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1992 Work Plan
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Technical Assistance to Bolivian Chagas' Disease Control Program of the CCH Project (511 - 0594)

January 18 – February 9, 1992

by

Andrew A. Arata, Ph. D.

VBC Report No. 82236A

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Resumen Ejecutivo

El Programa Comunal y de Salud Infantil (CCH) para el Control de la Enfermedad de Chagas se ha desarrollado rápidamente en sus primeros años. En las zonas piloto, más de 1,000 casas han sido mejoradas, estableciendo modelos para la participación comunal, inversiones externas de bajo costo y vigilancia entomológica y epidemiológica. Se completó el análisis de más de 4,000 muestras sanguíneas y datos sobre la infestación del vector, así como también el de las condiciones de las viviendas. Esta información servirá de base para monitorear los efectos de intervenciones futuras.

El Plan de Trabajo para 1992 del Equipo de Control de la Enfermedad de Chagas (Cochabamba) incluye:

- Monitorear todas las areas de estudio (epidemiológica y entomológica);
- Pruebas de insecticidas en laboratorios y campo;
- Investigación operacional sobre los posibles ciclos silvestres del vector principal, *Triatoma infestans*, y *Trypanosoma cruzi*, el parásito que causa la enfermedad de Chagas; y
- Investigación de la transmisión congénita de la enfermedad.

Más de 300 casas serán rociadas con varios insecticidas piretroides (permetrina) para evaluar resultados diferenciales a un largo plazo y examinar métodos para medir más efectivamente la reinfestación. El ciclo silvestre será estudiado durante del año, cerca de Cochabamba y en el área del Río Mizque para determinar si es una fuente de transmisión doméstica.

El establecer una capacidad para conducir pruebas apropriadas para determinar la fuente de las comidas de sangre de triatominos, será una prioridad para el programa de este año.

El programa ha preparado numerosos manuales de laboratorio y aspectos de campo relacionados con el control de la enfermedad de Chagas. Algunos de estos manuales serán modificados para facilitar su actualización y diseminación. Se necesitará de una coordinación

entre la Agencia Técnica Habitat de las Naciones Unidas (U.N. Commission on Human Settlements) y la Oficinas de la Enfermedad del Chagas en Cochabamba para poder producir guías para promotores y manuales sobre el mejoramiento de casas y mantenimiento. Habitat también ha firmado un acuerdo para 1992 para conducir estudios educativos en Tupiza y Tarija y así producir material educativo para el proyecto.

La importancia de darle seguimiento a todos los costos relacionados con el mejoramiento de casas, capacitación, vigilacia epidemiológica y de control del vector hace imperativo que la plaza de un economista sea agregada al grupo de trabajo del proyecto. Deberán desarrollarse modelos para costos por unidad, sistemas de recuperación de costos así como también proyecciones de costos para una etapa operacional fuera del programa piloto actual para poder lograr atraer a ambos grupos, nacionales e internacionales, interesados en invertir en un programa de control nacional a largo plaza.

La evaluación de a mediados de período ha sido fijada para Mayo de 1992. El grupo de trabajo del proyecto debe comenzar a organizarse con material y así proporcionar asistencia al grupo evaluador. Se desarrolló un bosquejo del tipo de material que se requerirá.

Durante esta consultoría se sostuvo un taller de grupo en Tarija para discutir puntos financieros y técnicos. Este taller fue un éxito y debería repetirse ya sea cada dos meses o cada trimestre para proporcionar un forum de intercambio de información y la promoción de colaboración entre el staff del proyecto en las diferentes regiones como también la actualización de puntos financieros, directivos, y/o problemas.

El esfuerzo nacional del Control de la Enfermedad del Chagas recibe un alto y visible apoyo popular y político. El Presidente de la República y tres Ministros de Estado han asistido a la inauguración del Proyecto de mejoramiento de casas en Tarija a principios de este mes. Debe hacerse un gran esfuerzo durante la evaluación de a mediados de período para justificar la extensión del proyecto, con fondos adicionales para varios años.

Executive Summary

The USAID/Bolivia Community and Child Health (CCH) Chagas' disease control program has developed rapidly during its first year. More than 1,000 houses were improved in the pilot zones, and the program established models for community participation, low external investments, and entomological and epidemiological surveillance. Analysis of over 4,000 blood samples and data on vector infestation and housing conditions is complete. This baseline information will be used to monitor the effects of program interventions, which include community-based housing improvement, health education and vector control.

The 1992 work plan for the Chagas' control program includes the following activities: monitoring all study areas; laboratory and field tests of insecticides; operational research on the possible sylvatic cycles of *Triatoma infestans*, the principal vector, and *Trypanosoma cruzi*, the parasite that causes Chagas' disease; and research on the congenital transmission of the disease. More than 300 houses in Aramasi (Cochabamba) will be sprayed with several pyrethroid insecticides to evaluate differential long-term results, and methods for measuring reinfestation will be tested. The sylvatic cycle of Chagas' will be studied throughout the year near Cochabamba and in the Río Mizque area to determine whether it is a source of domestic transmission.

Establishing a capability to conduct precipitin tests to determine the source of triatomine blood meals is a priority for the program this year.

The program has prepared numerous manuals on laboratory and field aspects of Chagas' control. Some will be modified to make them easier to disseminate, use and update. Coordination between the United Nations technical agency Habitat (U.N. Commission on Human Settlements) and the Cochabamba Chagas' office is required to produce guides for promotors and a manual or manuals on house improvement and maintenance. Habitat has also signed an agreement to conduct educational studies in Tupiza and Tarija and to produce educational materials for the program in 1992.

The importance of tracking all costs related to housing improvement, training, vector control and epidemiological surveillance makes it imperative that an economist be added to the project team. Models must be developed for calculating unit costs, establishing cost-recovery systems, and projecting costs for an operational stage beyond the current pilot program in order to attract both national and international groups interested in investing in the long-term national control program.

The midterm project evaluation has been set for August 1992.[1] The program team should begin at once to organize materials to assist the work of the evaluation team. An outline of the types of materials required was developed.

During this consultancy a team workshop was held in Tarija to discuss financial and technical issues. It was successful and should be repeated every two months or every quarter to provide a forum for exchange of information, development of collaboration between project staff in different regions, and updates on financial and managerial issues or problems.

The national Chagas' control effort receives very high and visible political and popular support. The President of the Republic and three ministers of state attended the inauguration of the housing improvement project in Tarija at the beginning of this month. A strong effort should be made during the midterm evaluation to justify the extension of this project with additional funding for several years.

[1]Originally scheduled for May 1992, the evaluation was delayed to accommodate the schedules of key participants and team members.

1. Introduction

The Chagas' disease control component of the CCH Project of USAID/La Paz was designed as a two-year pilot program to test the feasibility of controlling the disease through community participation, improved housing, health education and vector control. In addition, the pilot program will conduct a number of essential operational research activities to gain a better understanding of the epidemiology of Chagas' disease in Bolivia. These include studies to determine whether a sylvatic cycle exists and refuels domestic transmission. Other studies will look at the roles of congenital and blood transfusion transmission, as well as the social and economic conditions that increase the risk of Chagas' disease in the diverse regions of the country.

All of these areas, including housing improvement to test economic feasibility and methods for obtaining community participation, have been addressed in the first year. Some of these activities have progressed much further than others because of lack of resources and critical personnel, or simply because there was not enough time for proper planning. In some cases the need to develop the national infrastructure has delayed initiation of certain efforts. For example, laboratory capabilities have to be developed before the role of Chagas' transmission through blood transfusions can be assessed.

The work accomplished to date has attracted national attention and political support. An extension of the project and the possible addition of greater financial support appear justified. A mid-term evaluation is scheduled to start in late May 1992 to review the progress to date and to make recommendations for the 1992 action plan and the proposed extension of the program.

Accordingly, this consultancy was planned to assist the national control team in preparing for the evaluation and specifically to:

- review and refine 1992 operational and research plans;
- review manuals developed by the Cochabamba office;

- work with Dr. Bermudez in Cochabamba on the sylvatic cycle study in that area and assist him in planning insecticide evaluations in the laboratory and under field conditions;

- meet with Ministry of Health (MOH) officials to discuss regionwide *T. infestans* control plans; and

- finalize plans for the midterm evaluation proposed for August 1992.

2. Structure of the CCH Chagas' Control Program

After a planning meeting in La Paz at the end of November 1990, the Chagas' Disease Control Program began operations in early 1991. The baseline survey (see chapter 4) consumed a great deal of time and effort during the past year, but provided an invaluable epidemiological resource for present and future activities.

The national Chagas' control team was established at the same time in Cochabamba and was built upon the strong Chagas' expertise at the Universidad Mayor de San Simón, or CUMETROP. Currently three physician-researchers, Drs. Balderrama, Bermudez and Torrico, work full time (two) or part time (one) directing a team of approximately 20 office, field and laboratory staff in the CCH Chagas' control program.

Previously organized non-governmental organization (NGO) projects in Tarija, Tupiza and Chuquisaca have received support from the Chagas' control program and are now integrated into the scheme, providing regional diversity and variation in the control models that are being developed.

Recently the CCH Project entered into an agreement with Habitat, the United Nations technical agency for human settlements, to produce the educational component of the program. Technical support is provided by the Vector Biology and Control Project, a centrally funded project of the U.S. Agency for International Development's (A.I.D's) Office of Health, Bureau of Science and Technology and the U.S. Centers for Disease Control (CDC).

A schematic representation of the national Chagas' Disease Control Program is shown in Figure 1. This organogram shows the operational responsibilities of the respective elements of the program.

As the program has grown, the need for a timely flow of money has become critical to keep all program elements funded without interruptions in planned activities. The current funding (under the

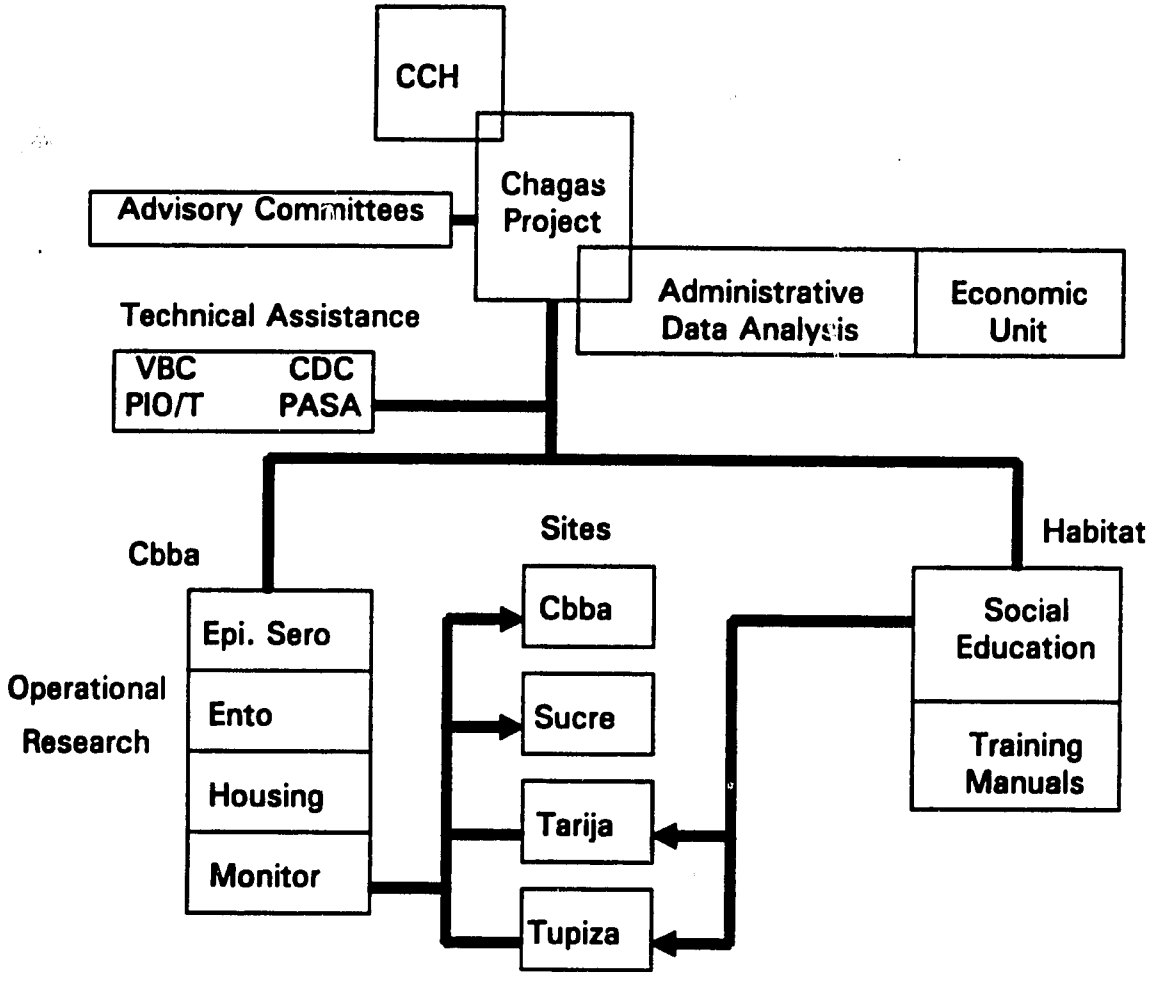
CCH Project, of which the Chagas' control element is one of four components) provides the equivalent of US$ 2.5 million for national operations through P.L. 480 and US$ 500,000 for supplies and technical services. The recent addition of a full-time program administrator (Mr. Jaime Burgoa) has smoothed some of the administrative and financial management practices and provided a better structure for budgeting starting in 1992. Annual planning and budgeting are now closer in synchrony with P.L. 480 procedures, which will speed transfer of funds; additional expeditions resulting from the expansion to new areas have increased the overall administrative responsibilities.

As a pilot program, the Chagas' control program has spent the bulk of its resources on operational research, demonstration of housing improvements, and administrative costs. This is quite reasonable as the objective of the pilot program is to demonstrate the practicality and cost-effectiveness of various approaches to Chagas' control, emphasizing the role of the community in improving housing conditions to reduce vector infestation and disease transmission. However, during the second year the program will need to look ahead to when it will be required to present control program models to the government of Bolivia and the broader donor community for implementation on a true national scale. This will require a sound economic base, means of cost recovery (where feasible), and identification of unit and area costs that might be funded by the respective donors. Moving from a pilot program to a national effort will also require reducing the relative proportion of the resources from administration to interventions, and for this a sound economic plan, with a suitable management program, will have to be developed.

It has not been easy to coordinate a program that has incorporated several pre-existing, diverse control efforts. Only the operation in Cochabamba was started *de novo*. Standardization of techniques and balancing funding between the regions and between research and operational demonstrations have required a number of compromises. Fortunately, these compromises have been made with relatively little disappointment to those concerned. In 1992

Figure 1

Operational Structure Of CCH - Chagas/Bolivia



however, it is essential that all participants in the program view it as a fully national effort, and that they focus on the overall program and not the regional or technical areas with which they are most familiar or most interested.

Fortunately, CCH has been able to recruit a remarkable group of national specialists with great commitment to the program and excellent technical skills. This is a sound base on which to develop the national program in the years to come.

3. 1992 Planning of Cochabamba Chagas' Control Team

During the week of January 20-24, Drs. Balderrama, Bermudez and Torrico outlined the pilot program's work plan for 1992, including studies and projects, specific objectives, and activities to achieve the objectives. A monthly chronogram and estimated personnel and budgets for each were developed (see Annex). Protocols, either in draft or completed form, have been prepared for all activities listed for 1992. A 1992 budget of over US$ 300,000 for work in Cochabamba has been approved.

The number of proposed activities will probably exceed the available budget for 1992, or at least the currently available P.L. 480 funds. Priority will be given to the operational research activities. The proposed extension of the program for at least one year (three in total) will allow certain major studies (e.g. transmission by means of blood transfusion) to be delayed until personnel and resources are available.

3.1. Sylvatic Cycle

In the southern part of South America, *Triatoma infestans* is the principal vector of Chagas' disease. The long and close association of this vector to man is evidenced by its exclusive existence in and around human dwellings. This observation has led to the assumption that household spraying of suitable insecticides could: 1) reduce levels of *T. infestans* infestation to the point where transmission of Chagas' disease would be interrupted; or 2) eradicate *T. infestans* in areas where it is the only vector, thereby removing all risk of future infection. This hypothesis is the basis of the multinational program proposed at an November 1991 conference in Montevideo, Uruguay, supported by the European Community.

The only known exception to the exclusive peri- and intra-domiciliary existence of *T. infestans* is in the valleys of Cochabamba, Bolivia. This was first noted by Torrico in 1946, and confirmed by observations of Venegas (1984-87) and Bermudez

(1990). Dujardin suggested (1984) that these "wild" populations might derive from more typical domestic populations.

The question is of more than academic interest. The existence of natural foci of the disease would imply a continuous potential for reinfection in nearby communities and would enhance the importance of housing improvements, surveillance and repeat spraying to eliminate, or reduce, the risk of human infections.

The CCH Chagas' team has prepared a protocol to study this situation, and preliminary results are interesting. In one area, approximately 20 kilometers south of Cochabamba near the Angostura dam, 23 wild guinea pig dens in rock piles in dry stream beds and on hillsides were examined in December 1991. Of the 23 dens, triatomines were found in 13 (57 percent): only *T. infestans* were collected in four; only *T. sordida* in six; and three dens yielded both *T. infestans* and *T. sordida*. Two of 12 guinea pigs collected were positive for *T. cruzi*: 61 of 82 (74 percent) of *T. infestans* and 12 of 48 (25 percent) of *T. sordida* collected were also positive for *T. cruzi*. These are exceptionally high rates: *T. infestans* collected in and around houses in the baseline studies had rates of *T. cruzi* infection in the range of 25-33 percent, depending on the locality.

In a visit during this duty travel, no guinea pigs were collected but both *T. infestans* and *T. sordida* were found in dens with abundant signs of guinea pig habitation. The areas where these collections were made ranged from 0.5 to 1.0 kilometers from human settlements, although there are adjacent cultivated fields near the small dry river beds above the Angostura reservoir.

Another location, in the Río Mizque area (approximately 255 km. southeast of Cochabamba), is more arid, with a relatively small human population. Triatomines were collected several kilometers from human habitation in and under bromeliad-like plants in areas where cattle range and sleep. On two trips to the area in January 1992, only *T. sordida* were collected. None of the triatomines collected from the first visit were positive for *T. cruzi*. Those from the second visit have not been examined as yet.

A second location in the Río Mizque area (sketch maps are provided, with distances, in the field reports of the Cohabamba team) was closer to human settlements along the road from Aiquile to Totora. On the first visit only eggs (hatched) of *T. sordida* were found. During the second visit, one guinea pig was collected in thorn fences and two were removed from rock piles in a thorn corral 0.5 kilometers from a house and approximately 1.0 kilometers from the houses along the road. One *T. infestans* also collected in the rock piles has not yet been examined.

These preliminary results indicate that:

1. *T. infestans* is occurring outside the normally defined domestic and peri-domestic foci;

2. *T. infestans* and *T. sordida* share a close ecological relationship in some localities; and

3. high rates of *T. cruzi* infection exist in locations where both triatomines are found together and in the associated guinea pig populations.

Forthcoming studies should include:

a. Collection of other rodents, marsupials, foxes and armadillos in these areas to be examined for *T. cruzi*. Designs of traps that can be used for rodents and marsupials were left in Cochabamba. They are simple and can be made cheaply of local materials in different sizes. Rodents can be collected by the Chagas' team and local *campesinos* can be enlisted to collect larger mammals.

b. It is essential that the team in Cochabamba acquire the capability and reagents to carry out precipitin testing for identifying the sources of triatomine blood meals. In view of the heavy entomological schedule set for 1992, it is not necessary to have large quantities of data on blood sources, but to determine whether *T. infestans* found in sites outside of houses and compounds are feeding on animals other than human and domestic stock, and to determine whether these are shared with *T. sordida*.

It is more important to demonstrate whether *T. cruzi* has a sylvatic source, passing through *T. sordida* to wild mammals to *T. infestans*, than to just determine whether *T. infestans* is able to maintain itself in a "wild" condition.

c. All triatomines collected to date from "wild" foci and isolates of *T. cruzi* are maintained at - 20°C in a freezer at the Universidad Mayor de San Simon, Cochabamba. Liquid nitrogen is available in Cochabamba and tanks for N_2s should be purchased (one large tank for holding, one small tank for transport).

   Triatomines and *T. cruzi* are to be tested to determine whether isoenzyme differences in strains from "wild" and domestic sites exist.

d. The site near Cochabamba (Jamach'uma) where *T. infestans* and *T. sordida* occur together is easily accessible. This is an ideal site to sample throughout the year (bimonthly) to study the relative abundance and age structure of the populations of each species, and levels of seasonal infection in both triatomines and guinea pigs.

   Flat skins and cleaned skulls should be kept as reference material from samples of all mammals collected. There is no taxonomic reference for these in Bolivia. VBC will send reference material, but eventually a specialist should be consulted. A sample will be taken to the United States National Museum, Smithsonian Institute (U.S.N.M.) to determine whether the wild guinea pigs collected so far are *Galea* or *Cavia*.

e. Traps (animal-baited and black-light) will be set up on a transect between the known existing "wild" populations and domestic populations of triatomines, and from these populations into other areas uninhabited by humans to determine the extent of the infested areas and of contacts with populations in human habitations.

f. Dr. Bermudez is developing a timeline and list of personnel and equipment needed for this study during 1992. Although it is tempting to continue searching for new localities that might be better-suited for these studies, this would be very time-consuming. Work should be concentrated at the site closest to Cochabamba (20 kilometers away), with at least quarterly trips to the Río Mizque site for intensive collecting during a one-week period.

3.2. Vector Control

Under this heading are three major vector control activities of the Chagas' control team in Cochabamba:

- o evaluation of insecticides,
- o spraying of houses and outbuildings, and
- o monitoring, including testing of methods to be employed.

3.2.1. Evaluation of insecticides

The project plan calls for spraying the insides of houses once they have been improved to prevent reinfestation: because of the number of adjacent outhouses (animal coops, corrals, storage areas and retaining walls), these will also be sprayed. Respraying will be on a house-by-house basis only after systematic monitoring reveals reinfestation.

Prior to the CCH Chagas' control program, there was no systematic screening of insecticides for triatomine control in Bolivia. Earlier use by MOH and CENETROP was sporadic, involving only small numbers of houses. The insecticides used included BHC, an organochlorine, and deltamethrin, a pyrethroid. Current known usage is as follows:

Chuquisaca	cypermethrin (pyrethroid)
Tupiza	deltamethrin (pyrethroid)
Tarija	to be selected
Aramasí (Cbba)	cypermethrin (being tested)
Aiquile (Cbba)	small quantities of malathion, fenitrothion (OPS) and deltamethrin

The insecticide laboratory in Cochabamba has colonies of *T. infestans* from Cochabamba, Chuquisaca and Tarija. It should establish a colony in Cochabamba from the colony in Tupiza.

Initial trials were conducted using the WHO test kits to test the susceptibility of triatomines from the three localities against malathion, fenitrothion and deltamethrin. Both malathion and fenitrothion showed high mortality in 48 hours with *T. infestans* from each locality (Table 1).

In these limited trials, malathion was superior to fenitrothion but trials of both insecticides should be replicated and the post-exposure extended to 72 and 96 hours. The results with deltamethrin were very poor, showing only 40 to 50 percent mortality after 120 hours. The deltamethrin test papers were old, however, and these results should be disregarded until new test papers are available.

The laboratory now has the following new sets of test papers for immediate testing:

Cypermethrin	0.06; 0.12; 0.25; and, 0.5%
Permethrin	0.25%
(Tempo) Cyfluthrin	0.05%
(ICON) L-Cyhalothrin	0.1%

Trials with cypermethrin began the week of January 27 and initial results (Figure 2) were obtained before the end of this trip, February 9. New papers for deltamethrin, fenitrothion and malathion will be obtained in Washington, D.C., and sent express to Cochabamba.

Deltamethrin was not approved by the environmental assessment review (VBC Report 82236) for operational use in this program because it has not yet been approved by the U.S. Environmental Protection Agency for vector control in the United States. It is important that the entomology team obtain comparative information on the susceptibility of *T. infestans* from Tupiza to both deltamethrin (which has been used since 1985-86 for triatomine

Table 1

Preliminary Results of *T. infestans Susceptibility* To Malathion, Fenitrothion and Deltamethrin (WHO test kits)

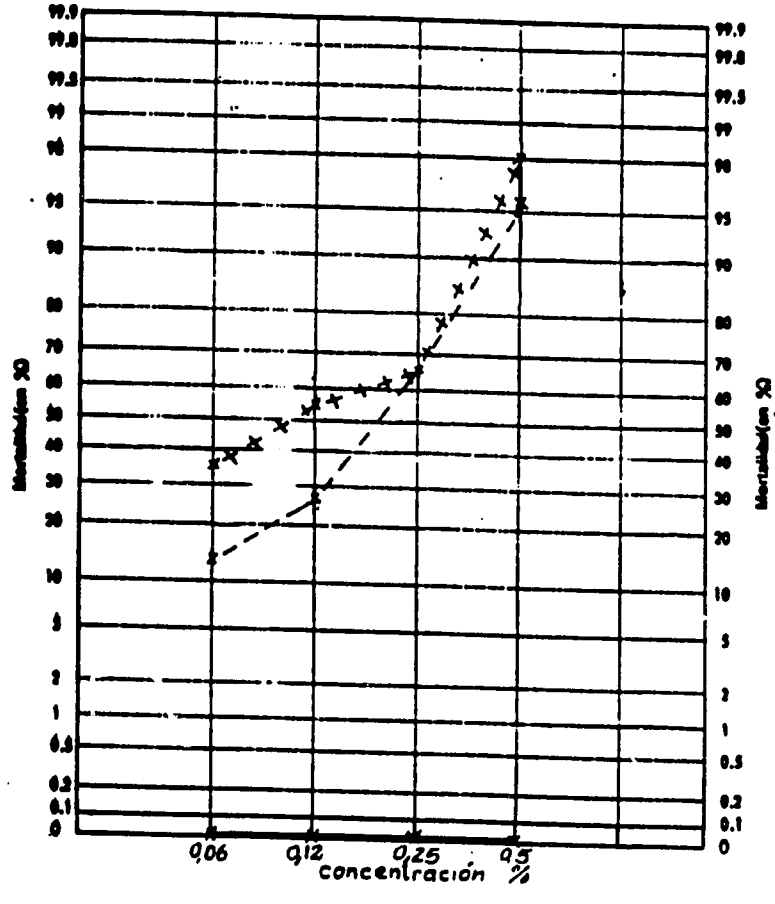
	Cochabamba			Tarija			Chuquisaca		
	% Mortality								
Hours	**12**	**24**	**48**	**12**	**24**	**48**	**12**	**24**	**48**
Malathion (5%)	75	88	98	95	98	100	48	75	95
Fenitrothion (1%)	15	90	100	0	40	75	7	45	75
Hours		**48**	**120**		**48**	**120**		**48**	**120**
Deltamethrin (0.025%)		33	43		31	51		15	41

control in that area) and cypermethrin. It is also urgent that the entomology team study carefully the reported reinfestation rates (4.5 percent) in the Tupiza area.

Available data do not indicate the time(s) after spraying at which these infestation rates occurred. If CCH/USAID is to support the activities in Tupiza, it will be necessary to discuss with CCH officers the possibility of changing to cypermethrin if all other factors are equal.

Figure 2

Susceptibility of *T. infestans* to Cypermethrin
Tarija, February 1992



+++ = knocked, with minor movements

- - - = mortality 48 hours after exposure

____ = control (0% mortality)

3.2.2. Insecticide field testing and monitoring reinfestation

The first operational use of insecticides in the Cochabamba (Aramasi) area will be initiated in March 1992 at the end of the rainy season (see map, Figure 3). Hudson X-Pert eight-liter hand-compression pumps were delivered in December 1991. The area to be sprayed consists of 406 houses: 304 have been improved or are new; 102, which are in an area where no water is currently available, have received no improvements. A total of 254 improved houses will be sprayed with Cymperator^R EC-25 (cypermethrin); and 25 each with ICON^R (lambda-cyhalothrin) and Tempo^R (cyfluthrin). All the unimproved houses will be sprayed with cypermethrin.

The same houses will be used to evaluate different methods for determining vector reinfestation: the Sensor Maria, adhesive wall tapes, and the conventional capture per man-hour/house (C/H/H/C). Each of these methods will be used in 57 improved houses and 26 unimproved houses.

Dosage applied will be according to the label instructions (0.25g/m2). Spraying will cover the insides and outsides of dwellings, adjacent structures and walls. The average size of family residence in the Aramasi area, including all structures, has been calculated to be 420 m^2. Cymperator 25 EC was purchased locally at a cost of US$ 54.00 per liter. Accordingly, the insecticide price should be US$ 22.75 per residence. Assuming that, as in other vector control programs, the cost of the insecticide is about 75 percent of the total cost (the remaining 25 percent is labor), the cost of spraying a residence in Aramasi should be US$ 30.33.

The actual costs of house spraying will be carefully monitored to determine how close the estimate is to the final cost per house.

3.2.3. Monitoring triatomine reinfestation

The 1991 baseline study (see chapter 4) revealed high triatomine infestation in Cochabamba, Chuquisaca and Tarija. The method employed was the standard # captured/man-hour/house. As

Figure 3

Field Map of Houses in Aramas Area to be Sprayed During Insecticide Trials

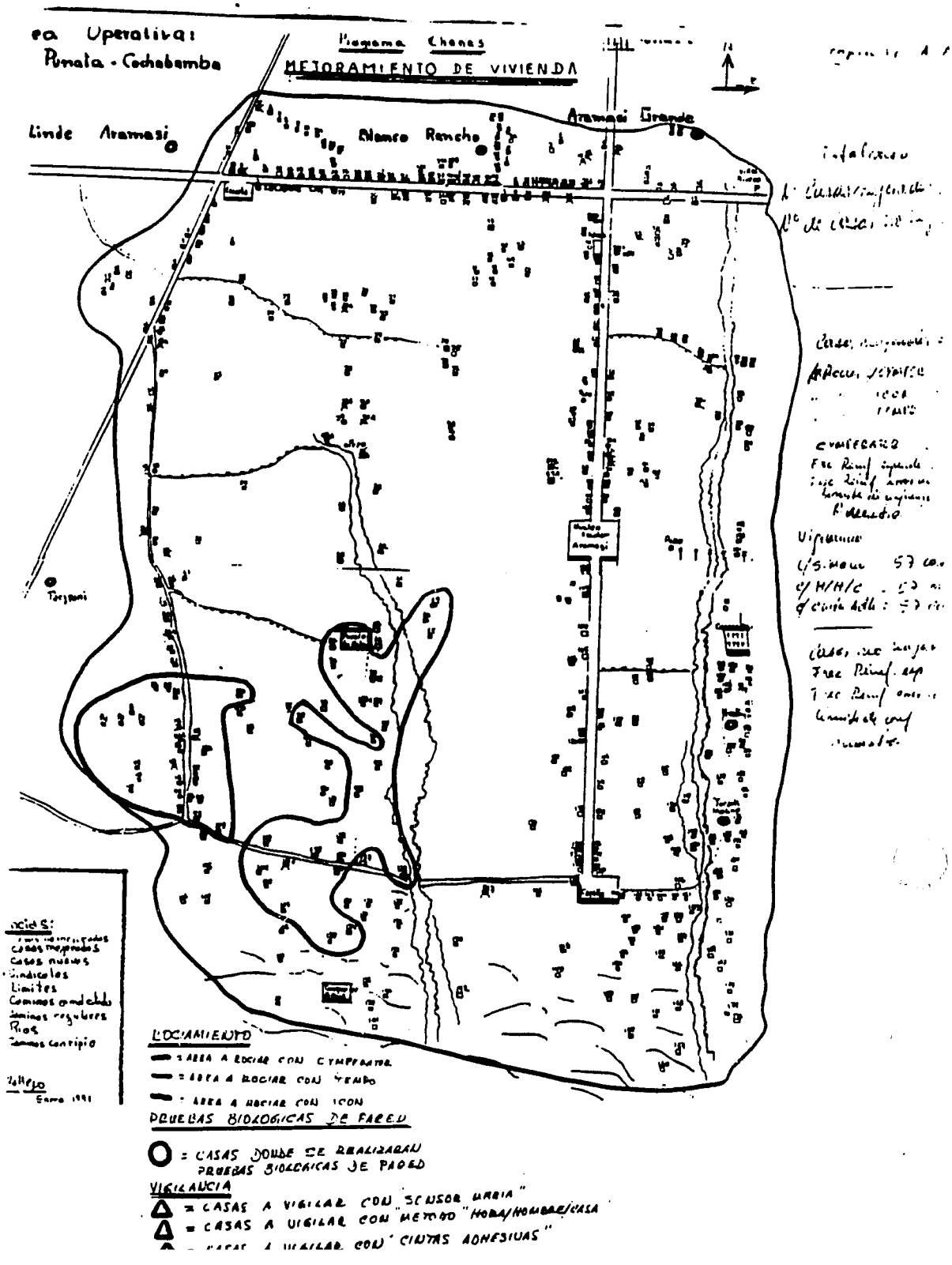
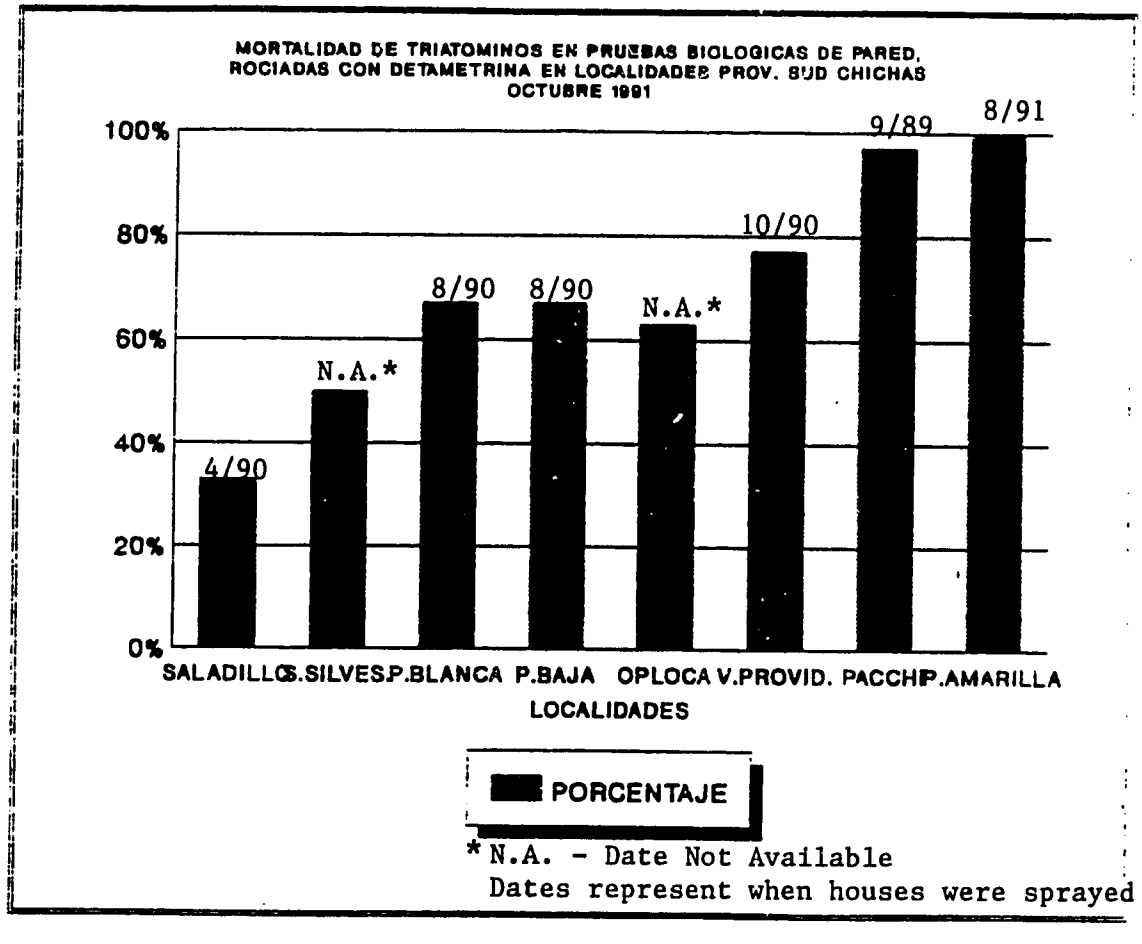


Figure 4

Mortality of Triatomines in Bioassays of Deltamethrin Sprayed on Walls In Localities Evaluated in the Province of South Chichas October 1991



*N.A. - Date Not Available
Dates represent when houses were sprayed

mentioned above, other less labor-intensive methods will be tested during the initial spraying operations in Aramasi.

A topic that arose during the workshop in Tarija was the possibility of organizing an independent triatomine evaluation team in collaboration with the MOH. This was discussed with Dr. Roberto Vargas, National Director of Epidemiology, who readily agreed. Arrangements should be made to solidify this agreement by an exchange of letters between CCH and the MOH. The CCH Chagas' control program could assist by paying the per diem and travel costs of the team. Technical details of the sample sizes, frequency of sampling, method(s) to be employed, and data collection and processing, will be arranged between Drs. Bermudez and Balderrama and Dr. Vargas and Mr. Gemio of the MOH Division of Epidemiology.

During 1992 the CCH Chagas' control program will provide financial assistance to the FIDA-supported project in Tupiza. This Chagas' control effort, which is part of a larger agricultural improvement project, has sprayed more than 18,000 houses with deltamethrin since 1986 in conjuction with a health education program and a degree of housing improvement.

At the Tupiza workshop Dr. German Guillen, Director of the Tupiza Project, agreed that an entomological evaluation was needed in samples of houses that had been sprayed over each of the previous years. He also welcomed the idea of an independent assessment team. We learned that Mr. Gemio, of the MOH, had conducted an entomological assessment in Tupiza in October 1991. These data were subsequently provided to us by Mr. Gemio. In addition to the standard # captured/man-hour/house evaluation, wall bioassays were conducted to determine the period of residual insecticide action. A preliminary analysis of these data (Figure 4) shows considerable variation in the results. In general about 50 percent of the sprayed walls caused 75 percent mortality after a period of 15 months, although in several sites mortality was below 60 percent after only a few months. In one case, 100% mortality was observed 24 months after spraying. The high variability in these results requires further analysis and validation.

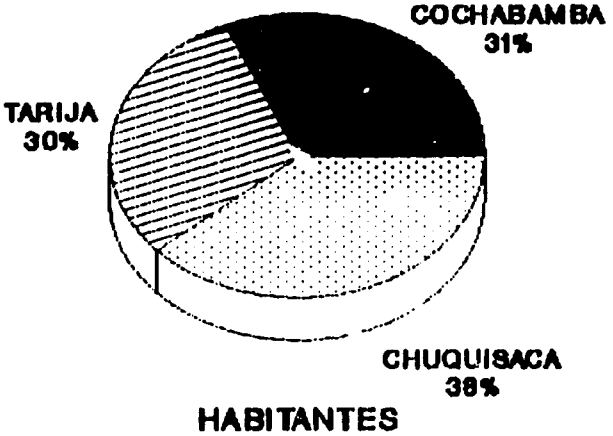
These data are valuable and can be used to design an evaluation that should give an accurate picture of both reinfestation and the residual action of deltamethrin.

3.3. Congenital Chagas' Transmission Study

The congenital transmission study is beyond the scope of work for this report, but it was outlined in the CCH Chagas' control program 1992 work plan developed in Cochabamba. The protocol will be completed during the consultancy of Drs. Ralph Bryan and Ann Moore, (CDC) in late February 1992. Initial observations will begin during the summer of 1992.

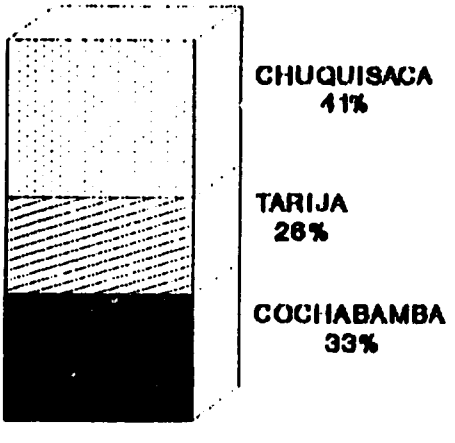
Figure 5

Precentage of Inhabitants and Houses from Each Department in the Selected Communities



HABITANTES

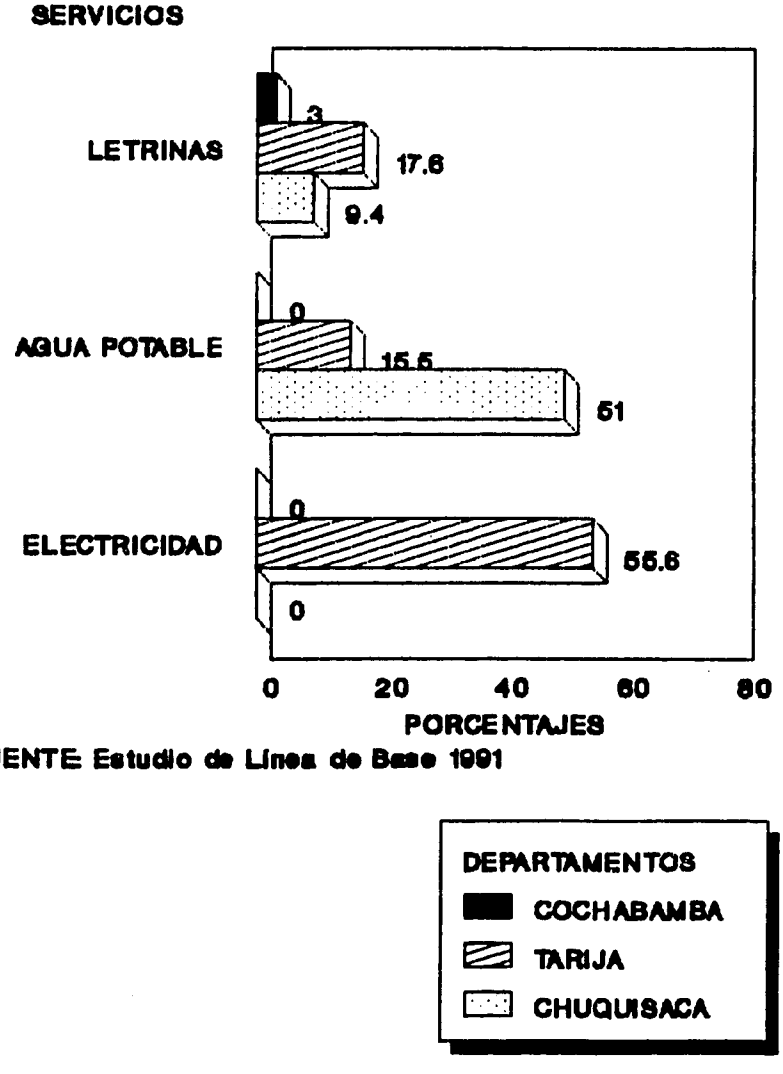
FUENTE: Estudio de Línea de Base 1191



VIVIENDAS

Figure 6

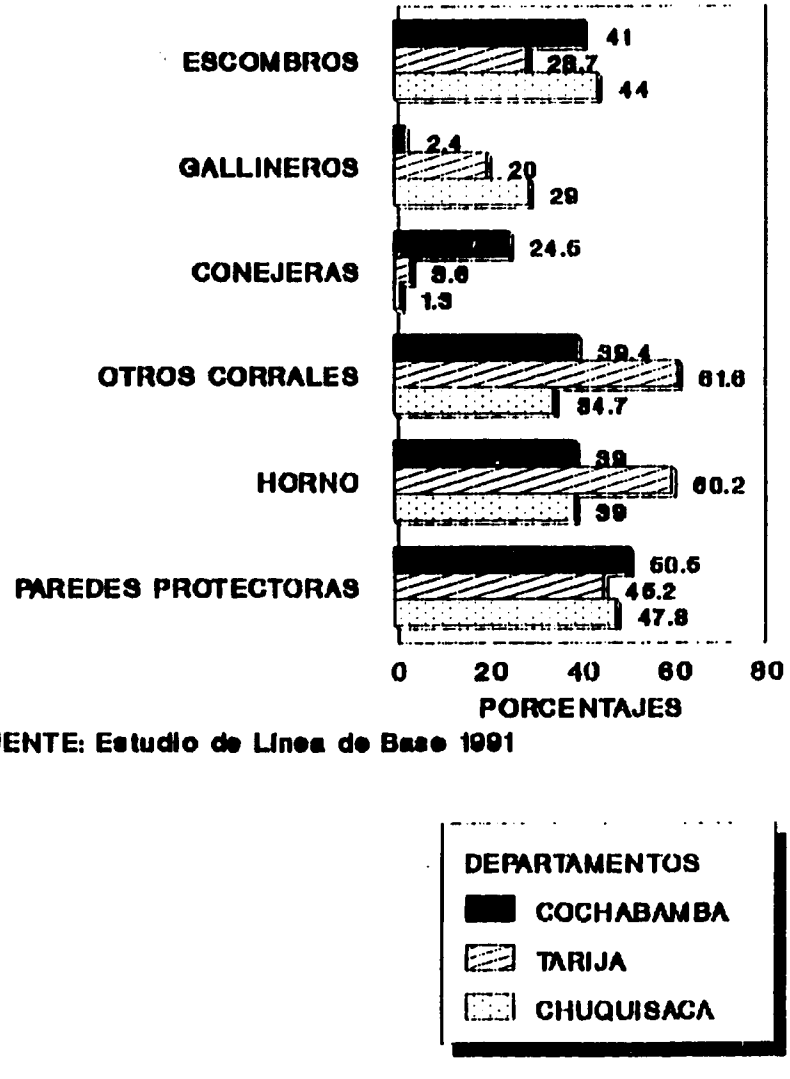
Percentage of Houses in Each Department with Basic Services (latrines, potable water, electricity) Available



FUENTE: Estudio de Línea de Base 1991

Figure 7

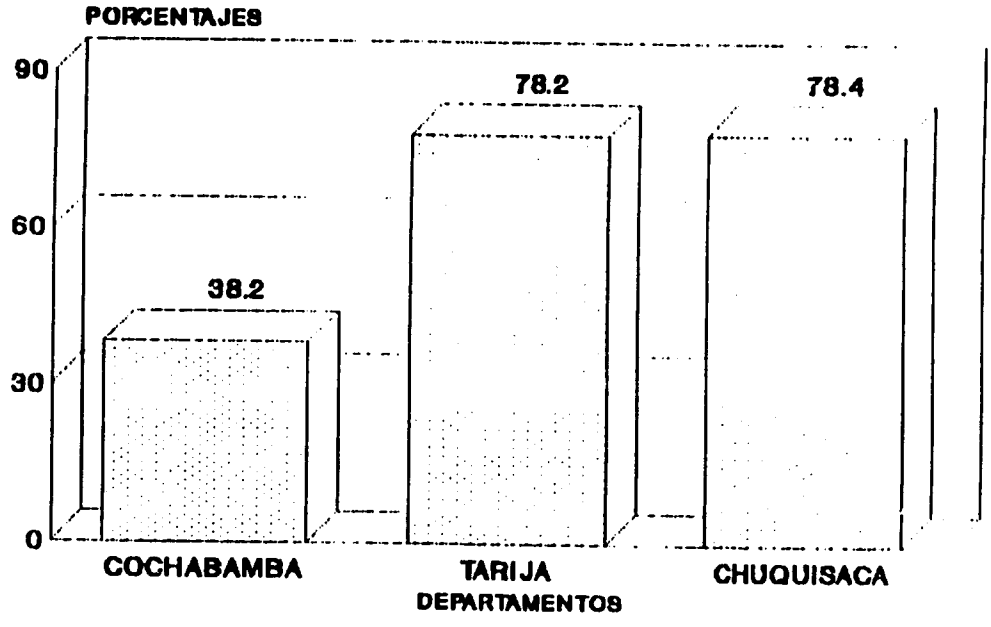
Percentage of Houses with Refuse, Outbuildings, Ovens, Animal Corrals And Other Surrounding Structures by Department



FUENTE: Estudio de Linea de Base 1991

Figure 8

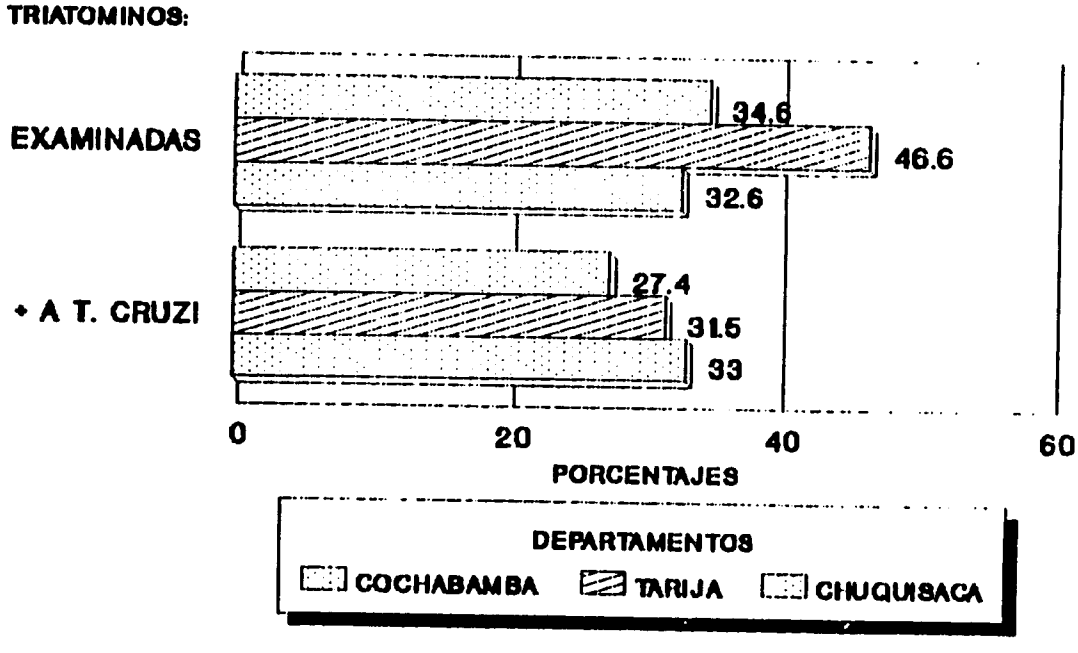
Percentage of Houses Infested With Triatomines by Department



FUENTE: Estudio de Linea de Base 1991

Figure 9

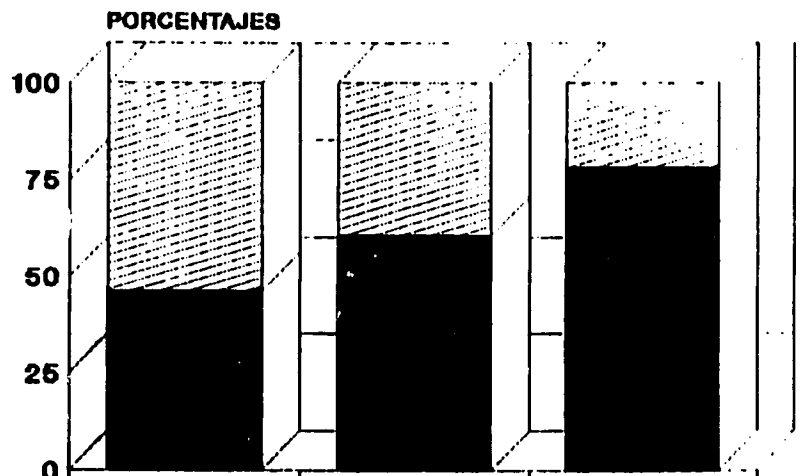
Percentage of Triatomines Examined and Triatomines Positive for *T. cruzi* by Department



FUENTE: Estudio de Línea de Base 1991

Figure 10

Results Of Serological Analysis of 4,128 Blood Samples (% Positive and Negative by Department)

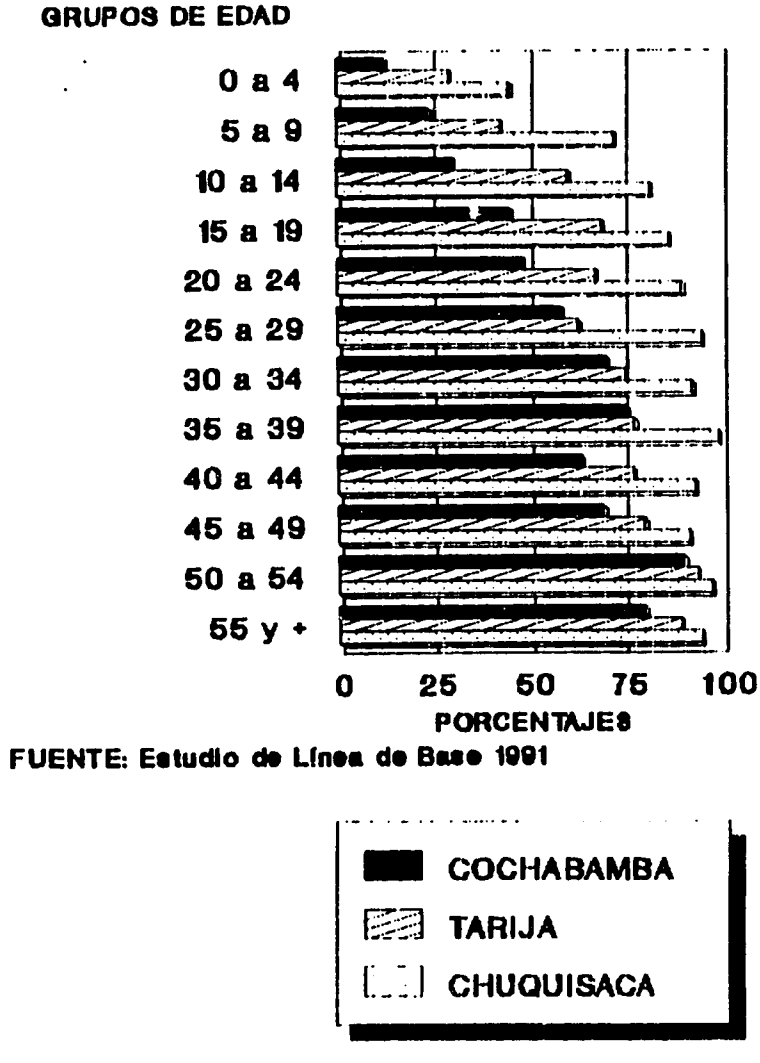


	COCHABAMBA	TARIJA	CHUQUISACA
NEGATIVOS	53.9	39.5	21.8
POSITIVOS	46.1	60.5	78.2

FUENTE: Estudio de Línea de Base 1991

Figure 11

Results of the Serological Analysis: Percentage of the Population with Positive Results by Age Group and Department



FUENTE: Estudio de Línea de Base 1991

4. Baseline Data

In the initial phase of this program, an extensive survey was made of the populations in the three prospective target areas — Chuquisaca, Cochabamba and Tarija. From a total population of 4,826 persons in 13 communities (1,038 habitations, with an average of 5.2 people per house) 4,128 blood samples were taken and analyzed for antibodies to *T. cruzi*. Entomological investigations were conducted in the houses (domestic) and adjacent structures (peridomestic), and the conditions and sizes of the houses were evaluated and measured. Demographic features of the population were established along with time of residence in the areas studied.

Serological work has been completed and all data analyzed. Samples of the analyses pertinent to the vector control phases of this study are illustrated in Figures 5-11.

The serological study found high rates of Chagas' infection in the study population. In two of the three areas, Tarija and Chuquisaca, the majority of people tested had antibodies to the parasite that causes Chagas' disease. Rates of Chagas' seropositivity ranged from 46 percent in Cochabamba to 78 percent in Chuquisaca (Figure 10). In some age groups in all three areas, more than 90 percent of the people were seropositive, and in Chuquisaca, approximately 90 percent of those between the ages of 35 and 39 were positive for *T. cruzi* antibodies (Figure 11).

Infestation rates in houses and adjoining stuructures were also high. In both Tarija and Chuquisaca, 78 percent of the houses were infested with triatomines, compared to 38 percent in Cochabamba. Infection rates in triatomines collected from houses and adjoining structures ranged from 27 percent in Cochabamba to 33 percent in Chuquisaca (Figures 8 and 9).

This baseline information will serve as an invaluable epidemiological reference for evaluating the impact of the proposed interventions on vector infestation and Chagas' transmission in these areas in subsequent years.

5. Inauguration of Tarija Housing Project and Program Planning Workshop for 1992

5.1. Tarija Inauguration

A CCH Chagas' housing pilot project in Tarija was inaugurated by the President of the Republic, Lic. Jaime Paz Zamora, and three ministers of state, including the Minister of Health, Dr. Mario Paz Zamora, and other dignitaries. The emphasis placed on the occasion is indicative of the strong political support granted the program. The U.S. Ambassador to Bolivia, Mr. Richard Bowers, represented the U.S. Government at the ceremonies.

The inauguration also provided a forum for discussion with representatives of the Fondo de Inversión Social (FIS), a national development fund, which is interested in investing in the program, and with the director of P.L. 480 in Bolivia, who promised more ease and speed in processing and releasing funds for Chagas' control.

5.2. Project Planning Workshop

Project participants at the Planning Workshop for 1992 included Dr. Kuritsky and Mr. Hartenberger (USAID/La Paz), Jaime Burgoa, the new CCH-Chagas' administrator, Dr. Velasco of CCH, Dr. Balderrama (Cochabamba), Dr. Ciro Figueroa (Tarija), Dr. Germán Guillen (Tupiza), Drs. Irene Vance of Habitat and two associates, and the author of this report.

Mr. Burgoa gave a summary statement of the fiscal situation of the program. He described the breakdown by salaries, transport, materials, and other categories required by P.L. 480 and the necessity for each activity leader to prepare budget requests using the same categories. This is essentially the way that the Cochabamba work plan had been prepared during the previous week.

Dr. Kuritsky reviewed the proposed work in each of the four pilot areas (including Tupiza, which will receive support in 1992), and pointed out that a balance had to be reached between the planned operational research and increased number of improved houses. Although continued house improvement is a strong political incentive and extremely good public relations, the basic idea of the pilot program is to develop a better understanding of Chagas' disease and cost-effective means for its control. Therefore, he recommended reducing the number of houses to be improved in 1992 (but still exceeding the 1,600 proposed at the 1990 Project Planning Meeting). The number now proposed for 1992 is 1,970: in 1991, 1,079 houses were improved (Table 2). All of the operational research projects — insecticide and infestation monitoring trials, sylvatic cycle, and congenital transmission — are funded.

Table 2
Houses Improved by CCH - Chagas' Control Program

	1991		1992
	Planned	Completed	Planned
Cochabamba			
Aramasi	327	300	300
Totora			70
Chuquisaca	400	445	400
Tarija	285	334	400
Total	1,012	1,079 (+6%)	1,170

Habitat's work will be extended to include Tupiza as well as Tarija. Coordination with the Cochabamba team will be required in preparing or completing manuals for the control program (see chapter 6).

Mr. Hartenberger pointed out that the Chagas' Control Program has achieved remarkable progress in a short period of time and has become (despite its relatively small size) one of USAID/La Paz's most visible and respected projects.

The group reviewed the 22 graphics representing the analysis of baseline information. Various suggestions and minor corrections were made. The Habitat representatives pointed out that there was little information on the social aspects of the population, beliefs about Chagas' disease and general levels of health education. It was suggested that samples be taken in each community to add such necessary data. Some of this information is available in the two consultant reports of Dr. Silverio Gonzalez-Tellez (Venezuela), who developed plans and instruments for a KAP study.

It would be very profitable to hold Chagas' group workshops bimonthly or quarterly. Such meetings would foster a better team spirit if organized properly. A two-day meeting, rotating between La Paz, Cochabamba and other sites, should be planned.

The agenda for such a meeting could include:

1. a financial review for the period;

2. technical review of important events that have occurred, or will occur, such as meetings with other agencies or donors;

3. review of activities by each team component: advances and problems encountered;

4. review of recent program documents prepared, consultant reports, SOWs for forthcoming consultants;

5. a seminar by one staff member on a particular project topic: for example, congenital transmission, sylvatic cycle or insecticide testing.

This meeting could be advertised and open to outside scientists and interested participants.

6. Manuals

During the first year of the program a great deal of effort has gone into preparation of various manuals — especially those for field operations, laboratory procedures and housing improvements.

The manuals for field operations and laboratory procedures have been drafted and submitted to several technical experts for review. Most of the sections in each of these two manuals are good, but often it is not clear who is expected to use them. For example, the field operations manual contains a laboratory section. The material in these two manuals will be used primarily for training laboratory and field workers in the national Chagas' control team at the levels of rural professors and medical field supervisors or their equivalents. These trainees will, in turn, train promoters[2] in the communities.

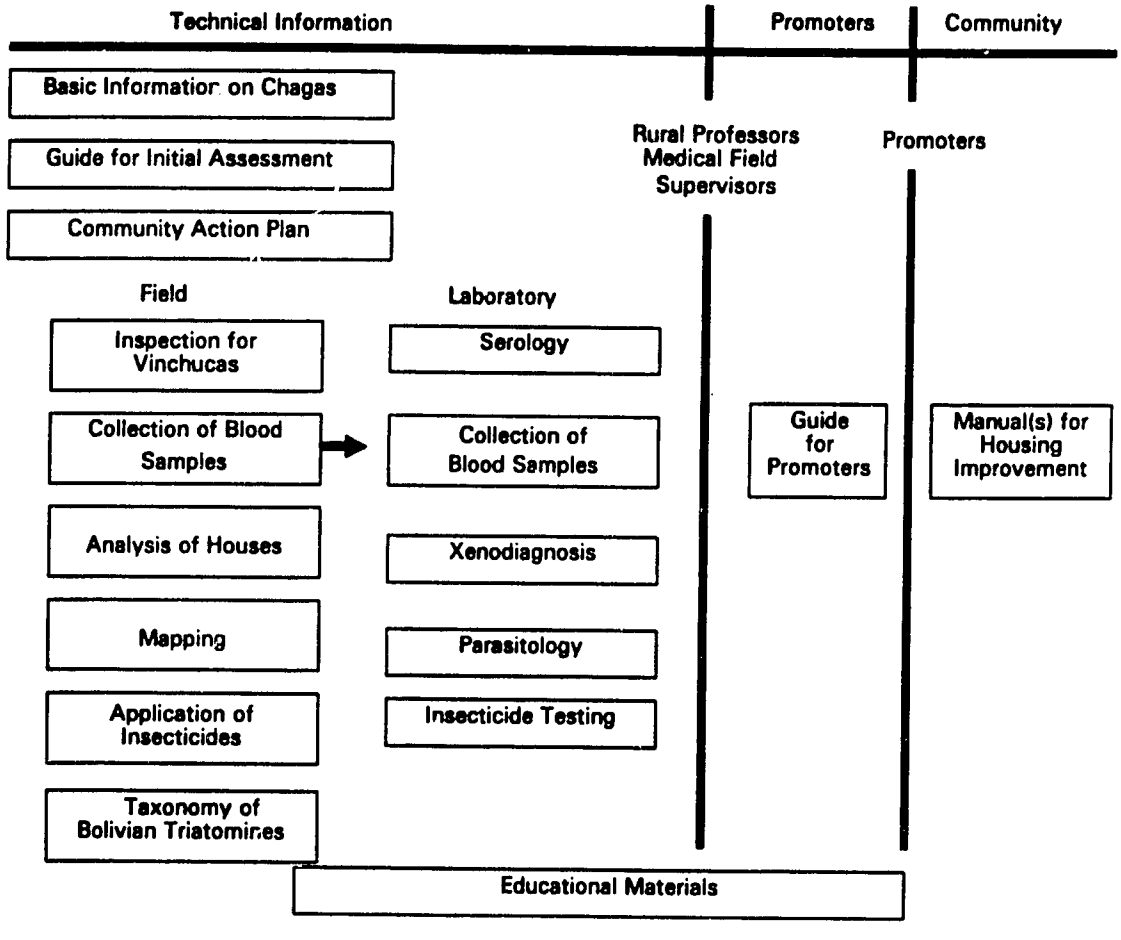
It would be more useful to have each of the chapters of technical information presented as separate units because: 1) some (e.g. mapping and application of insecticides) will be needed in larger quantities than others (e.g. insecticide testing or serology); and 2) it would be easier to update new versions as needed. Figure 12 illustrates how the individual sections could be grouped. The section entitled Basic Information on Chagas' is presently Section I (La Enfermedad de Chagas' y la Salud de la Comunidad) in the manual of field operations. Of the 13 units shown in Figure 12 under the heading of Technical Information, 11 are essentially complete.

Two additional units are recommended: a brief guide or checklist for the initial assessment of a community prior to the initiation of interventions, and a community action plan for estimating the costs and efforts to be committed within a community. This will be

[2]In various program documents, the Spanish words *promotores*, *capacitadores*, and *educadores* are used somewhat in the same sense. Standardized definitions would be helpful.

Figure 12

Suggested Educational Units for the CCH Chagas' Program



useful for planning purposes and can be used again when the work has been completed to compare the final cost against the initial estimate.

All of the above material has been or will be prepared by the CCH Chagas' control staff in Cochabamba. In addition, the staff in Cochabamba has prepared a draft guide for promoters. This is a good document. Some editorial changes have been suggested to Dr. Balderrama. The sections on insecticide safety and spraying could be dropped and incorporated into the similar technical information section. Also, the promotors would profit from a section or annex on how to organize community meetings.

In the terms of reference for the contract between CCH and Habitat (1992), the proposed educational packet (pp 7-8) includes two manuals: a manual on house maintenance (7.1) and an instructional manual (7.8) for educators and institutions working with the Chagas' problem.

Initially a manual on housing improvement was prepared by a contract architect in Cochabamba. The draft of this manual was considered unacceptable. The lengthy introductory text (40 plus pages) is of no value to the program. Some of the illustrations are valuable, although the accompanying descriptive texts clutter the pages.

It was agreed at the January 30 workshop in Tarija that Habitat would review the draft manual on housing improvement. Habitat will revise this draft or rewrite the manual completely with technical assistance from the Cochabamba CCH Chagas' control staff. Manuals on housing improvement and housing maintenance will be drafted in the same style as either one or two parallel volumes. The problem of how to produce regional versions of these manuals has not been resolved as yet.

The instructional manual will also be prepared by Habitat. An outline of this manual should be prepared as soon as possible. If the manuals have any overlaps with the guide for promotors already drafted by Dr. Balderrama, they should be clarified. Dr. Balderrama's guide provides more technical advice to promotors:

the proposed focus of the Habitat document will be on "community protagonists — women, children and youngsters, their needs and characteristics," as well as "improvement of levels of health in general." Both approaches are clearly needed whether they are combined or developed as separate manuals. If, as proposed, the Habitat manual is intended for use in schools and through other institutions, there will be no conflict in the two approaches. Each will have something to offer to the other.

7. Economic Component of the Program

It is essential that the Chagas' Program of CCH have a strong economic assessment of the activities that are successfully being undertaken. The core of the success of the program will be to develop, and deliver, housing improvements, education and vector control components that can be combined into an economically feasible national program in Bolivia.

Although financial figures are being gathered and the costs of the initial housing improvements in the different study areas are available, the information required to translate the initial pilot program into a national program must go beyond the present cost accounting. As there are regional differences in size, initial condition of houses, and the types and quantities of materials needed for necessary improvements, collection of economic data will require considerable foresight.

In addition, the cost of other activities must be calculated for each locality. These include:

- training of trainers, promoters and local craftsmen;
- insecticide application, both initially and for reinfested houses;
- monitoring for reinfestation;
- serological monitoring (including collecting blood samples, conducting laboratory tests and acquiring reagents); and
- producing and disseminating educational materials.

The present pilot phase of the Chagas' control program is heavy on administrative costs (including salaries), data management and analysis, research and other central activities. This is to be expected, but when the program reaches an operational stage there must be a plan for reducing central costs in proportion to those costs devoted to actual control interventions in the field. Habitat has

proposed to initiate market surveys (or to develop the mechanism to do such surveys) and to explore the feasibility of establishing revolving funds for housing improvement. To complete these initiatives, it is strongly recommended that an economist, preferably a Bolivian, be added to the Chagas' control staff to direct this effort.[3]

Such economic data will be important for evaluating the pilot program and for forthcoming discussions with potential donors. As the program is examining several different models of housing improvement and combinations of housing improvement, insecticide application, and training, it seems reasonable to assume that the program will eventually be able to present several Chagas' control models, and their costs, to the Government of Bolivia and other potential donors.

Regional models, depending on levels of income, present status of housing, intensity of Chagas' infection, and the level of organization of the existing health and community infrastructure, must be developed. It is most likely that the cost of regional programs will differ considerably.

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[3] By early June 1992 this was accomplished: the VBC project provided an in-country team (2 persons) to do the initial economic analysis and provide guidelines for future data collection and analysis.

8. Mid-Term Evaluation

The mid-term evaluation for the Chagas' disease component of the CCH Project is scheduled to begin May 18, 1992. As a number of the team members are expected to be from Latin America, the team planning meeting will be held in La Paz at the beginning of the evaluation.

To properly prepare for the evaluation, and to assist the evaluation team in carrying out its work, the Chagas' program staff should begin organizing material to make it readily available. This should include:

1. Background Documents:

   - literature on Chagas' disease listed in VBC Report AR-123 and Angel Valencia's book;
   - VBC Report 82229 on the November 1990 Planning Meeting;
   - consultant reports by Drs. Bryan, Tonn, Pinto Días, Gonzalez Tellez, and Arata; and
   - manuals prepared for the Chagas' program (see chapter 6 of this report).

2. Files on Contracts/Agreements with:

   - MOH,
   - Habitat,
   - Tupiza,
   - Tarija,
   - Chuquisaca, and others.

3. Financial Data on Expenses to Date:

- salaries,
- equipment,
- housing improvements,
- research activities,
- subcontracts, and
- PIO/T (VBC).

4. Report on Financial Problems: flow of money from P.L. 480

- effect on program progress, and
- steps being taken to overcome problems.

5. 1991 Accomplishments

6. 1992 Work Plan

7. Individual Files on:

- Tupiza,
- Tarija,
- Cochabamba, and
- Chuquisaca.

These files should include summaries of all activities completed (1991) and plans for 1992; baseline data appropriate for each section; and a description of the area and the interventions being employed.

8. Special Projects

- baseline data collection,
- congenital Chagas' study,
- sylvatic cycle study,
- insecticide testing,
- community training and community participation,
- development of educational module,
- economic assessment, and
- independent monitoring.

9. Future Plans

These individual files will also be useful to program managers in preparing internal reports, as needed.

9. Recommendations

1. In order to strengthen the program's capability to evaluate costs associated with housing improvements, educational efforts and vector control, and to develop plans for alternate sources of funding both at the national and international levels, it is recommended that a national economist be added to the program staff.

2. To prepare for the midterm review it is essential that the program team begin to assemble data and program documents in an organized manner to make these available to the evaluation team prior to, or at the beginning of, the evaluation. A sample organizational chart (organogram) is provided in the text (Figure 1), which should be adjusted if needed at the time of the evaluation.

3. Although the health benefits and political good will gained from increasing the number of houses to be improved in 1992 are important, the exercise should be used primarily to develop the methodology for housing improvement, testing of the manuals already prepared, training of trainers (*promotores*) at the local level, and means of increasing community participation.

4. Considering that measuring the rate of reinfestation by triatomines in improved and/or sprayed houses is a major evaluation technique to be used by the program, it is recommended that an evaluation program for all of the pilot areas involved (Cochabamba, Tupiza, Tarija and Chuquisaca) be established with the Division of Epidemiology of the MOH.

5. a) Production of a large number of manuals and guides has been undertaken by the program. It is recommended that these be produced as separate units (especially the technical guides) to make them easier to reproduce, use in different combinations, distribute and update. A proposed scheme is presented in Chapter 6.

b) Coordination between Habitat and the Cochabamba office will be required to finalize the two major uncompleted manuals — those for promotors and housing improvement/maintenance. The two groups should meet to share their current efforts and approaches to completing a draft of each prior to the midterm evaluation.

6. VBC should be requested to make arrangements, as soon as possible, to send a consultant to work with Drs. Torrico and Bermudez in establishing the capability to conduct precipitin tests for triatomine bloodmeal sources. This capability is essential for the sylvatic cycle study.

7. a) Bimonthly or quarterly meetings of the program team should be held to share financial and operational information. These meetings would provide a forum for discussing problems and developing cooperation between participants, and a mechanism for presenting technical seminars to a wider national audience to expand collaboration.

   b) The financial and operational planning process presented by Mr. Burgoa at the Tarija workshop was a new experience for some of the Chagas' team members. This should be formalized and used by all program groups.

10. Itinerary

January

18	Leave Washington D.C.
19	Arrive La Paz : briefing with Dr. Kuritsky
20-24	La Paz - Cochabamba (Jan. 20-24)
25-26	Field visit to Aiquile - Río Mizque area
27-28	Cochabamba
29	Cochabamba - La Paz (Office) - Tarija

January - February

29/1	Tarija: Inauguration of Tarija Housing Improvements
1	Tarija - Sucre - Cochabamba
2-3	Cochabamba
4	Cochabamba - La Paz
4-8	La Paz
9	La Paz - Lima/Quito

11. People Contacted

1. **USAID/La Paz**

   Mr. Paul Hartenberger, Chief HPN Officer, Deputy GDO
   Mr. Charles Lewellyn, Project Manager, CCH

2. **CCH Project/La Pa**

   Dr. Alvaro Muñoz, Director
   Dr. Joel Kuritsky, TACS, CCN Project
   Dr. Jorge Velasco, Epidemiologist
   Lic. Antonio Gomez, Systems Analyst

3. **CCH Project/Chagas' Components**

   Lic. Jaime Borgoa, Coordinator, La Paz
   Lic. Juan Carlos Lea Plaza, Computer Analyst, La Paz

   Dr. Fanor Bauldarrama, Coordinator, Cochabamba
   Dr. Herman Bermudez, Entomologist, Cochabamba
   Dr. Faustino Torrico, Immunologist, Cochabamba

   Dr. Roberto Marquez, Tarija
   Dr. Ciro Figueroa, Tarija
   Dr. José Beltrán, Tarija
   Dr. German Guillem, Tupiza

4. **USAID/Cochabamba**

   Lic. José Infante, Security Officer

5. **Ministry of Health**

   Dr. Mario Paz Zamora, Minister
   Dr. Jack Antelo, Director, Public Health
   Dr. Roberto Vargas, Director, Epidemiology
   Mr. Ibraham Gemio, Chagas' Unit
   Mr. Johnny Blanda, Chagas' Unit

6. P.L. 480

Lic. Carlos Brockman, Director/Bolivia

7. Habitat

Dr. Irene Vance, Coordinator, Bolivia Office

8. PAHO

Dr. Marcia Moreira, Epidemiologist, Country Advisor, Communicable Diseases

Annex

Sample Pages Of Cochabamba Work Plan 1992

Lista de Paquetes	Objetivos	Descripción de actividades
1. Procesamiento del material (triatominos) de: - Linea de base (nuevas localidades) - Vigilancia entomológica (antiguas localidades)	Conocer las especies de triatominos y el grado de su infección por T.cruzi.	- Identificación entomologica del 100% de los triatominos. - Examen parasitológico de heces y hemolinfa de una muestra de los triatominos.
2. Colonizacion de Triatominos de antiguas y nuevas localidades para ser utilizados en: - Pruebas con insecticidas - Xenodiagnostico del Proy."Ciclo silvestre"	Disponer: a)ninfas de 5to. estadio en suficiente cantidad para las pruebas relacionadas con insecticidas (acción residual, sensibilidad). b)ninfas de 3er. estadio para Xenodiagnóstico animal del Proy.Ciclo Silvestre	- Mantenimiento de una colonia de gallinas para alimentación de triatominos. - Cuidado, selección por edades y alimentación programada de las colonias de triatominos
3. Pruebas de acción residual de insecticidas en: - adobes de diverso origen - paredes de localidad rociada	Determinar la acción residual de varios insecticidas para la selección definitiva del insecticida más adecuado.	- Observacion de la mortalidad mensual de lotes de 20 ninfas de 5to. estadio de T.infestans (de Aramasi, Chuquisaca y Tarija) aplicadas (durante 6 horas) en superficies rociadas con insecticidas en: - adobes del mismo origen que los insecticidas - paredes de la localidad rociada
4. Pruebas de sensibilidad-resistencia a insecticidas de: - triatominos de localidades antiguas (completar con insecticidas nuevos). - triatominos de localidades nuevas.	Conocer la "linea de base" de sensibilidad de los triatominos de los 3 departamentos a los insecticidas seleccionados.	- Observación de la mortalidad de 20 ninfas de 5to. estadio de T.infestans aplicadas en papeles impregnados con insecticidas.

5. Proyecto "ciclo silvestre"	- Verificar el desarrollo de colonias de T. infestans en ecotopos silvestres. - Estudio del movimiento de T. infestans desde los ecotopos silvestres a los domiciliarios. - Estudio de características genéticas de T. infestans y T. cruzi silvestres y domésticos y estudio de hábitos alimenticios de los triatominos silvestres.	- Localizacion de madrigueras de animales con varios métodos. - Disección de las madrigueras en busca de triatominos. - Estudio de los movimientos de T.infestans desde isotopos silvestres a domiciliarios (construccion de gallineros y su disección periódica). - Examen parasitológico y entomológico del 100% de los triatominos capturados.
		- Conservación de los triatominos (infectados y no infectados) a -70 C para estudios genéticos y del origen de la sangre ingerida. - Examen parasitológico de los animales capturados con: - prueba de micro-hematocrito - Xenodiagnóstico
		- Estudio genético de triatominos y T.cruzi utilizando Iso-enzymas y PCR (previo aislamiento y cultivo de los parasitos). - Estudio del origen de la sangre ingerida por los triatominos mediante la técnica de precipitinas.
		- Rociamiento con insecticida para eliminar los triatominos domiciliares y evitar el movimiento de triatominos domiciliares al ecosistema silvestre.
6. Proyecto "Nuevas alternativas en el control de Chagas"	Comparar el costo-efectividad de la pintura-insectioida frente al pote fumigeno y los insecticidas habituales y comparar el rendimiento del Sensor Maria frente al del método "Hora/Hombre/Casa"	- Linea de base Entomologa y Serologa - Rociamiento con insectioidas, pintura-insecticida, potes fumigenos, etc. - Vigilancia entomológica con Sensor Maria, cintas adhesivas y h/h/casa. - Vigilancia serológica.
7. Preparacion de manuales operativos	Difusión de los manuales a diferentes niveles de las estructuras institucionales.	- Revisar manual de operaciones de campo - Revisar manual de examen parasitológico y serológico. - Terminar manual de promotores. - Elaborar manual de mejoramiento de vivienda
8. Analisis de los datos de linea de base 1991, escribir informe y publicaciones	Preparar el informe final y el documento para publicación	- Elaborar los datos y analizar la información. - Escribir los informes. - Escribir publicaciones.

CRONOGRAMA 1992

Lugar de Ejecución	Primer trimestre			Segundo trimestre			Tercer trimestre			Cuarto trimestre		
	Enero	Febrero	Marzo	Abril	Mayo	Junio	Julio	Agosto	Septiemb.	Octubre	Noviemb.	Diciemb.
Laboratorio Entomológico				X	X				X	X		
Laboratorio Entomológico	X	X	X	X	X	X	X	X	X	X	X	X
Laboratorio Entomológico Aramasi			X	X	X	X	X	X	X	X	X	X
Laboratorio Entomológico		X	X							X	X	

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LISTA DE PAQUETES	OBJETIVOS	DESCRIPCION DE LAS ACTIVIDADES
Chagas congenito - HGU - CBBA	- Conocer la magnitud de la transmisión congenita de la enfermedad de Chagas en los recien nacidos - Conocer la incidencia de transmision congenita de T. cruzi - Describir la mortalidad por chagas - Identificar cepas de T. cruzi - Validar nuevos métodos de dx de chagas congenito	**FASE DE PREPARACION** - Preparacion y aprobación del protocolo de trabajo - Elaboración de fichas técnicas, historias clinicas, programa computarizado - Entrenamiento del personal - Estandarización de las técnicas de laboratorio - Acuerdos y contratos con las instituciones participantes - Instalación de lugares de consulta, toma de muestra y control clinico **FASE PILOTO Y DE EJECUCION** - Toma de muestras a las embarazadas de la consulta prenatal y sala de parto - Toma de muestra de sangre de cordón - Llenado de la ficha materna y del RII - Procesamiento diario de las muestras obtenidas HAI - IFI materna IFI (IgM) ELISA (IgG) Parasitologico - Control mensual serologico y parasitológico del RN de madre (+) - Estudio de casos y control estudio clinico por el pediatra y asistente social - Introduccion diaria de resultados de laboratorio - Evaluacion y modificacion de los protocolos - Aislamiento de cepas - Supervicion de calidad
Evaluacion epidemiologica por serologia control 1991	Conocer el impacto de las acciones de control ejecutadas en 1991 en las diversas localidades de los tres departamentos	- Toma de muestras de sangre en papel filtro en Tarija, Cochabamba y Chuquisaca - Contrato con laboratorio para procesamiento - Procesamiento de las mismas por técnicas de HAI e IFI (500 muestras) - Almacenamiento de datos en paquete de computacion - Análisis de datos obtenidos

Estudio serológico de la Línea de Base para 1992	Determinar la prevalencia de infección chagásica humana en las nuevas zonas donde el proyecto iniciará labores de control	- Toma de muestras de sangre en papel filtro: el 30% de la población - Contrato con laboratorio para procesamiento - Procesamiento de las mismas (4,500 muestras) por TIF y HAI - Almacenamiento de datos en paquete de computacion - Análisis de datos obtenidos - Supervisión
Fortalecimiento del sistema de laboratorios de diagnóstico serológico y parasitológico de chagas	Preparar personal de laboratorio que trabaje tanto a nivel del Proyecto CCH-Chagas como a nivel asistencial con técnicas estandarizadas de diagnóstico instalar 2 laboratorios mas regionales en áreas consideradas prioritarias por el Proyecto.	- Curso de actualización en técnicas de diagnóstico laboratorial en chagas - Determinación de 2 regiones donde se instalen laboratorios de dx - Instalación de 2 laboratorios regionales de dx - Formación del personal y mejoramiento de manuales - Fortalecimiento de laboratorio central de investigación y distribución de reactivos - Control de calidad - Seminario de estandarización y control de calidad
Bancos de sangre	- Lograr la emisión de una ley que regule el control de calidad de la sangre de transfusión. - Educar al cuerpo médico y población en general sobre la importancia de la calidad de la sangre transfundida. - Iniciar un centro piloto de control de calidad y banco de sangre.	- Recabar información acerca de los sistemas de bancos de sangre en otros países comprendidos en áreas chagásicas - Recabar información acerca de la legislacion sobre bancos y transfucion de sangre en otros paises - Recabar información sobre las experiencias de control en Santa Cruz y sobre las formas de funcionamiento de los principales bancos de sangre del país - Proponer texto de ley sobre normas de transfusion - Proponer encuestas y material de educacion para el cuerpo médico - Preparar un afiche de salud sobre la calidad de la sangre de transfusion - Preparar "spots" televisivos sobre la calidad de la sangre de transfusion y la donación gratuita de sangre - Seleccionar una ciudad donde se inserte un banco de sangre modelo con donantes gratuitos y voluntarios

DESCRIPCION DE LAS ACTIVIDADES	LUGAR	CRONOGRAMA 1992			
		1er. Trimestre	2do. Trimestre	3er. Trimestre	4to. Trimestre
FASE DE PREPARACION					
Preparación y aprobación del presupuesto de trabajo	CCH - Cochabamba	X X X			
- Elaboración de fichas técnicas, historias clínicas, programa computarizado	CCH - Cochabamba	X X			
- Entrenamiento del personal	MGU - LABIMED	X X			
- Estandarización de las técnicas de laboratorio	LABIMED	X X			
- Acuerdos y contratos con las instituciones participantes	CCH - Cochabamba	X X			
- Instalación de lugares de consulta, toma de muestra y control clínico	MGU	X			
FASE PILOTO Y DE EJECUCION					
- Toma de muestras a las embarazadas de la consulta prenatal y sala de parto	MGU		X X X	X X X	X X X
- Toma de muestra de sangre de cordón.	MGU		X X X	X X X	X X X
- Llenado de la ficha materna y del RN	MGU		X X X	X X X	X X X
- Procesamiento diario de las muestras obtenidas HAI - IFI materna IFI (IgM) ELISA (IgM) Parasitológico	LABIMED		X X X	X X X	X X X
- Control mensual serológico y parasitológico del RN de madre (+)	MGU - LABIMED		X X X	X X X	X X X
- Estudio de casos y control estudio clínico por el pediatra y asistente social	MGU		X X X	X X X	X X X
- Introducción diaria de resultados de laboratorio	DIEMED		X X X	X X X	X X X
- Evaluación y modificación de los protocolos			X		
- Aislamiento de cepas	LABIMED		X X	X X X	X X X
- Supervisión de calidad					
- Toma de muestras de sangre en papel filtro en Tarija, Cochabamba y Chuquisaca.	Tarija - Cochabamba - Chuquisaca				
- Contrato con laboratorio para procesamiento					
- Procesamiento de las mismas por técnicas de HAI e IFI (500 muestras)	LABIMED - CUMETROP				
- Almacenamiento de datos en paquete de computación	LABIMED				
- Análisis de datos obtenidos	CCH				