF WORK

FINAL EXTERNAL EVALUATION OF THE IVERMECTIN DELIVERY PROGRAM OF THE INTERNATIONAL EYE FOUNDATION: SUCHITEPEQUEZ PROVINCE, GUATEMALA

July 6, 1994

BACKGROUND

A. Overview

USAID's Ivermectin Delivery Program (IDP) is a three year pilot program in select countries of Africa and Latin America that are endemic for onchocerciasis. The purpose of the program is to assess the feasibility of using USA-based private and voluntary organizations (PVOs) to strengthen the institutional capacity of indigenous health systems to provide cost-effective and sustainable delivery of ivermectin for the prevention or control of onchocerciasis.

The Foreign Assistance Appropriations Act for FY91 earmarked \$5 million of the health account for activities relating to the control, prevention and eradication of river blindness, or onchocerciasis. The Conference Committee Report suggested that a portion of these funds be provided to PVOs to distribute the drug ivermectin (mectizan ®), a more effective and safe new treatment for onchocerciasis donated by Merck & Co. \$2.5 million of this allocation was intended for use in a USAID-supported Ivermectin Delivery Program established in 1991. The IDP is a collaborative effort involving PVOs, related host national institutions, USAID country missions and the Office of Health (USAID/G/HN). The PVO is responsible for implementing the IDP within the framework of the host country's national onchocerciasis program. Program management and oversight is the responsibility of the USAID mission, except in Guatemala which is managed directly by USAID/G/HN. There are an additional five programs located in the African countries of Nigeria, Cameroon, Niger and Burkina Faso, all of which have comparable EOP dates.

The IDP was designed to provide support and technical guidance for PVOs to develop and implement a sustainable delivery system for ivermectin in collaboration with local institutions. The intent of the program is to integrate specific activities into the existing health care system, and in the process to strengthen the local capacity to deliver sustainable health care, particularly in rural environments. The pilot nature of this program is an effort to test this as a model for an integrated and sustainable program using the PVO as the

pivotal means to transfer the requisite technical and managerial expertise to build such capacity within local institutions. The primary challenge for the PVO rests in establishing the program within the existing health care system. The PVO works collaboratively with host government institution in the development and implementation of the project workplan: conducting the initial baseline assessments, determining the appropriate mode of drug delivery, initiating the training of personnel and IEC component, and setting up the management/health information system to monitor project progress and to identify early prospective problems. The workplan should also reflect a steady increase in local institutional capacity for managing the program. Thus, at the conclusion of the pilot project, local effort should be the major driving force in sustaining the program.

B. Guatemala

The long term goal of the program in Guatemala is unique among USAID-supported IDPs in that it focuses not only on control but also the eradication of onchocerciasis through mass treatment of people living in endemic areas with ivermectin. There are an estimated 400,000 people living in endemic areas for onchocerciasis in Guatemala. Of these, approximately 50,000 are thought to be infected. The aim of the project is to establish an effective, safe and locally sustainable health service delivery model for the bi-annual distribution of ivermectin in endemic communities, which can be replicated on a national scale in order to reduce the prevalence of onchocerciasis and eventually interrupt transmission of the disease.

In Guatemala, this project is being implemented by the USA-based PVO, the International Eye Foundation, and executed in direct collaboration with the National Committee for the Blind and Deaf of Guatemala and the Onchocerciasis Control Division in the National Malaria Eradication Service (SNEM) of the Ministry of Health. The project is based in the Department of Suchitepequez. This department had an original population estimate of 40,000 people dispersed in 117 localities among 5 municipalities.

PURPOSE OF THE EVALUATION

The purpose of this evaluation is to determine whether the project goal and objectives will have been met by the end of the project both specifically and in the larger context, and to provide a synthesis of lessons learned in the process which may contribute toward the development and implementation of the bi-national plan for elimination of onchocerciasis in Guatemala and Mexico, other programs in the Latin American region, and the USAID-supported ivermectin delivery program in general. This should include an assessment of the sustainability of this particular model, and its potential for replicability on a national scale. Included in this evaluation should be an assessment of the

progress made toward these ends by IEF in concert with its designated collaborating institutions: SNEM, NCDB, UVG, and TUSPH&TM.

TASKS

The evaluation team will:

1. Read background material on the project.
2. Prepare a detailed workplan outlining the evaluation methodology, and approach to the evaluation. (This has been drafted by Dr. Chip Oliver)
3. Participate in a one day team planning meeting at the EHP office on July 15, 1994.
4. Present a preliminary evaluation report outline and in-country workplan to AID and EHP staff in a one hour briefing to be scheduled on the afternoon of the team planning meeting.
5. Travel to Guatemala to meet with project officials and carry out the evaluation. The evaluation will be carried out according to the detailed workplan to be developed by the team prior to departure.
6. Provide a debriefing to USAID/Guatemala on evaluation findings if so requested.
7. Finalize the written report addressing all the specific elements outlined in the evaluation workplan. Submit the final draft of the evaluation document to the activity manager within 10 days of the end of the on-site evaluation.
8. Conduct a debriefing of the lessons learned and evaluation outcome to USAID Washington and interested parties within 10 days of submission of the completed evaluation report.

SCHEDULE

June 1994	Finalize Scope of Work and team composition
	Request and review needed documents
July 15 1994	Conduct team planning meeting in Washington
July 18 - 31 1994	Conduct field interviews and evaluation in Guatemala

ANNEX L
Calendar of Activities for the Evaluation

**EXTERNAL EVALUATION OF THE PROJECT
"MASS DISTRIBUTION OF IVERMECTIN FOR THE CONTROL OF ONCHOCERCIASIS
IN THE DEPARTMENT OF SUCHIITEPEQUEZ, GUATEMALA"
(AID/IEF/NCBD/SNEM/UVG)**

18 - 29 JULY, 1994
GUATEMALA

OVERALL AGENDA

MONDAY JULY 18	TUESDAY JULY 19	WEDNESDAY JULY 20	THURSDAY JULY 21	FRIDAY JULY 22	SATURDAY JULY 23
<p>MEETINGS:</p> <p>08:30 - 11:00 IEF/G</p> <p>PURPOSE OF EVALUATION</p> <p>MEETINGS:</p> <p>12:30 - 13:30 UVG</p>	<p>MEETINGS:</p> <p>08:00 - 09:30 GCBD</p> <p>PRESENTATION NATIONAL PLAN:</p> <p>10:30 - 12:30 UVG Onchocerciasis Activities Mobile Distribution Teams</p>	<p>06:30 - Departure to the field: Hotel Santiaguito, Sta. Lucía Cotzumalguapa</p> <p>FIELD TRIP: Mobile Distribution Teams</p> <p>10:30 - Finca Mirandilla, Pochuta (sentinel community)</p>	<p>FIELD TRIP: Rapid Epidemiologic Assessment & Health Education - Treatment</p> <p>09:30 - Cabecera Municipal de Patulul</p> <p>CHW's Training:</p> <p>11:00 - Finca Santa Elena Sinacá Colonia Luisiana</p>	<p>FIELD TRIP: Health Education & CHW's Training - Treatment</p> <p>11:00 - Aldea La Estrellita Finca Panajabal (sentinel communities)</p>	
<p>MEETINGS:</p> <p>14:00 - 16:00 MOH Malaria Division</p> <p>16:30 - 17:30 PAHO</p>	<p>PRESENTATION NATIONAL PLAN (cont.):</p> <p>14:00 - 15:30 UVG Health Education, CIHW's Training, Evaluations</p> <p>15:30 - 16:30 UVG Epidemiology Treatment & Coverage</p>	<p>14:00 - Cabecera Municipal de San Juan Bautista</p> <p>18:00 - Hotel Santiaguito, Sta. Lucía Cotzumalguapa</p>	<p>CHW's Training (cont.)</p> <p>15:00 - Finca Los Tarrales Finca La Ermita</p> <p>18:30 - Hotel Santiaguito, Sta. Lucía Cotzumalguapa</p>	<p>14:00 - Return from field</p> <p>MEETINGS:</p> <p>16:30 OEPA Headquarters Antigua Guatemala</p>	

IEF/G = International Eye Foundation/Guatemala

MOH = Guatemalan Ministry of Health

MERTU/G = Medical Entomology Research & Training Unit/Guatemala

GCBD = Guatemalan Committee for the Blind & Deaf

UVG = Universidad del Valle de Guatemala

PAHO = Panamerican Health Organization

USAID = US Agency for International Development

CHW's = Community Health Workers

**EXTERNAL EVALUATION OF THE PROJECT
 "MASS DISTRIBUTION OF IVERMECTIN FOR THE CONTROL OF ONCHOCERCIASIS
 IN THE DEPARTMENT OF SUCHTEPEQUEZ, GUATEMALA"
 (AID/IEF/NCBD/SNEM/UVG)**

18 - 29 JULY, 1994
 GUATEMALA

OVERALL AGENDA

MONDAY JULY 25	TUESDAY JULY 26	WEDNESDAY JULY 27	THURSDAY JULY 28	FRIDAY JULY 29	SATURDAY JULY 30
MEETINGS: Individual Meetings with Field Coordinators 09:00 - 10:00 Dr. Zea UVG Field Personnel 10:00 - 11:00 PRESENTATION H/MIS: 11:00 - 13:00 UVG	OTHER ACTIVITIES: (To be determined based on findings of previous week) Individual Meetings with Field Coordinators 09:00 - 10:00 Dr. Castro 11:00 - 12:00 Dr. Luján	REPORT WRITING	REPORT WRITING (08:00 - 12:00 Symposium "Tropical Diseases in Latin America" II International Congress of Tropical Diseases JICA/MOH/USAC Guatemala)	REPORT WRITING	
MEETINGS: 14:30 - 15:30 USAID PROJECT MANAGEMENT & ACCOUNTING SYSTEMS: 16:30 - 18:00 UVG	MEETINGS: 14:00 - 14:30 MERTU/G PRESENTATION GIS: 14:30 - 16:00 UVG & MERTU/G	REPORT WRITING	MEETINGS: 16:00 - 17:00 MOH Minister of Health Dr. Gustavo Hernández Polanco	REPORT WRITING	

JICA = Japanese International Cooperation Agency

USAC = Universidad de San Carlos de Guatemala

H/MIS = Health/Management Information Systems

GIS = Geographic Information Systems

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ANNEX M
Populations at Risk

"PLAN NACIONAL PARA LA ELIMINACION DE LA ONCOCERCOSIS EN GUATEMALA"
POBLACION TOTAL ESTIMADA A RIESGO E INFECTADA POR DEPARTAMENTO

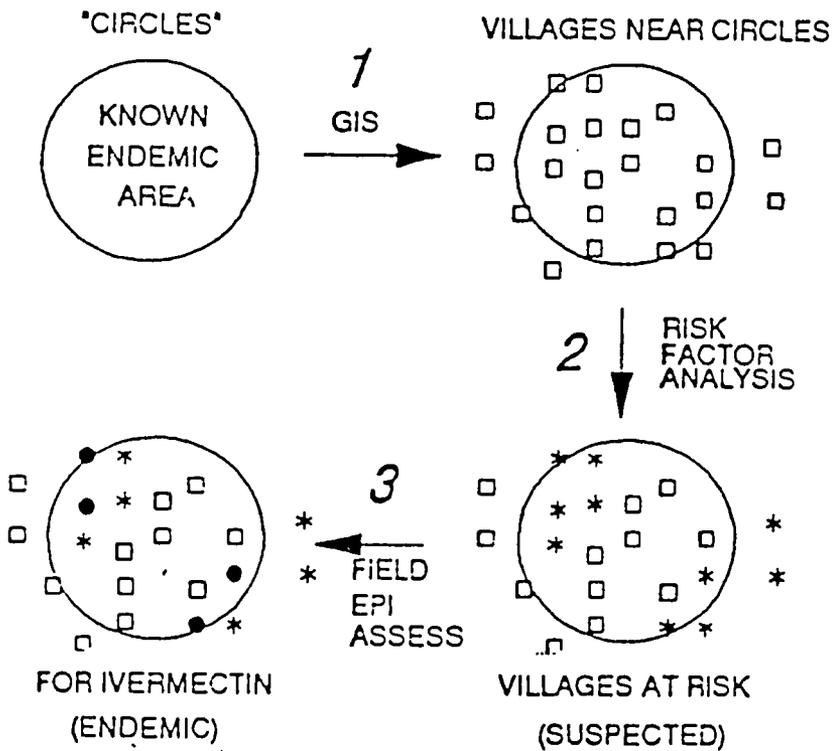
El número de localidades, población total a riesgo y estimada infectada está basada de acuerdo a los datos obtenidos de las evaluaciones epidemiológicas en las localidades de las áreas oncocercosas en la República de Guatemala, por las brigadas de diagnóstico del Departamento de - - Enfermedad de Robles (Oncocercosis), durante los años 1990 a 1992.

DEPARTAMENTO	No. DE LOCALIDADES EXISTENTES EN EL AREA ONCOCERCOSA	POBLACION EN RIESGO	POBLACION ESTIMADA INFECTADA			
			BIOPSIA		NODULOS	
			#	%	#	%
Guatemala	11	10586	444	4.2	222	2.1
Chimaltenango	140	48615	16577	34.1	9239	19
Escuintla	118	154324	4475	2.9	1697	1.1
Santa Rosa	9	62032	0	0	62	0.1
Sololá	29	11495	3609	31.4	1391	12.1
Suchitepéquez	151	83836	15090	18	8132	9.7
Huehuetenango	94	61799	494	0.8	1359	2.2
* San Marcos	7	5490	66	1.2	104	1.9
TOTAL	559	438177	40755	9.3	22206	5.1

* Pendiente de realizar Evaluacion Epidemiológica y Entomológica a Profundidad

Figure 1

THREE STEPS TO ASSESS A FOCUS OF ONCHOCERCIASIS IN LATIN AMERICA



BEST AVAILABLE COPY

Altitude (mts)

- 0 to 500
- 500 to 1500
- 1500 to 4000

GUATEMALA

Communities at risk

GUATEMALA

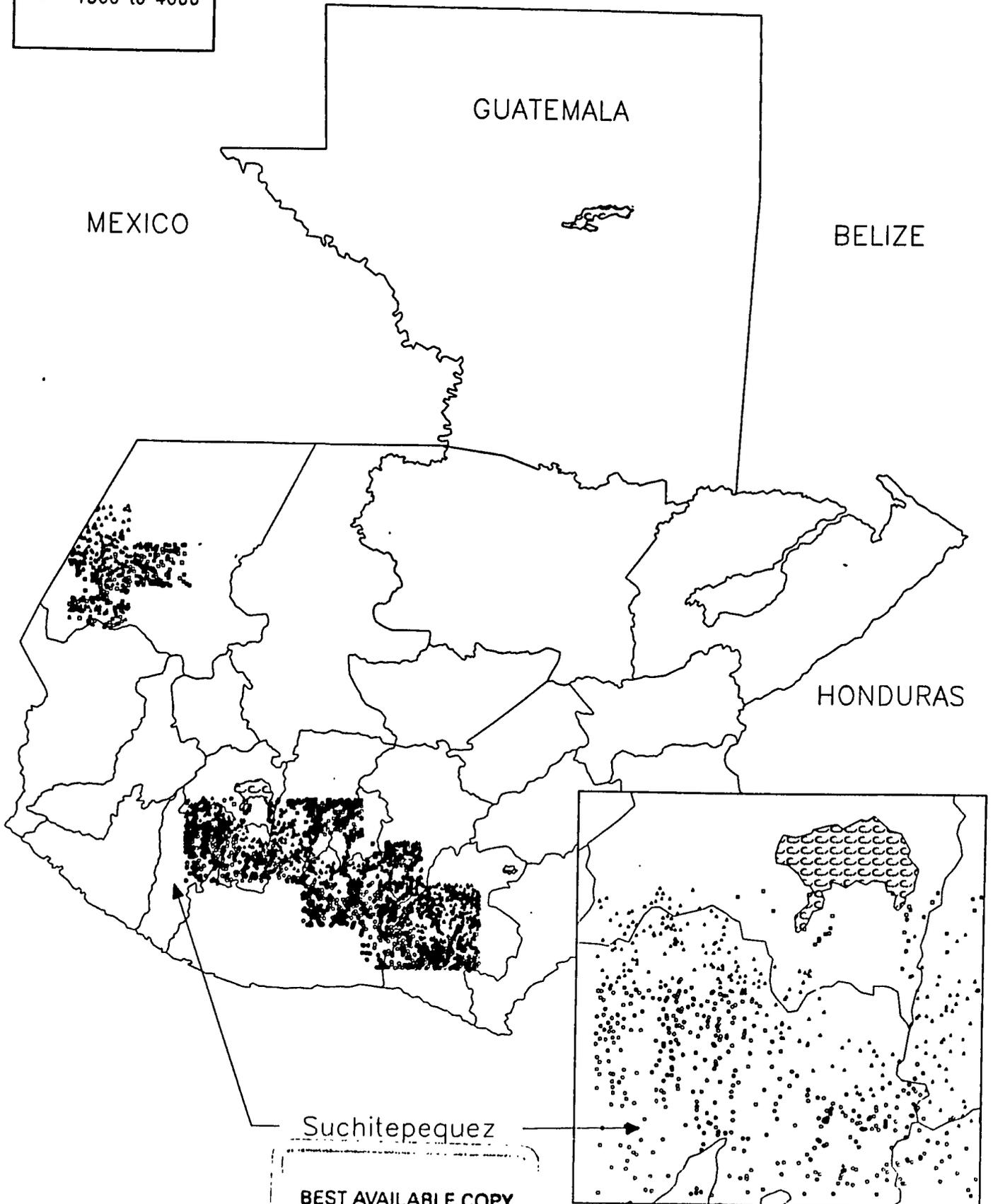
MEXICO

BELIZE

HONDURAS

Suchitepequez

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Departamento de Suchitepequez
Reporte de Biopsias

Nombre de la Localidad	Año	Pob. Tot.	Tot Exam	% Tot Exam	Total (+)	% Total (+)	≥ 15 años	Biops. (+)	% Biops. (+)	CNFL (+/-)	MMFL (+)	≤ 5 años	Biops. (+)	% Biops. (+)	CNFL (+/-)	M. (+)
Municipio de: Patulul																
No. de ID -> 2533																
FINCA SANTA CRISTINA	1986	105	-1	-1.00	0	0.00	4	-1	-1.00	-1.00	-1.00	1	-1	-1.00	-1.00	-1.00
FINCA SANTA CRISTINA	1988	105	76	72.38	0	0.00	2	-1	-1.00	-1.00	-1.00	0	-1	-1.00	-1.00	-1.00
FINCA SANTA CRISTINA	1989	88	54	61.36	9	16.67	14	8	57.14	1.14	2.79	11	1	9.09	0.04	0.5
FINCA SANTA CRISTINA	1990	95	33	34.74	0	0.00	16	0	0.00	0.00	0.00	1	0	0.00	0.00	0.0
FINCA SANTA CRISTINA	1991	112	48	42.86	0	0.00	4	-1	-1.00	-1.00	-1.00	0	-1	-1.00	-1.00	-1.00
FINCA SANTA CRISTINA S.A.	1992	120	4	3.33	1	25.00	4	1	25.00	0.11	0.50	0	-1	-1.00	-1.00	-1.00
No. de ID -> 2534																
FINCA SAN AGUSTIN	1986	466	-1	-1.00	0	0.00	1	-1	-1.00	-1.00	-1.00	1	-1	-1.00	-1.00	-1.00
FINCA SAN AGUSTIN	1988	466	96	20.60	0	0.00	10	-1	-1.00	-1.00	-1.00	0	-1	-1.00	-1.00	-1.00
FINCA SAN AGUSTIN	1989	526	195	37.07	17	8.72	30	16	53.33	3.08	12.93	20	1	5.00	0.02	0.5
FINCA SAN AGUSTIN	1990	460	158	34.35	21	13.29	29	20	68.97	4.21	9.96	16	1	6.25	0.22	23.0
FINCA SAN AGUSTIN	1991	530	152	28.68	0	0.00	8	-1	-1.00	-1.00	-1.00	2	-1	-1.00	-1.00	-1.00
FINCA SAN AGUSTIN	1992	688	30	4.36	13	43.33	30	13	43.33	1.85	10.22	0	-1	-1.00	-1.00	-1.00
No. de ID -> 2553																
FINCA MONTE MARIA	1986	34	34	100.00	0	0.00	0	-1	-1.00	-1.00	-1.00	0	-1	-1.00	-1.00	-1.00
FINCA MONTE MARIA	1989	30	21	70.00	3	14.29	7	3	42.86	1.52	7.65	5	0	0.00	0.00	0.0
FINCA MONTE MARIA	1990	33	21	63.64	1	4.76	7	1	14.29	0.40	9.50	3	0	0.00	0.00	0.0
FINCA MONTE MARIA	1991	55	40	75.47	0	0.00	3	-1	-1.00	-1.00	-1.00	0	-1	-1.00	-1.00	-1.00
FINCA MONTE MARIA	1992	43	9	20.93	0	0.00	9	0	0.00	0.00	0.00	0	-1	-1.00	-1.00	-1.00
No. de ID -> 2554																
FINCA LA ERMITA	1986	313	-1	-1.00	0	0.00	3	-1	-1.00	-1.00	-1.00	2	-1	-1.00	-1.00	-1.00
FINCA LA ERMITA	1988	313	143	45.69	0	0.00	6	-1	-1.00	-1.00	-1.00	0	-1	-1.00	-1.00	-1.00
FINCA LA ERMITA	1989	324	104	32.10	4	3.85	30	4	13.33	0.39	10.51	3	0	0.00	0.00	0.0
FINCA LA ERMITA	1990	271	101	37.27	13	12.87	30	13	43.33	1.66	8.53	5	0	0.00	0.00	0.0
FINCA LA ERMITA	1991	300	203	67.67	0	0.00	4	-1	-1.00	-1.00	-1.00	1	-1	-1.00	-1.00	-1.00
FINCA LA ERMITA	1992	225	14	6.22	5	35.71	14	5	35.71	0.88	4.86	0	-1	-1.00	-1.00	-1.00
No. de ID -> 2556																
FINCA SANTA ISABEL	1986	185	-1	-1.00	0	0.00	2	-1	-1.00	-1.00	-1.00	1	-1	-1.00	-1.00	-1.00
FINCA SANTA ISABEL	1988	185	74	40.00	0	0.00	1	-1	-1.00	-1.00	-1.00	0	-1	-1.00	-1.00	-1.00
FINCA SANTA ISABEL	1989	325	125	38.46	0	0.00	7	-1	-1.00	-1.00	-1.00	0	-1	-1.00	-1.00	-1.00
FINCA SANTA ISABEL	1990	258	26	10.08	0	0.00	4	-1	-1.00	-1.00	-1.00	2	-1	-1.00	-1.00	-1.00
FINCA SANTA ISABEL	1991	131	44	33.59	0	0.00	2	-1	-1.00	-1.00	-1.00	0	-1	-1.00	-1.00	-1.00
FINCA SANTA ISABEL	1992	129	12	9.30	11	91.67	12	11	91.67	5.76	7.94	0	-1	-1.00	-1.00	-1.00
No. de ID -> 2559																
CABECERA MUNICIPAL BARRIO EL TRIUNFO III	1992	25000	3	0.01	0	0.00	3	0	0.00	0.00	0.00	0	-1	-1.00	-1.00	-1.00
CABECERA MUNICIPAL BARRIO EL TRIUNFO IV	1992	25000	4	0.02	0	0.00	4	0	0.00	0.00	0.00	0	-1	-1.00	-1.00	-1.00
CABECERA MUNICIPAL PATULUL SECTOR I	1992	25000	27	0.11	0	0.00	27	0	0.00	0.00	0.00	0	-1	-1.00	-1.00	-1.00
CABECERA MUNICIPAL PATULUL BARRIO SAN PE	1992	25000	20	0.08	0	0.00	20	0	0.00	0.00	0.00	0	-1	-1.00	-1.00	-1.00

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Departamento de Suchitepequez
Reporte de Modulos

Nombre de la Localidad	Año	Pob. Tot.	Tot Exam	% Tot Exam	Total (+)	% Tot (+)	≥ 15 años	Modulos (+)	% Mod. (+)	≤ 5 años	Modulos (+)	% Mod. (+)
------------------------	-----	-----------	----------	------------	-----------	-----------	-----------	-------------	------------	----------	-------------	------------

Municipio de: Patulul

No. de ID -> 2533

FINCA SANTA CRISTINA	1986	105	-1	-1.00	6	0.00	4	4	100.00	1	1	100.00
FINCA SANTA CRISTINA	1988	105	76	72.38	2	2.63	2	2	100.00	0	0	0.00
FINCA SANTA CRISTINA	1989	88	54	61.36	4	7.41	14	0	0.00	11	1	9.09
FINCA SANTA CRISTINA	1990	95	33	34.74	2	6.06	16	0	0.00	1	0	0.00
FINCA SANTA CRISTINA	1991	112	48	42.86	4	8.33	4	4	100.00	0	0	0.00
FINCA SANTA CRISTINA S.A.	1992	120	4	3.33	0	0.00	4	0	0.00	0	0	0.00

No. de ID -> 2534

FINCA SAN AGUSTIN	1986	466	-1	-1.00	5	0.00	1	1	100.00	1	1	100.00
FINCA SAN AGUSTIN	1988	466	96	20.60	16	16.67	10	10	100.00	0	0	0.00
FINCA SAN AGUSTIN	1989	526	195	37.07	51	26.15	30	9	30.00	20	6	30.00
FINCA SAN AGUSTIN	1990	460	158	34.35	33	20.89	29	7	24.14	16	4	25.00
FINCA SAN AGUSTIN	1991	530	152	28.68	33	21.71	8	8	100.00	2	2	100.00
FINCA SAN AGUSTIN	1992	688	30	4.36	2	6.67	30	3	10.00	0	0	0.00

No. de ID -> 2553

FINCA MONTE MARIA	1986	34	34	100.00	0	0.00	-1	-1	-1.00	-1	-1	-1.00
FINCA MONTE MARIA	1989	30	21	70.00	2	9.52	7	1	14.29	5	0	0.00
FINCA MONTE MARIA	1990	33	21	63.64	0	0.00	7	0	0.00	3	0	0.00
FINCA MONTE MARIA	1991	53	40	75.47	4	10.00	3	3	100.00	0	0	0.00
FINCA MONTE MARIA	1992	43	9	20.93	2	22.22	9	3	33.33	0	0	0.00

No. de ID -> 2554

FINCA LA ERMITA	1986	313	-1	-1.00	9	0.00	3	3	100.00	2	2	100.00
FINCA LA ERMITA	1988	313	143	45.69	16	11.19	6	6	100.00	0	0	0.00
FINCA LA ERMITA	1989	324	104	32.10	9	8.65	30	2	6.67	3	2	66.67
FINCA LA ERMITA	1990	271	101	37.27	7	2.58	20	0	0.00	0	0	0.00
FINCA LA ERMITA	1991	300	203	67.67	22	10.84	4	4	100.00	1	1	100.00
FINCA LA ERMITA	1992	225	14	6.22	0	0.00	14	0	0.00	0	0	0.00

No. de ID -> 2556

FINCA SANTA ISABEL	1986	185	-1	-1.00	9	0.00	2	2	100.00	1	1	100.00
FINCA SANTA ISABEL	1988	185	74	40.00	28	37.84	1	1	100.00	0	0	0.00
FINCA SANTA ISABEL	1989	325	125	38.46	14	11.20	7	7	100.00	0	0	0.00
FINCA SANTA ISABEL	1990	253	26	10.28	15	57.69	4	4	100.00	2	2	100.00
FINCA SANTA ISABEL	1991	131	44	33.59	11	25.00	2	2	100.00	0	0	0.00
FINCA SANTA ISABEL	1992	129	12	9.30	8	66.67	12	8	66.67	0	0	0.00

No. de ID -> 2559

CABECERA MUNICIPAL BARRIO EL TRIUNFO III	1992	25000	3	0.01	0	0.00	3	0	0.00	0	0	0.00
CABECERA MUNICIPAL BARRIO EL TRIUNFO IV	1992	25000	4	0.02	0	0.00	4	0	0.00	0	0	0.00
CABECERA MUNICIPAL PATULUL SECTOR I	1992	25000	27	0.11	1	3.70	27	1	3.70	0	0	0.00
CABECERA MUNICIPAL PATULUL BARRIO SAN PE	1992	25000	20	0.08	3	15.00	20	3	15.00	0	0	0.00

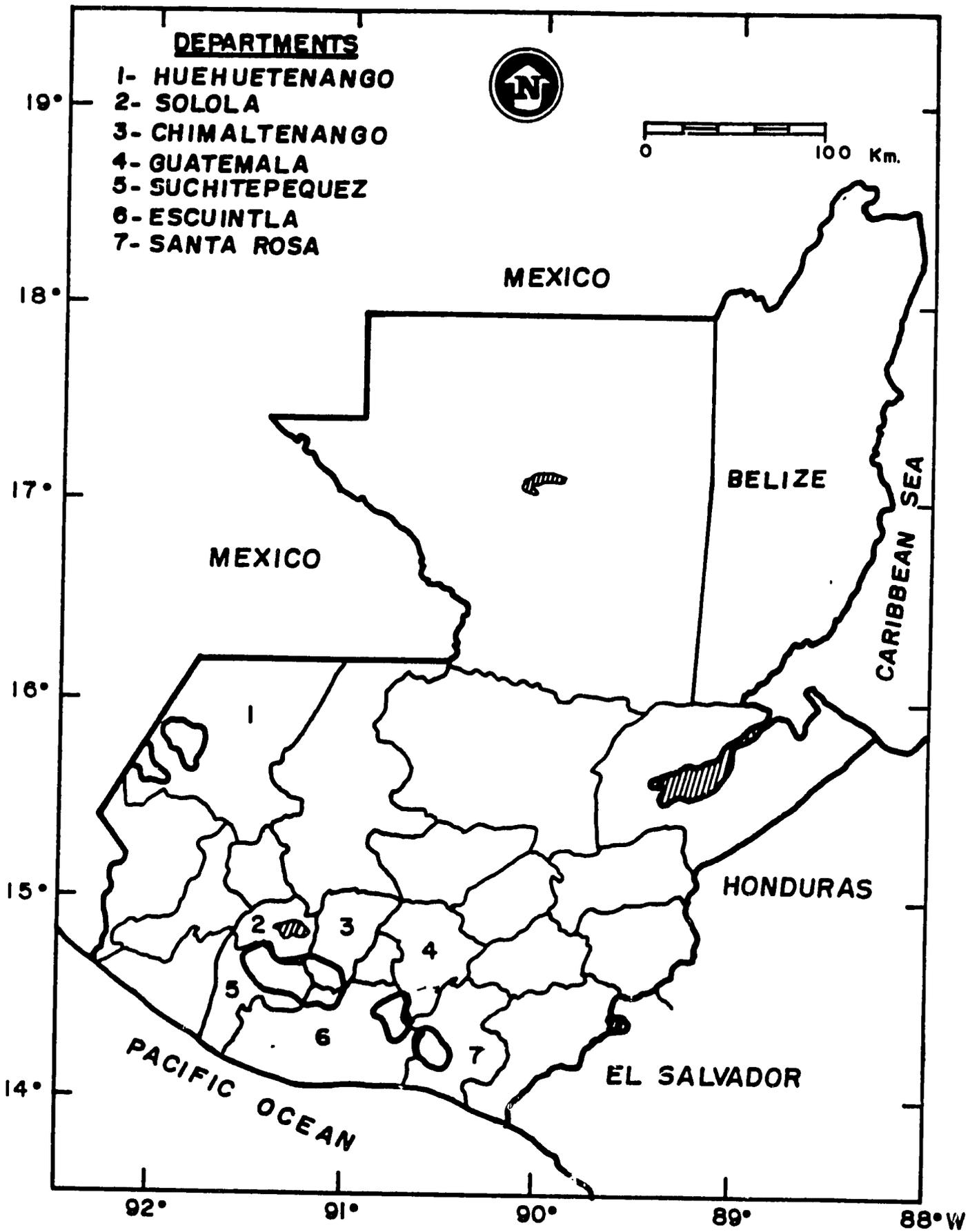
BEST AVAILABLE COPY

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ANNEX N
Maps of Guatemala



Base 504916 (547180) 2-82

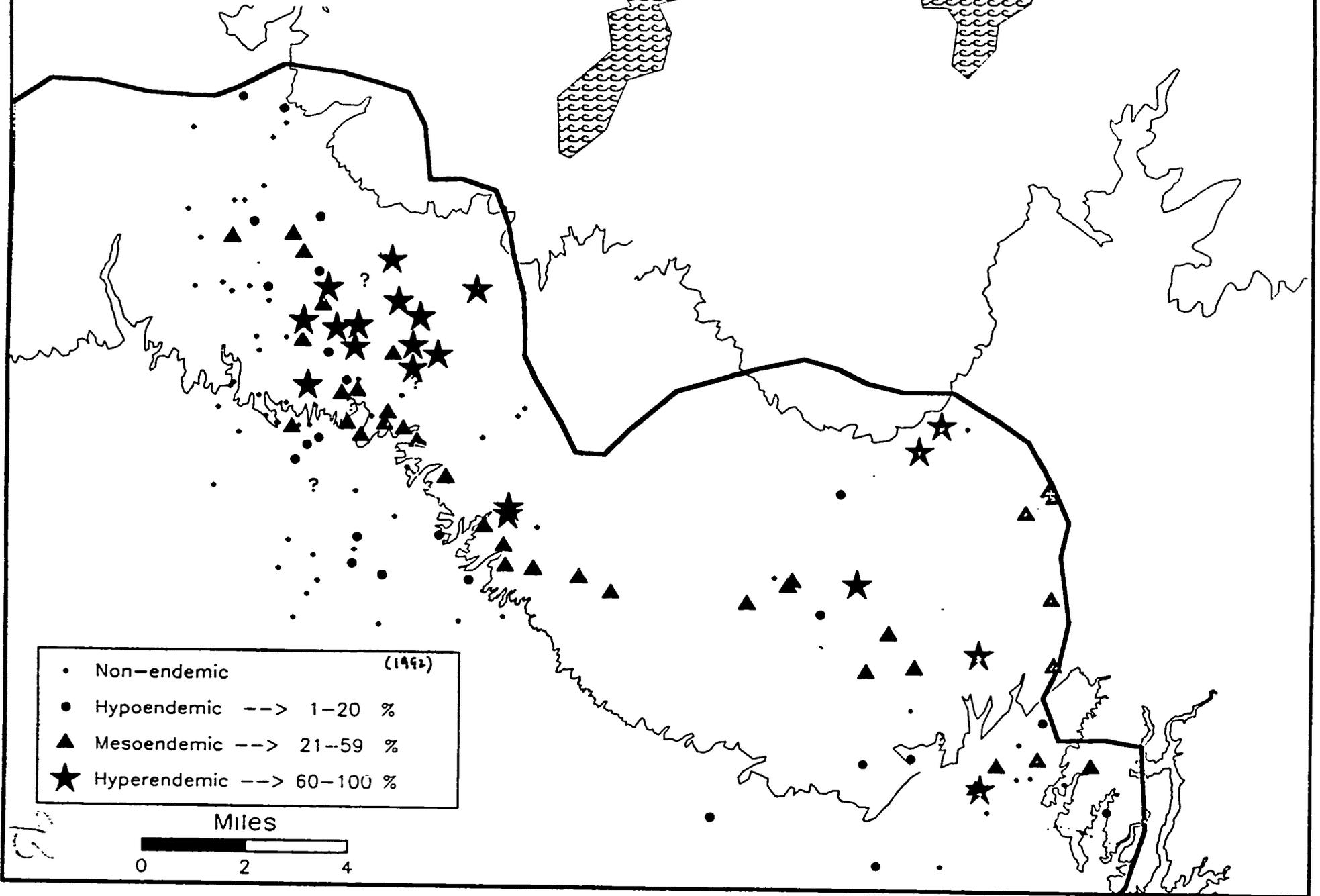


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ANNEX O
Onchocerciasis Control in Suchitepequez

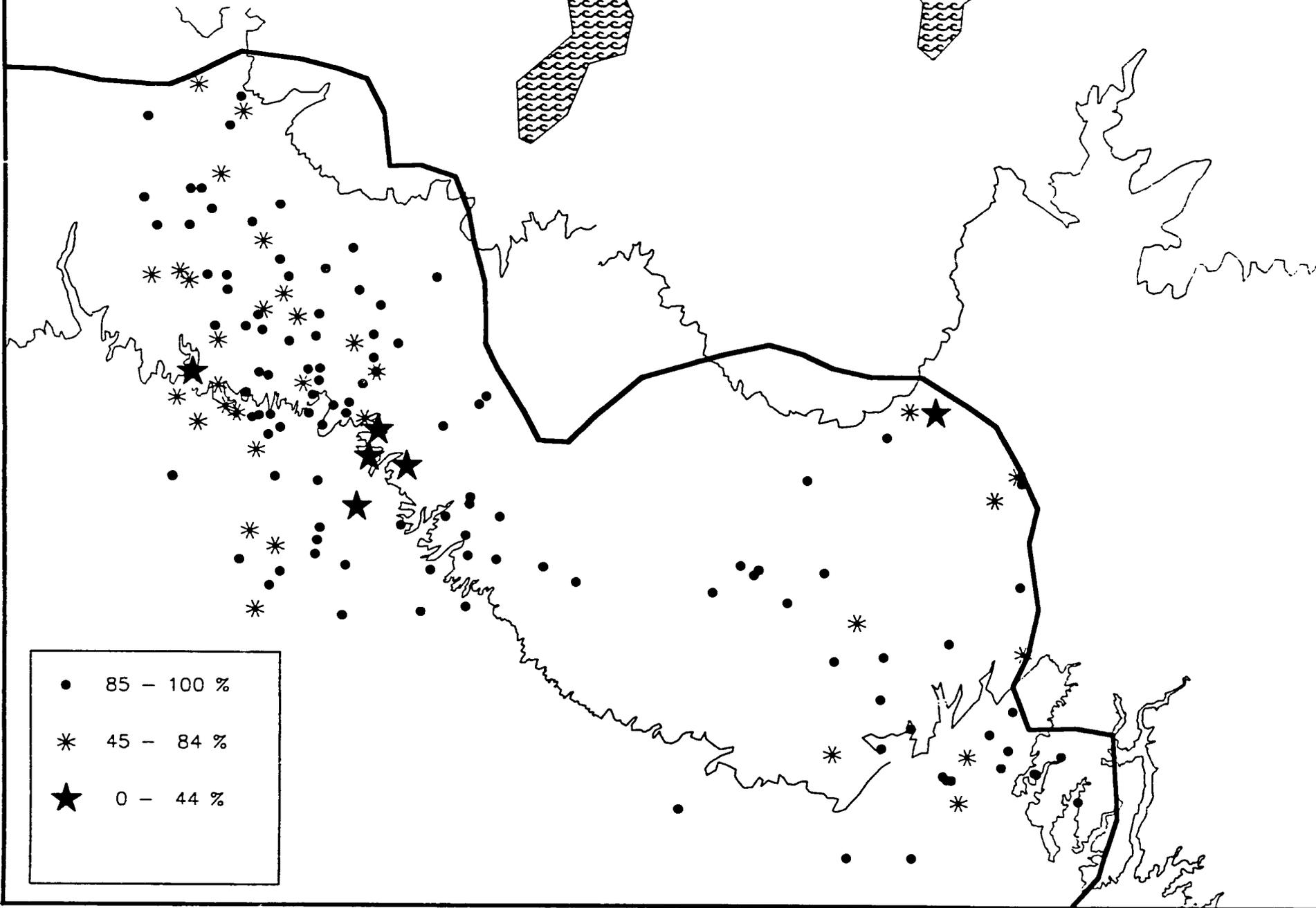
SUCHITEPEQUEZ

Mf Prevalence



SUCHITEPEQUEZ

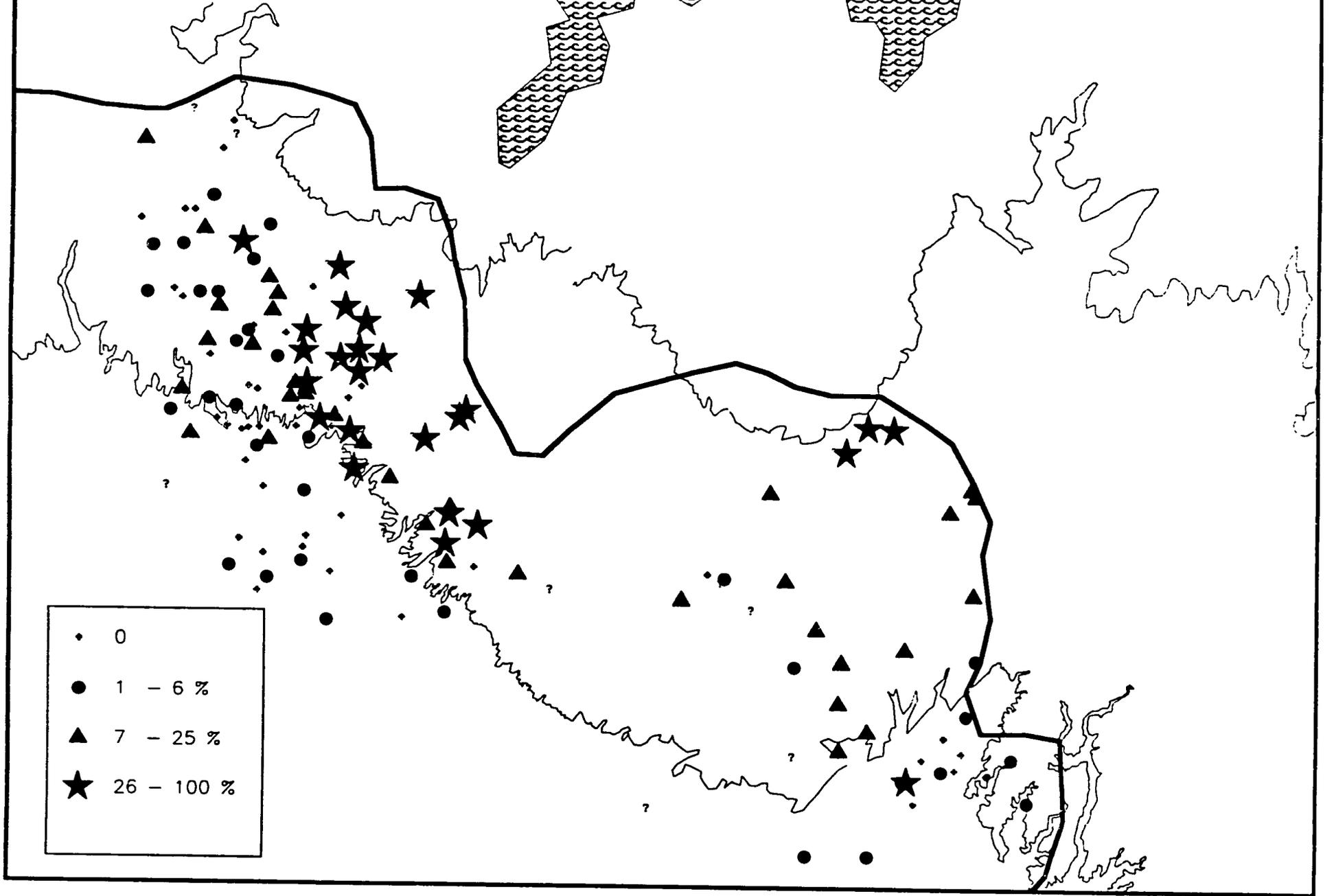
Participation Rates



h/b

SUCHITEPEQUEZ

Adverse Reactions



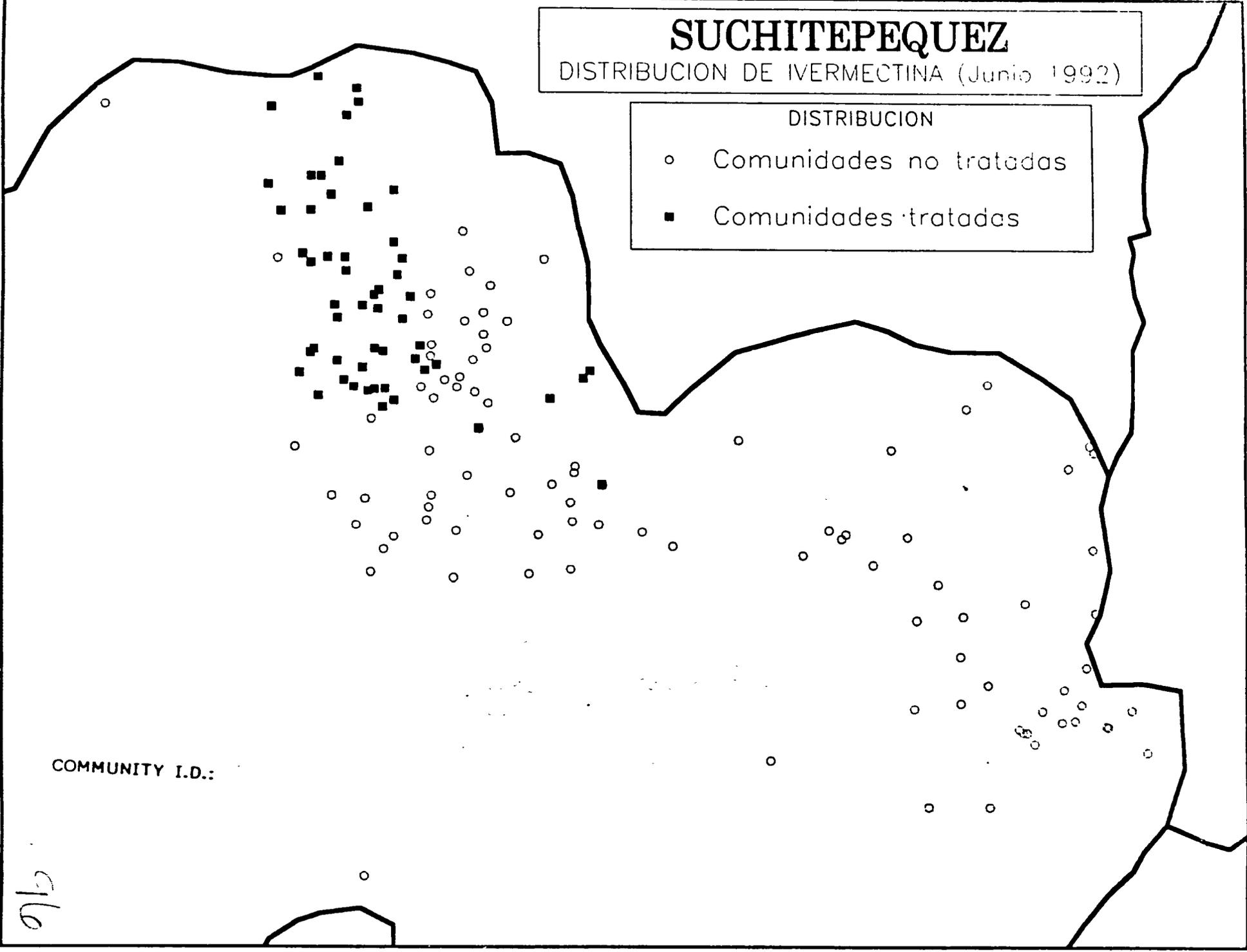
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SUCHITEPEQUEZ

DISTRIBUCION DE IVERMECTINA (Junio 1992)

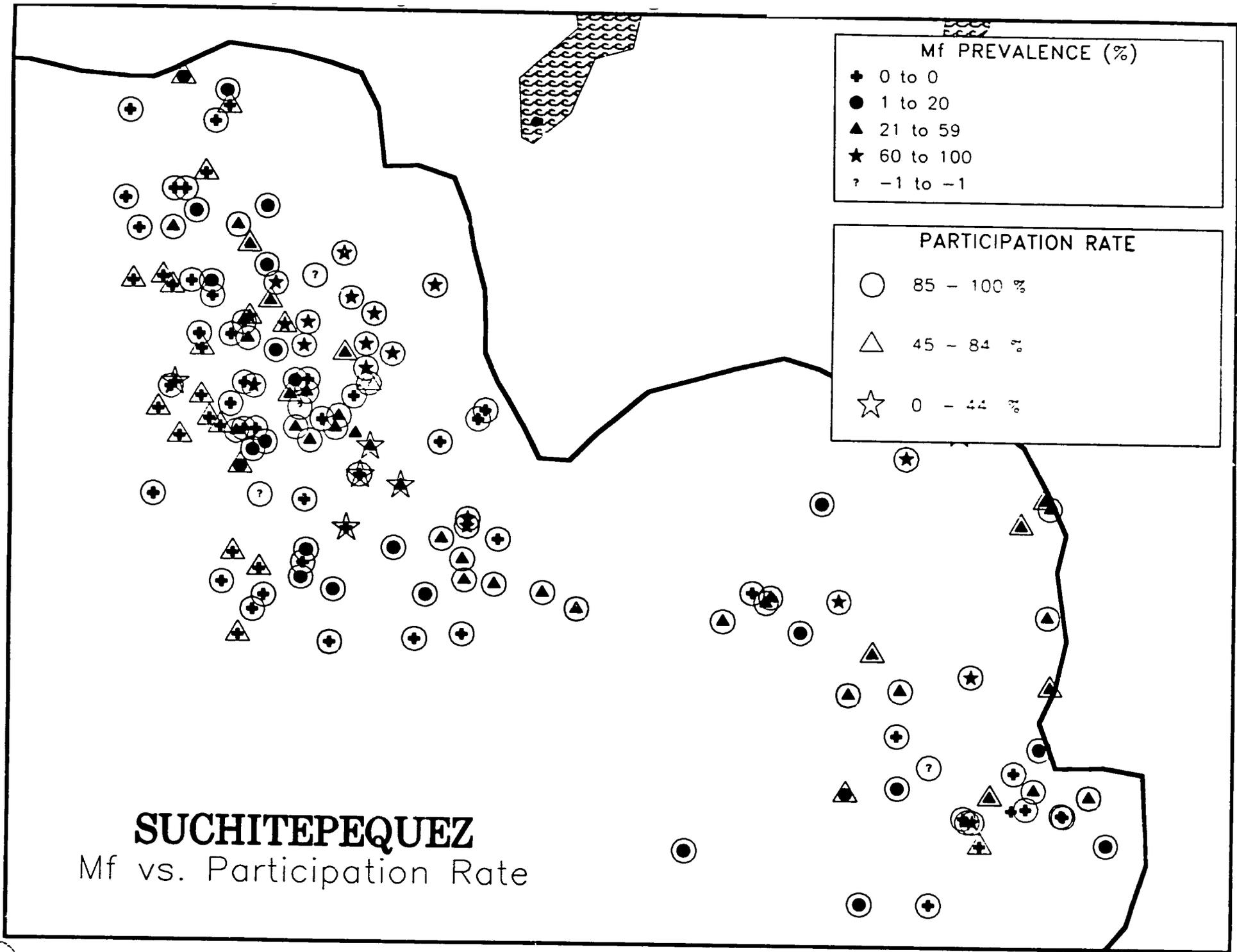
DISTRIBUCION

- Comunidades no tratadas
- Comunidades tratadas



COMMUNITY I.D.:

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Mf PREVALENCE (%)

- ⊕ 0 to 0
- 1 to 20
- ▲ 21 to 59
- ★ 60 to 100
- ? -1 to -1

PARTICIPATION RATE

- 85 - 100 %
- △ 45 - 84 %
- ☆ 0 - 44 %

SUCHITEPEQUEZ

Mf vs. Participation Rate

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ANNEX P
Risk Factors for Onchocerciasis

Table 3

Table 1. Risk Factor Analysis: Parameters for analysis of the dynamics of transmission of onchocerciasis

-
- (1) Parameters relating to the status of infection of human populations
- (1-a) the clinical manifestation (morbidity) prevalence
 - (1-b) the microfilarial prevalence [P(mf)]
 - (1-c) the microfilarial density [CMFL]
 - (1-d) immunological test positive rate [P(adult)]
- (2) Parameters relating to the infection of the vector populations
- (2-a) the infectivity potential of the human population [CMFL]
 - (2-b) the rate of ingestion of microfilariae by vector (whether microfilariae are ingested randomly by the vector at a rate corresponding to the density in the blood, or whether they are concentrated or diluted while feeding)
 - (2-c) the circadian rhythm of the microfilariae and the vector
 - (2-d) the biting density of the vector per man per year
 - (2-e) the proportion of human blood among the blood meals taken by the vector (human blood index)
- (3) Parameters relating to the development of filarial larvae in the vector
- (3-a) the rate of development of ingested filaria larvae to maturity in the vector
 - (3-b) the time required for completion of larval development under the local condition
 - (3-c) the gonotrophic cycle of the vector under local condition
 - (3-d) the survival rate of vector (per day, per gonotrophic cycle, or per maturation time)
 - (3-e) the proportion of vector with all stage larvae (the infection rate) and with mature larvae (the infective rate)
 - (3-f) the frequency distribution of the number of mature larvae found in the infective vector
- (4) Parameters relating to infection of man
- (4-a) the number of infective bites per man per year
 - (4-b) the rate of transfer of infective larvae to man while the vector is taking a blood meal
 - (4-c) the flight range of the vector
- (5) Parameters relating to the development and reproduction of filaria in human host
- (5-a) the proportion of filaria larvae to reach adults of the reproductive stage
 - (5-b) the efficiency of adult filariae in producing microfilaridemia in man
 - (5-c) the reproductive life-span of female worms; of male worms
-

Source: Sasa M. Human filariasis: A global survey of epidemiology and control. Baltimore: University Park Press, 1970.

ANNEX Q
Persons Met during the Evaluation

Ministry of Health

The Honorable Dr. Gustavo Polanco, Minister of Health

Division of Malaria, Ministry of Public Health

Dr. Arturo Sánchez, Director

Dr. Julio Castro, Chief, Department of Onchocerciasis

International Eye Foundation

Dr. Edmundo Álvarez, National Director

Dr. Christine Witte, Onchocerciasis Director (Bethesda)

Dr. Rodolfo Zea-Flores

Eye and Ear Hospital (NCBD)

Dr. Fernando Beltranena, Chief Department of Ophthalmology

Dr. Juan Carlos García, Coordinator, Eye Institute

Sra. Lleana Cardona, Social Worker, Prevention of Blindness Program

Universidad del Valle de Guatemala, Research Institute

Dr. Robert Klein, Research Coordinator

Dr. Charles MacVean, Vice-Dean

Universidad del Valle de Guatemala, Research Institute, Center for Health Studies

Dr. Ricardo Luján, Professor and Director

Licda Renata Mendizábal, Associate Investigator

Ing. Byron Morales, Programmer

Sr. Fabio Amílcar Acevedo, Project Manager

USAID Mission

Dr. Patricia O'Connor, Chief, Office of Health

Pan American Health Organization

Dr. Jacobo Finkelman, Representative

Dr. Enrique Loyola, Malaria and Infectious Diseases

Onchocerciasis Elimination Program for the Americas (OEPA)

Mr. Jack Blanks, Administrative Director

Dr. Guillermo Zea-Flores, Technical Director