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EXCERPTS FROM A HEALTH SECTOR ASSESSMENT PREPARED FOR USAID/GUATEMALA

DECEMBER 1986

by

The Institute for Resource Development
at Westinghouse

and

The Vector Biology & Control Project

AR-031-2

Managed by Medical Service Consultants, Inc.
under contract to U.S. Agency for International Development

Foreword

This report contains the executive summary of "An Incentive-Based and Inter-Institutional Community Oriented Primary Health Care System for Information, Training, and Service Delivery," prepared by the Institute for Resource Development at Westinghouse and the Vector Biology & Control Project. Also included, beginning with page 8-30, is a portion of Chapter 8, which discusses vector-borne diseases in Guatemala, and Chapter 9 which covers environmental health and sanitation.

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AN INCENTIVE-BASED AND INTER-INSTITUTIONAL COMMUNITY ORIENTED PRIMARY HEALTH CARE SYSTEM FOR INFORMATION, TRAINING, AND SERVICE DELIVERY

A HEALTH SECTOR ASSESSMENT

PREPARED FOR USAID/GUATEMALA

THE INSTITUTE FOR RESOURCE DEVELOPMENT

AT WESTINGHOUSE

AND

THE VECTOR BIOLOGY AND CONTROL PROJECT/USAID

DECEMBER, 1986

EXECUTIVE SUMMARY

Current (1986) health conditions in Guatemala provide dramatic evidence of resource shortages and of imperfect use of the scarce resources available. Key indicators of Guatemalan health show high infant mortality, low life expectancy, high incidence of communicable and chronic disease, malnutrition, and high fertility, than the same rates recorded for Latin American countries. Accordingly, Guatemalans are deprived of one of their most basic human rights -- that of a reasonable standard of health.

USAID/Guatemala, fully cognizant of these remediable shortcomings, engaged the Institute for Resource Development/Westinghouse to recruit an international team of experts to produce a health sector assessment for Guatemala. The team included a specialist in primary health care and family practice, an epidemiologist, a malariologist, a health economist, a medical logistician, and an anthropologist. The result of the team's efforts is a truly joint report.

The 1986 Guatemalan health sector assessment serves to update an earlier multi-volume evaluation of health conditions performed in 1977. The decade following the 1977 assessment saw many changes in Guatemala. The country passed through a succession of military dictatorships and a spasm of violence during the early 1980s remarkable for its ferocity. Following a constitutional convention, in 1985 the military voluntarily ceded their authority to a democratically elected president (for the moment, a greater degree of civil tranquility and political democracy have returned to Guatemala). Thus Guatemalans together with the international agencies dedicated to promoting their welfare now find themselves at a crucial juncture.

The uniqueness of the present moment lends extra urgency to the conclusions and recommendations of this assessment. Actions impossible even in the recent past may now be possible.

The present report consists of 16 chapters that deal with Guatemalan health problems in a systematic and practical way. This Executive Summary includes only the <u>most important recommendations</u> for USAID/Guatemala action, that is, those to which <u>first priority</u> should be attached. <u>Other recommendations</u> about desirable activities with <u>lower priority</u> are not mentioned here but are reviewed in detail in their respective chapters in the text of the report.

The first chapter begins with a consideration of the desirable policy dialogue in five areas. It recognizes that <u>USAID's most influential role</u> may lie in its leadership in sponsoring <u>policy dialogue</u>, rather than in brute force "move-the-money" efforts.

Accordingly, the first chapter urges dialogue on the replacement of short-term objectives (specific diseases, big-push campaigns) with longer-term goals. Similarly, immediate program needs must be subject to longer-term health-system objectives, to permit global coordination to replace partial approaches. The USAID is urged to build on local strength rather than seeking to create institutions from the ground up. Urban and rural considerations are explicitly introduced as relevant to any Guatemalan policy dialogue. The health situations in peri-urban areas surrounding Guatemala City are examined as a special problem case. Finally, the interactions between public providers of health care and the private sector are also reviewed.

Problems specific to Guatemala are considered throughout the introductory chapter. Examples include oral rehydration therapy, immunization, child survival more generally, the fiscal sustainability of health programs, the organization and administration of the Ministry of Health, the extent of coverage of health programs and their uneven distribution, and the problems of coordination between public and private health providers -- all within a Guatemalan context. An active policy dialogue between USAID, the Guatemalan health authorities, and other national and international agencies is recommended as an integral part of any effective health strategy.

The first chapter concludes by introducing basic policy recommendations in eight important areas -- areas whose detailed examination consumes the remainder of the report.

Incentives. The first recommendations, again within a context specifically Guatemalan, urge the adoption of incentives in health planning and health delivery. Carefully crafted sets of incentives should apply both to providers and to consumers. These incentives may be monetary and non-monetary. A Guatemalan Health Maintenance Organization is moving toward paying its physicians based upon the number of plan members for whom they assume responsibility -- a "wellness incentive", while providers in Ministry of Health clinics may be rewarded for data collection by prompt and accurate return of results.

Patient incentives range from a month's free membership in Salud Total for enrolling another member to a vaccination card for the mother of a child covered by an immunization program.

Multi-institutional setting. The Guatemalan health system contains a variety of institutions. Public sector providers include most prominently the Ministry of Health and the Guatemalan Social Security Institute. In the private sector, hospitals, clinics, pharmacies, private medical practices are present. They are supplemented by more than 150 private voluntary organizations, United Nations dependencies,

and other international agencies. The report recommends that effective extension of health care exploit the possibilities for leverage and coordination present in these diverse institutions -- institutions that at present operate independently of one another, with all the possibilities for gaps and duplication implied by such independence. The close connections between multi-institutional cooperation and the areas of important policy dialogue mentioned earlier in the chapter now take on added significance.

Community orientation. A third set of recommendations, which like all the others, is explored in more detail in succeeding chapters, deals with the desirability in Guatemala of a community-oriented focus. Many of the problems of the present system appear to stem from a highly centralized, top-down administrative approach. Such an approach neglects or even suppresses the rich cultural diversity of the country. Processes of goal-setting and health management are stripped away from the intended beneficiaries. The recommendations also explore preliminarily the issues of community responsibility and community participation.

Primary health care. The fourth family of recommendations deals with primary health care. Guatemala is far from unique in paying lip service to primary care at the same time that it tilts its budgetary allocations toward tertiary care. A renewed focus on child survival is clearly an important element in Guatemala's primary care strategy. In addition, the assessment emphasizes that strengthening primary care will occur only when midwives, volunteers and other para-medical personnel are incorporated more fully into the delivery system.

Disease prevention. The fifth set of policy recommendations is concerned with disease prevention and health promotion. These concepts are fundamental to a country like Guatemala, with a high incidence of preventable diseases. Unfortunately, Guatemala at the present time invests only a small percentage of its total health resources in prevention. Approximately 80% of expenditures by the Ministry of Health are for secondary and tertiary hospital care. Despite an active accident prevention program, the Social Security Institute (IGSS), has few prevention programs and has recently curtailed one of those. Some success may be noted in national immunization campaigns, although the last one, held in 1986, was flawed, perhaps due to a strike by health workers. The greatest need in Guatemala today is for effective and targeted programs in disease prevention for those diseases contributing most heavily to morbidity and mortality indices.

Health information. The initial chapter continues by recommending improvements in Guatemala's health information network. Existing information gathering, processing, distribution, and evaluation are deficient. These deficiencies, in turn, erect substantial barriers for

rational and cost-effective approaches to improving health care. More than the Ministry of Health is involved, although its position as the cornerstone of the health system leads the report to focus on its information problems. The biggest gap (and thus the clearest recommendation for more information), however, lies in the private sector, comprising at least half of the Guatemalan health delivery system.

Human resources. Guatemalan human resource questions occupy a prominent part of the assessment. Both formally trained medical personnel and traditional practitioners are reviewed. Strong recommendations deal with the training of paramedical personnel in selected categories (rural health technicians, midwives, auxiliary nurses). More effective use of medical students in their obligatory period of service and a plan to initiate a residency in family medicine have considerable attraction and deserve international support.

Service delivery. The first chapter concludes with an eighth set of recommendations. These center around questions of Guatemalan service delivery. The report recognizes that good information, well-focused training, and the like are meaningful only if health services can be delivered in a timely and efficient fashion. But traditional service delivery has failed to concentrate on primary care or preventive medicine or paramedical personnel or usable information or most of the other subjects of the previous recommendations. The report includes a series of recommendations whose goal can be summarized as a re-dedication to the end product of medical care: improved service delivery to all Guatemalans.

The assessment's second chapter provides more detailed background on Guatemalan health conditions. The demographic situation with its high fertility and infant mortality, the corresponding youthful age distribution of the population, the chief causes of infant deaths (pre-natal mortality, respiratory diseases, digestive-system illnesses, and infectious and parasitic diseases), and the rural-urban distribution of the population are reviewed. The chapter also examines in detail the stated health priorities published in official documents of the Ministry of Health, the Pan American Health Organization, and the Kissinger Commission. Supplementary interviews with officials in the Guatemalan mission of USAID provide additional detail on health goals and priorities.

In the third chapter, the present document pulls together briefly the recommendations made in the multi-volume 1977 health sector assessment. It goes on to consider USAID's response to those recommendations. It concludes that, for a variety of reasons, USAID and the government of Guatemala have not implemented extensively the recommendations from the 1977 assessment.

Chapter 4 describes the organization of the Guatemalan health sector. Extensive coverage is devoted to the Ministry of Health, the Social Security Institute (IGSS), health-related private voluntary organizations, and other private sector activities. The chapter clarifies the complexity of the organizations, their fields of operation, and their organizational and administrative problems.

Major recommendations in Chapter 4 that emerge from a review of the health sector's organization urge USAID's support for:

- Community-level primary and preventive care sponsored by the Ministry. A notable example, treated in detail in a later chapter, is the rural area of San Juan Sacatepequez.

- Reduction of mortality and morbidity in high-risk groups such as women of child bearing age and children under 5 years of age. Possible projects especially appropriate for Guatemalan circumstances include programs devoted to ORT, immunization as related to childhood communicable diseases, and infant nutrition more generally. In addition, active detection, surveillance, and evaluation should form an integral part of Guatemalan projects directed toward high-risk groups in poor populations, both urban and rural.

- Multi-institutional health projects at the local level, especially incorporating efforts by government health agencies (including hospitals), public and private universities, the private sector (including PVOs). A notable example of such cooperation in the past is Guatemala Sur with its El Milagro Health Center, reviewed as a detailed case study in a later chapter.

- Local-level community and consumer direction and control of health services. In Guatemala, service delivery projects should be guided in part by local health advisory committees and community groups with budgetary and decision-making authority. Clearly such a recommendation will not be an easy one to carry out, since it requires decentralization of authority.

Continuing in Chapter 4, the assessment recommends that USAID avoid involvement in Guatemalan tertiary care projects, as well as projects that impose burdensome obligations to pay for continuing streams of current costs out of strained local budgets.

In connection with the Social Security Institute (IGSS), the report's principal recommendations urge that USAID support:

- Geographic extension of IGSS maternal and child health programs to more of the 22 departments than the 9 now covered.

- Inter-institutional goal setting and cooperation between the Ministry of Health and the IGSS.

The assessment recognizes the PVOs in Guatemala as useful and highly visible organizations. It recommends a continuing role for USAID with respect to these important organizations:

- Better coordination among the numerous PVOs should be sought through agreed-upon policy guidelines (recall the policy dialogues mentioned earlier) rather than through intermediary funding agencies such as ASINDES.

- Potential support areas for PVOs include training rural health promoters, extension of family planning information, participation in ORT and immunization programs, and distribution of surplus food commodities, among others.

To begin to comprehend the scope of activities and interventions in the rest of Guatemala's private sector, the report recommends that USAID support systems for the private sector's reporting of health data. Particular needs at present lie in the development of appropriate reporting forms and incentives to private health providers for timely and accurate reporting.

Chapter 5 of the assessment deals with socio-cultural factors in health care. The report recognizes the problems implicit in improving health in a country where the indigenous population is concentrated in rural areas, speaks a bewildering variety of non-European languages, and has established a characteristic set of folk beliefs about health and medicine. While anthropological studies have confirmed the unexpected effectiveness of some of these practices, they remain at the fringes of our comprehension. Yet the extension of health care to these notably under-served populations requires considerable knowledge of their perceptions, beliefs, and practices and languages.

Thus the report recommends USAID support for studies leading to improved communication between providers and patients from varied cultural backgrounds. The role of traditional practitioners should be a key element in such studies. Community participation in the design, execution, and evaluation of this research is reinforced by this recommendation.

Chapter 6 of the assessment reviews briefly the role of international agencies in the Guatemalan health sector. It concludes that:

- USAID should recognize the challenges implicit in multi-sectoral projects such as those combining health measures with, for example, water and sanitation. Limited administrative and technical support for such projects in the past have reduced their effectiveness.

- USAID should join other agencies in avoiding involvement in high-technology hospital-based programs. Construction of new health facilities at all levels should be discouraged, at least until existing installations are adequately staffed and operating near capacity.

- USAID should coordinate more effectively its activities with those of other international agencies such as the Interamerican Development Bank and UNICEF. Particular attention, once again, should be paid to Guatemala Sur as a possible model for future multi-institutional program development.

Chapter 7 is the first in a sequence of three chapters dealing with specific health conditions. It reviews the Guatemalan situation in maternal and child health, family planning, and nutrition. Chapter 8 considers communicable disease control and features sections on diarrheal diseases , diseases prevented by immunization, respiratory diseases, malaria, onchocerciasis, and a variety of other communicable diseases. the sequence concludes with Chapter 9 on water and environmental sanitation.

Clearly these subjects are central to AID's health concerns. A correspondingly important set of recommendations for USAID action grows out of the assessment.

- Child survival. USAID should increase its support for the child survival program conducted by the Guatemalan Ministry of Health. Within an overall context of emphasis on primary and preventive community-based care, specific programs should include ORT, immunization and early diagnosis and treatment of Acute Respiratory Infections.

- Maternal and Child Health. USAID should support more training and supervision of unskilled midwives to improve hygiene surrounding child delivery. These activities should be a compulsory task for physicians and nurses working in rural areas and for all health professionals during their supervised professional practice.

- Family planning. USAID should continue its support for family planning services, such as those provided by APROFAM. This is especially important for inaccessible rural areas. Educational programs on contraception should play an increased role in family planning.

- Nutrition. Owing to the close relation between nutrition and health, USAID should continue its support for Guatemalan agricultural programs, especially those related to locally consumed crops.

- Selective immunization. USAID should emphasize more highly focused immunization program ("channelization") in areas of Guatemala where the necessary health infrastructure exists. This should replace an emphasis on mass national campaigns.

- Immunization products. USAID should make available a supply of immunization products, where and when needed. In Guatemala this will require the provision of certain commodities such as vehicles and other components of the cold chain.

- Malaria. Because of the alarming rise in cases of malaria, USAID should support the Guatemalan malaria control program. This should include an emphasis on reducing household spraying of chemical insecticides, an improvement of the surveillance network, technical assistance for increased knowledge about the ecology of the major vectors, operational research on alternative means of vector control, and improvement in the system of anti-malarial drug distribution.

- Onchocerciasis. USAID should support a national campaign to eradicate onchocerciasis in Guatemala. The campaign should be based on the provision of Ivermectin for treatment and reduction of disease potential. Focal control of vectors in well-defined areas of transmission should also be emphasized.

- Water and environmental sanitation. USAID should use its influence as a major donor to help achieve better coordination among the numerous national organizations engaged in water and sanitation projects. Of particular usefulness would be case studies of the quality of water and sanitation systems and the direct relationship of improvements in water for better health.

- Water in peri-urban areas. USAID should place more emphasis on the provision of water to peri-urban areas of Guatemala City and smaller cities in the country.

In Chapters 10 and 11, the assessment explores economic and financial aspects of health care delivery. This exploration is reflected in many of the report's recommendations. The chapter includes a survey of sources and uses of funds by the Ministry of Health and the Social Security Institute (IGSS). An original estimate of the size of private sector spending within Guatemala appears. It has risen to nearly 40 percent of total health expenditures. The chapter also includes a section on problems for providers and consumers alike which have stemmed from Guatemala's unanticipated inflation.

The absolute and relative size of government financial support for health has fallen in the mid-1980s. This leads to a recommendation that USAID assist the Ministry of Health in returning to levels of real per capita expenditure on health no less than those achieved during the early 1980s.

The surprising size of the Guatemalan private sector in health generates a recommendation that its magnitude be more carefully documented through studies of the size and economic implications of private hospitals, outpatient clinics, private physicans's offices, time studies of physicians' activities, and private pharmacies.

Chapter 12 examines the administration of Guatemalan health care by the Ministry of Health. Although a National Health Council has been established to coordinate all the activities of the health sector, it has never met. Thus the Ministry must bear the brunt of coordination and planning in health. The assessment recommends USAID support for the Ministry in incorporating budgetary considerations and limitations into its national health plans. This would supplement the use of physical health indicators in the health planning process and make the planning process more realistic.

Chapter 13 explores the important area of human resources in Guatemalan health. The uses of doctors and other health personnel in the Ministry and the Social Security Institute (IGSS), as well as their training, are central parts of the chapter. Recommendations that USAID should encourage certain programs and support them financially follow:

- Programs that integrate health educational experiences and health service opportunities. These programs should bring together universities and public sector institutions. Examples include the already mentioned programs in San Juan Sacatepequez and Guatemala Sur.

- Programs that put greater emphasis on the proven capabilities of rural health technicians and auxiliary nurses.

- Programs by PVOs that train health promoters.

- Programs that attract existing health professionals to under-served areas, whether urban or rural. One Guatemalan example is the proposal by Roosevelt Hospital for the establishment of a formal residency in family practice.

Chapter 14 turns to an exploration of the sensitive problem of health logistics in Guatemala. The Ministry, the IGSS, and the private sector are all active in the production, importation, and physical distribution of medical supplies and equipment. First priority recommendations for USAID support include the following:

- In collaboration with PAHO, an analysis of the basic list of drugs purchased by the Ministry. The goal of the analysis would be a shorter list of drugs essential to primary care. The more selective list of drugs, in turn, could be more readily supplied to distant health posts throughout the country.

- Once the list of essential drugs is available, the USAID should assist the Ministry in exploring alternative modes of delivery. These could involve the private sector. In any event they should provide incentives necessary to ensure timely and consistent product distribution.

The assessment's Chapter 15 inspects the Guatemalan health sector's management information system. Considerable frustration has been expressed by all those closest to it. Accordingly, careful study led to a number of high priority recommendations for USAID support:

- Technical assistance for a study on re-structuring the health information system. If other recommendations in this report are to be effective, more timely and reliable health information is absolutely essential.

- Training technical personnel needed to run and maintain a fully functioning health information system.

- An evaluation of the need for complementary computer facilities. Given the current configuration of equipment, these could include mini-computers compatible with the Ministry's present micro-computers, as well as complementary software.

Finally, the assessment concludes with a chapter that reviews principal conclusions and recommendations. In this summary, they have been stated above. The final chapter also examines four case studies -- two that might serve as models for implementation of the basic recommendations noted in Chapter 1, and two others that exemplify more prevalent and less promising ways to solve Guatemala's health problems.

The two model case studies provide working examples of many recommendations found in the health sector assessment. Their existence shows that the recommendations are not idle. It is significant that of the two model case studies, one is rural and the other is urban. It is also significant that both are strongly multi-institutional in their approach, involving the public and private sectors, as well as universities and service agencies.

The name of one of the model health centers, El Milagro, provides the basis for the title of this report: "The Miracle" of Guatemala. As is noted in the final chapter, the miracle of Guatemala is symbolized by a healthy child. This health sector assessment is dedicated to the proposition that implementation of its recommendations can assure "Health for All" in Guatemala.

GUATEMALAN HEALTH SECTOR ASSESSMENT

AUGUST 1986

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It is recommended that:

8.4.1 AID assist in the control of sexually transmitted diseases in Guatemala through: 1.) support of studies of factors associated with newer sexual concepts, pre- and extra-martial relations, behavior and knowledge related to venereal diseases; and 2.) development of programs in sex education for school age children and adults.

8.5 Malaria

During the 1940's and 1950's there were approximately 300,000 cases of malaria per year in Guatemala (1977 Guatemala Health Sector Assessment). With an intensified control program the number of cases diminished, so that from 1971 through 1976 the number of confirmed cases/year averaged fewer than 7000, with a low of 4030 cases in 1974. A dramatic increase followed, with 69,000 cases reported in 1979, and over 77,000 confirmed cases in 1982 (Figure 8.5.1).

Malaria continues to be the most common transmissible disease reported in Guatemala.[1/]. In 1983 the 63,024 cases confirmed parasitologically represented 43.4% of the morbidity due to communicable diseases (followed by influenza, with 16.7%). The number of cases dropped to 54,958 in 1985, and some reduction has been seen in the first six months of 1986 (37% lower than the corresponding months of 1985), possibly due to a cool spring and lack of rain. However, malaria transmission is highest during the rainy season (June-November) so the number of cases may still equal the 1985 total.

These recent figures may be misleading, however, as surveillance for malaria is based solely on passive case detection (i.e., people who experience chills and/or fevers and suspect malaria present themselves to voluntary collaborators, (details below) requesting anti-malaria drugs and allowing the collaborator to make a blood slide. Out of 441,757 seeking treatment in 1985, 54,958 were subsequently diagnosed as positive by microscopic examination of the blood samples.

1/ Recopilacion y Ordenamiento de Informacion para Diagnostico de la Situacion de Salud y su Relacion con el Desarrollo Economico, tomo III de IV (unpublished document), PAHO, 1985.

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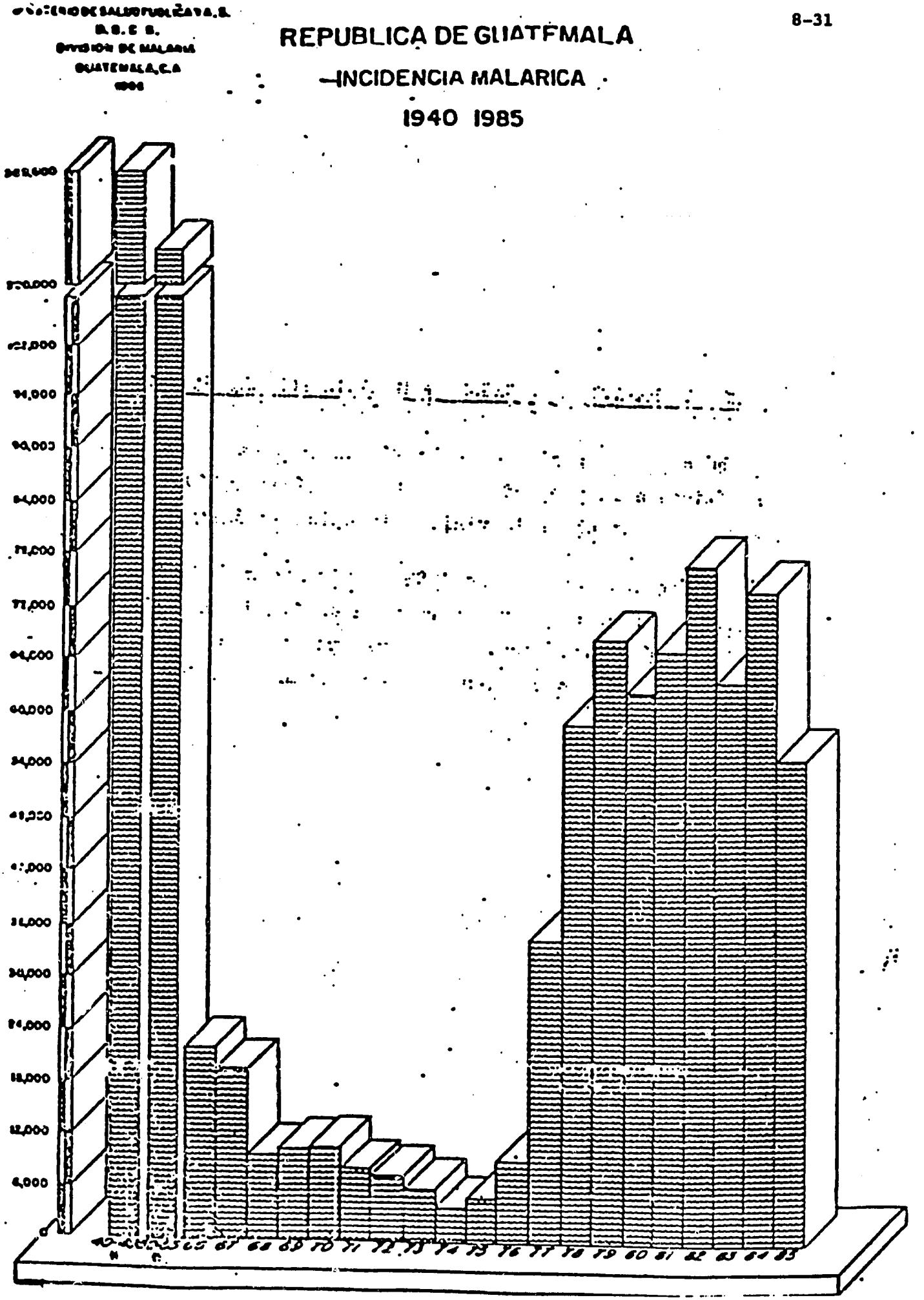
Figure 8.5.1


REPUBLICA DE GUATEMALA
INCIDENCIA MALARICA
1940 1985
6,000
12,000
18,000
24,000
30,000
36,000
42,000
48,000
54,000
60,000
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84,000
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96,000
102,000
108,000
114,000
120,000
126,000
132,000

Nevertheless, in a recent evaluation of the efficiency of the passive case detection system in Guatemala [2/] only 23.6% of a sample of known positive cases had visited a volunteer collaborator, 59% had automedicated themselves with drugs purchased at local stores or pharmacies, and 13% had not sought treatment at all. Assuming that this approximately 25% coverage applies nationwide, the official count of 54,958 malaria cases in 1985 would really represent a national case total of some 220,000 cases during 1985, only 25% of whom received treatment through the national service. (Table 8.5.1)

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TABLE 8.5.1

Data on Malaria Incidence (reported cases) in Guatemala
1981 - 1985

Year	Blood Samples Taken voluntary collaboration for system	% Positive	Reported Cases	P. vivax Cases	P. falciparum Cases	% P.f.	North (approximate to 500)	Central	South
1981	475,777 (68.9)	14.3	67,994	62,176	5,623	8.2	22,342	14,054	31,568
1982	468,400 (69.5)	16.5	77,375	69,534	7,398	9.6	30,958	15,250	31,126
1983	442,745 (72.8)	14.5	64,024	59,668	4,184	6.5	30,400	11,883	21,695
1984	526,694 (79.5)	14.1	74,132	67,597	6,270	8.5	41,232	13,112	19,779
1985	441,757 (80.3)	12.4	54,958	51,833	3,125	5.7	29,974	11.378	13,593
TOTALS	2,355,373	14.2	335,483	308,883	26,600	7.9			

5 years malaria = 67,100/year
5 years P.F. x = 5,320/year

Source: Compiled by author from Memorias de Labores, Division de Malaria.

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8.5.1 Geographic Distribution of Malaria

The National Malaria Erradication Service (SNEM) has estimated that a population of 3.2 million people live in malarious areas. Of these, where cases are reported, 17% have been confirmed as positive. For the country as a whole (approximately 8 million), the incidence rate is 3.25%.

For both surveillance and control purposes, SNEM has divided the country into three zones: North, East-Central, and South (Pacific Coast) (Figure 8.5.2). Over the past 5 years (1981-85) the number of cases has increased in the north (22 to 30 thousand cases); remained stable in the East-Central at about 13 thousand; and decreased in the South (from 31 to 14 thousand) (Figure 8.5.3). The percentage of confirmed cases of *Plasmodium falciparum* from 1981-1985 has averaged 7.9 (range 5.7 in 1985 - 9.6 in 1983) (Figure 8.5.4). Malaria is more frequent in the second six months of the year, except for 1985, during which the number of cases in the first semester was slightly higher (Figure 8.5.5).

8.5.2 Age, Sex and Social Impact

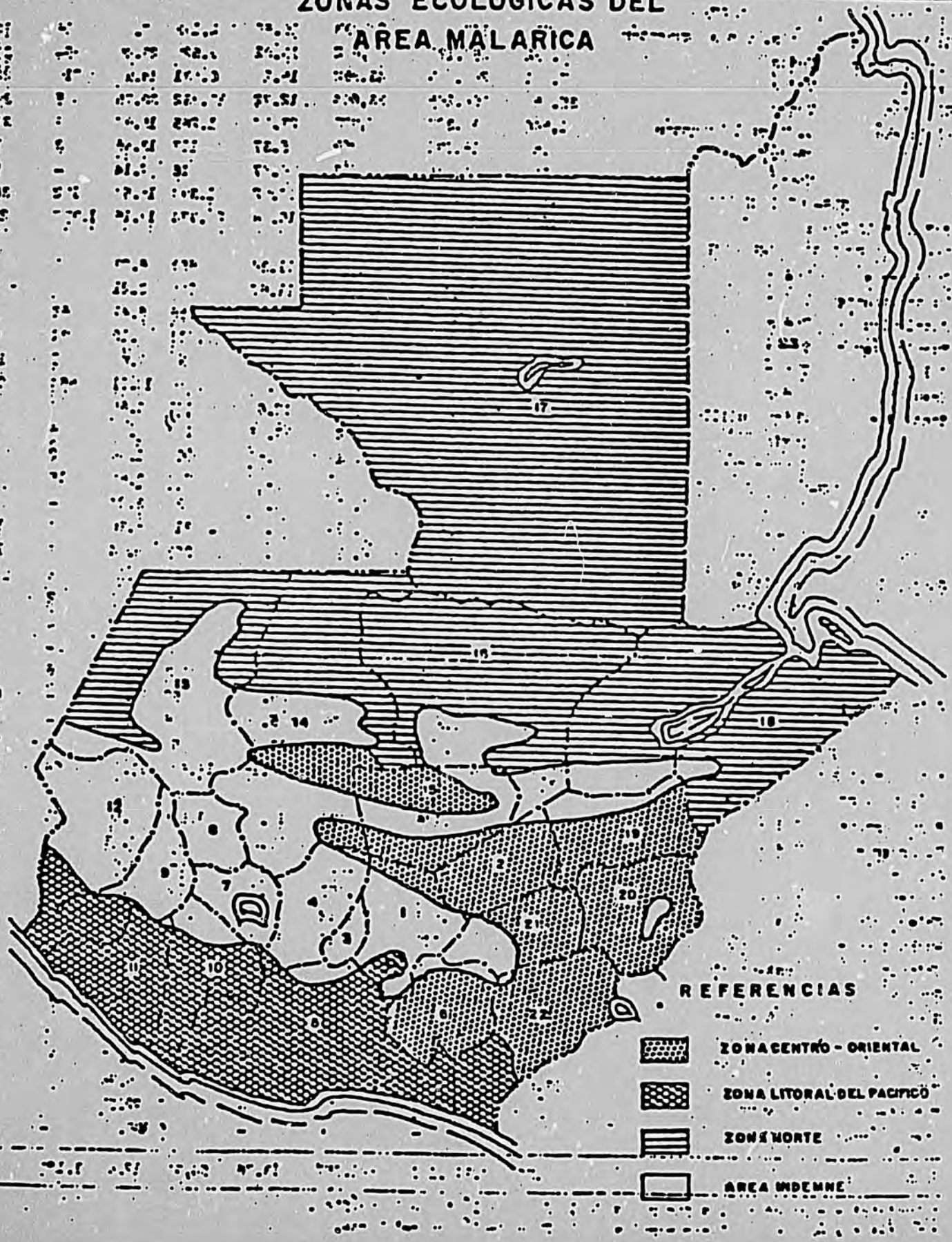
The only figures available are those resulting from the passive surveillance system, in which the age groupings of cases closely parallel the age distribution of the total population. Incidence is slightly higher (about 10%) in men and young boys than in women and girls. No studies have been carried out using active case detection laboratories or clinical techniques (e.g., spleen size) to determine whether the incidence among young children is higher than has been reported. It is not known if parents are less prone to have microscopic diagnosis (requiring a finger prick) of children, or if other cultural factors are involved. As 60% of medication is purchased through stores, precise treatment regimes used for children are unknown. This is an area that needs clarification, and active studies of age-specific rates in highly endemic areas are required.

2/ Ruebush, T.K., Godoy-Bonilla, H.A. and Klein, R.E.: 1985, *World Health Forum* Vol. 6: pp 274-277.

MINISTERIO DE SALUD PUBLICA Y A.S.
D.G.S.S.
DIVISION DE MALARIA
GUATEMALA, C.A.
1986

Figure 8.5.2

ZONAS ECOLOGICAS DEL AREA MALARICA



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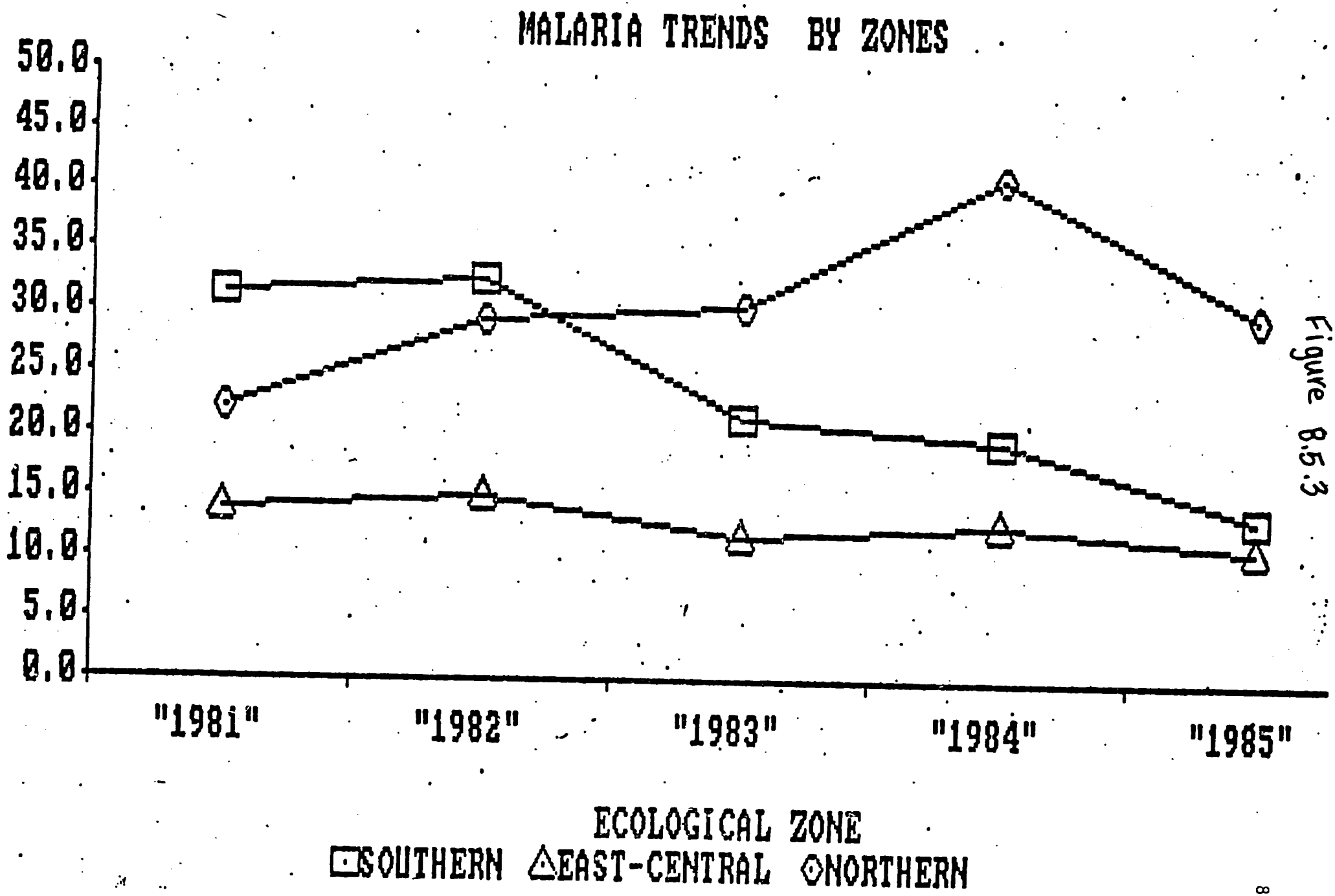

Figure 8.5.3

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Figure 8.5.4

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GUATEMALA, C.A.
1986

M A L A R I A

EVOLUCION DEL PLASMODIUM FALCIPARUM

1968-1985

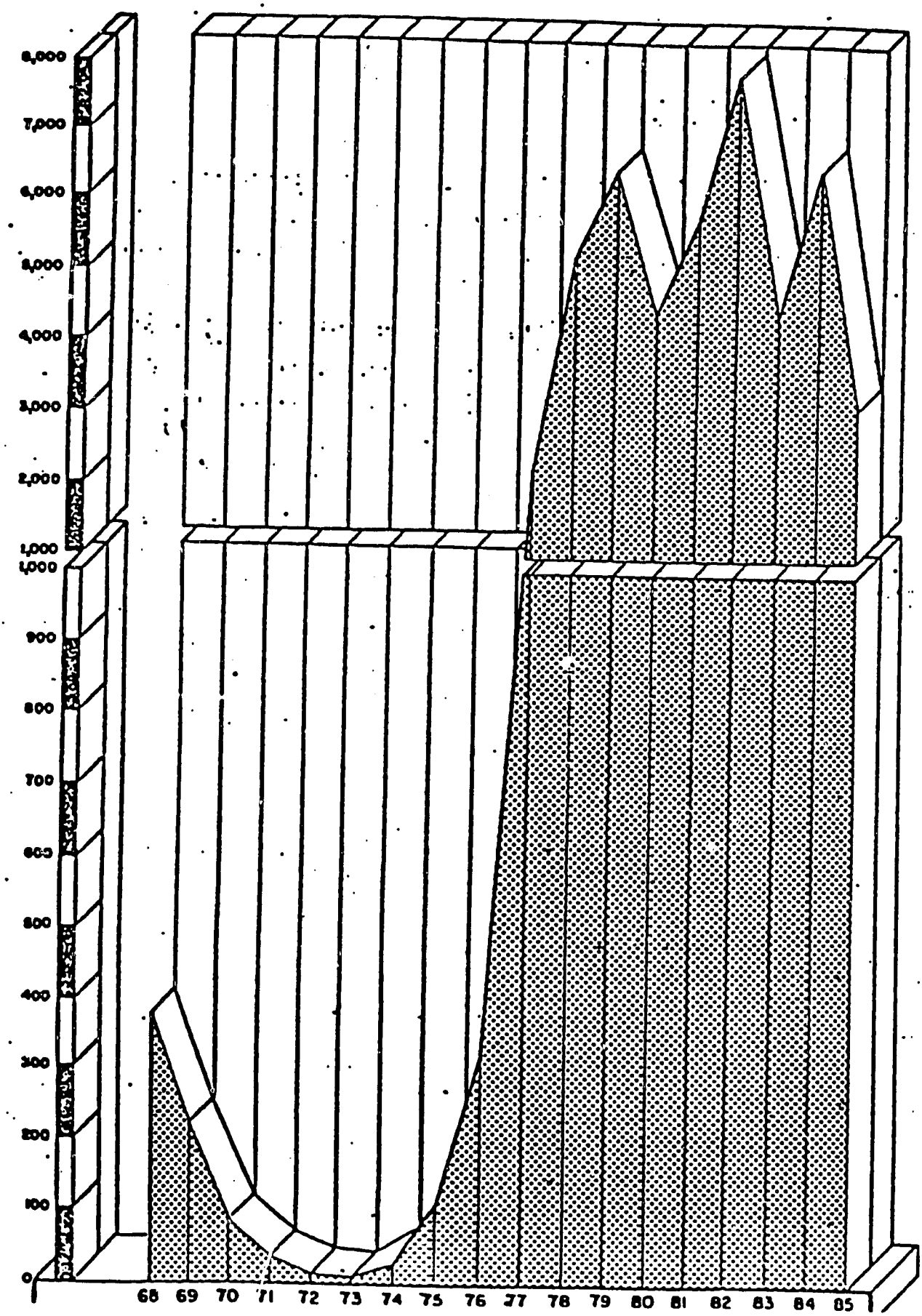

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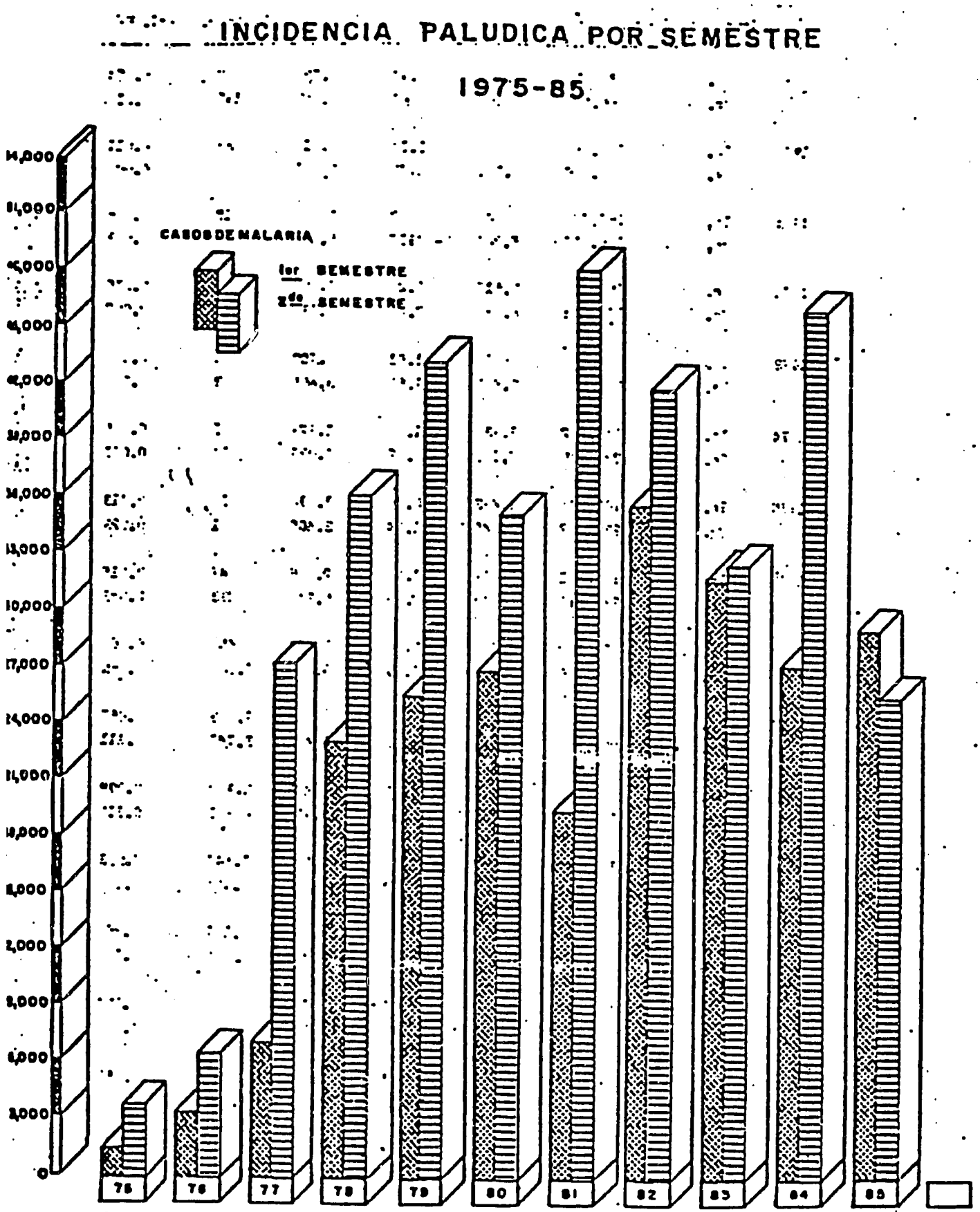
Figure 8.5.5


INCIDENCIA PALUDICA POR SEMESTRE
1975-85
CASOS DE MALARIA
1er SEMESTRE
2do SEMESTRE
75
76
77
78
79
80
81
82
83
84
85

Although mortality directly attributed to malaria has not been reported in recent years, the impact in relation to malnutrition and other conditions such as diarrhea cannot be overlooked as a major contributing factor to mortality, especially in the younger age groups. No studies have been carried out to determine the role malaria plays during pregnancy either as a factor in abortion or maternal health.

SNEM points out that about 60% (or 40,000) of the 67,100 verified malaria cases/year occur in persons of working age, active in the agricultural and livestock industries. Loss of work is estimated at 15 days for each case of malaria, at an annual loss of 600,000 person-days/year, or 2300 person-years. If the case-detection system is only 25% accurate, the work loss would be proportionally (i.e., four times) greater (i.e., over 9000 person-years).

8.5.3 Surveillance and Treatment

Surveillance (and treatment) is based on passive case detection, using a network of 6,222 voluntary collaborators (1985). These volunteers are local residents who receive no remuneration and are selected by their neighbors. They are trained for two days (on the average) and receive recording forms, chloroquine tablets, and materials (slides, alcohol and lancets) for making bloodsmears.

People who suspect (based on chills and fever attacks) that they might have malaria, visit the collaborator, and, after having a blood slide made, receive two tablets (150 mg) of chloroquine (a presumptive treatment). The slides are sent to SNEM, where they are read by trained microscopists. Persons whose slides are positive are given radical (i.e. curative) treatment, consisting of chloroquine and primaquine.

Most malariologists recommend that radical treatment begin by 7 (or at most 14) days after the blood film is made. In a sample of positive cases, the delay between the time the slide was taken and the date it was determined to be positive ranged from 0-93 days (average = 23 days); in 56% the delay was more than 15 days. Figures may vary by region (e.g., informal reports indicate delays in the south range about 15 days).

Radical treatment was given to only 62% (34,124 patients) of those individuals whose blood slides were diagnosed as positive.[1/] Both of these examples (delay and lack of follow-up) indicate

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1/ Division of Malaria, Memoria Anual 1985.

that the system could be improved, and SNEM is attempting to improve the efficiency of the volunteer collaborator system. In conjunction with CDC and the Universidad del Valle, several studies are now under way.

However, not many other sources of blood-slide exist. the SNEM volunteer collaborators collect 75% of all slides collected in the country. The remaining 25% are collected in hospitals and health posts, and by doctors. The 75% of the cases confirmed as positive are from the slides collected by the collaborators.

In addition to providing radical treatment for positive cases, the surveillance system operates to indicate areas of active transmission where spraying can be directed as needed. Delays and low coverage of radical treatment indicate that emergency spraying is not being carried out promptly. At present (1986) this delay is compounded by the lack of insecticides, which keeps even routine spraying at a minimum.

The MOH Division of Malaria is conducting a study on "Knowledge, Attitudes and Treatment-Seeking Behavior for Malaria in Guatemala," ($68,100), and a second study entitled "Study of Drug Distribution and Sentinel Volunteer Collaborator Posts for Malaria Treatment and Surveillance in Guatemala," ($151,355 USD) both funded by the WHO Special Programme on Tropical Diseases (TDR).

Also, a trial is under way in the South Zone, where volunteers in an area are giving 3 days of treatment (chloroquine (150 mg) plus primaquine 15 & 5 mg according to age) instead of blood sampling to see if the use of the service improves. These trials will be subsequently evaluated by active case detection.

As noted above, some 60% of the people in the evaluation study preferred purchasing their medication from local pharmacies and stores. As this figure is much greater than the 24% going to the volunteer collaborators, a study involving on the private sector's role in both surveillance and treatment would seem appropriate.

8.5.4 Vector Control

a) Insecticides Although donations of insecticides have not been forthcoming, the Guatemalan government has consistently provided funds for their purchase, which amounted to an average annual expenditure of Q1.3 million, or 36% of the annual budget of the Malaria Division, but which has dropped notably in 1985 to Q 0.5 million. Five percent of insecticides thus purchased are used to cover the *Aedes aegypti* control program.

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These financial limitations have had a drastic effect on spray coverage, which has dropped dramatically since 1980. The total number of reported cases of malaria (Figure 8.5.7) and the proportion of positive slides, however, have not increased yet, although there was a regional increase in the number of positive cases recorded in the Northern Zone (Table 8.5.2).

Approximately 1,500 localities were sprayed in 1984 and 2,000 in 1985, representing 87% and 83% reductions, respectively, from the 1980 level, due primarily to the lack of insecticides, vehicles and spraying equipment (both purchase of new items and spare parts for the old have been impossible due to lack of funds).

Susceptibility trials conducted in 1985 showed that acceptable mortality (i.e., control) of the principal vector, Anopheles albimanus, is still feasable in some parts of the country (using most insecticides currently available), except, perhaps, for the southern coastal zone, given current fiscal resources. (Table 8.5.3) The pattern of insecticide usage from 1977-1985 is shown in Figure 8.5.8.

TABLE 8.5.2

Variation in Sampling and Incidence of Malaria in the Three Malarious Ecological Zones of Guatemala 1985

Zone	Population in Malarious Zone	Blood Samples Taken (positive)	% Population Sampled	% Samples Positive	Cases/ 1000 Persons
Northern	1,039,764	156,442 (29,974)	15.0	19.2	28.8
Southern	997,668	121,287 (13,593)	12.2	11.2	13.6
East-Central	1,172,669	163,991 (11,378)			

Source: Compiled by author from Memorias de Labores, Division de Malaria.

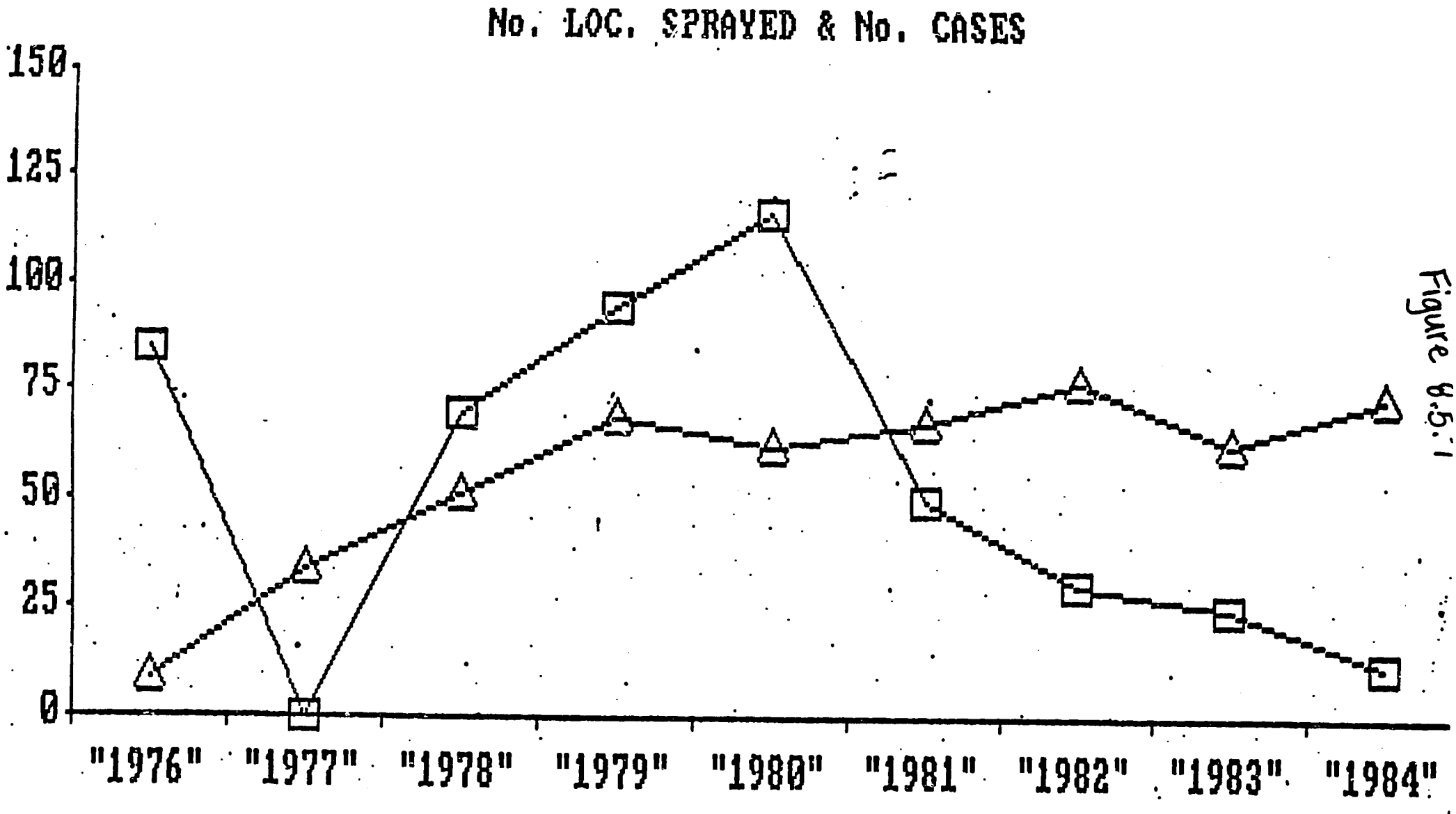

Figure 8.5.1

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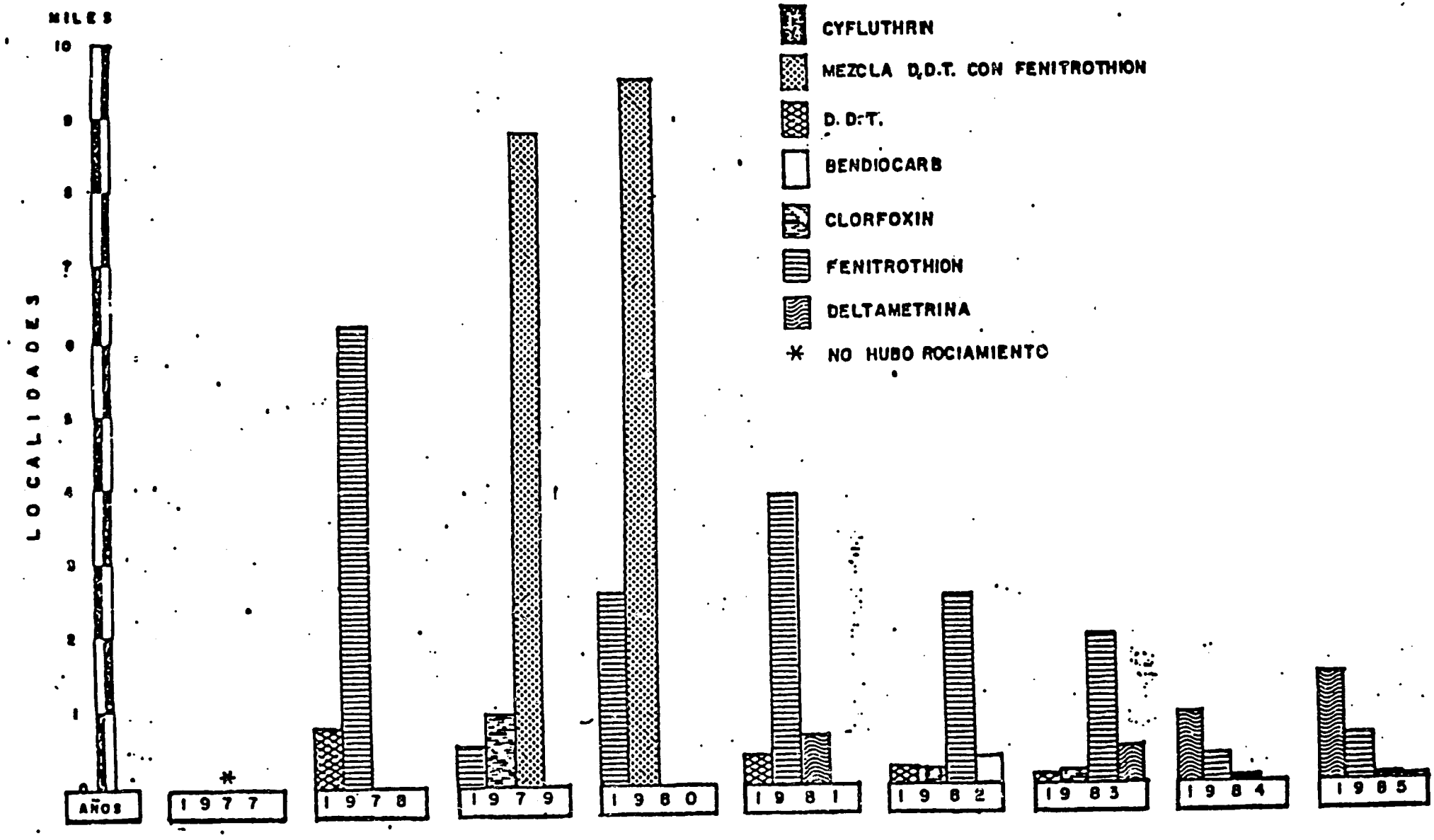
MILES
LOCALIDADES
10
9
8
7
6
5
4
3
2
1
0
AÑOS
1977
1978
1979
1980
1981
1982
1983
1984
1985
CYFLUTHRIN
MEZCLA D,D.T. CON FENITROTHION
D. D.T.
BENDIOCARB
CLORFOXIN
FENITROTHION
DELTAMETRINA
* NO HUBO ROCIAMIENTO

Table 8.5.3

Mortalities (susceptibility obtained in trials with An. albimanus (1985)

	North	East-Central	South
Deltamethrin	100%	100%	90%
Cyfluthrin	NT*	NT*	96%
Bendiocarb	100%	99%	89%
Propoxur	NT*	99%	93%
Fenitrothion	100%	100%	94%

*NT=Not tested

Source: Memoria Anual, 1985, Division de Malaria, MOH.

b) Source Reduction There has been little systematic use of source reduction, because it was generally held to be expensive or ineffective in extensive breeding sites. However, source resolution should be tested in certain localities. For example, modest efforts could be effective in identifying small water management problems which may be producing vector mosquitos within flight range of rural communities. These breeding sites could be eliminated by filling or drainage work provided by local labor as a form of community participation, under appropriate incentives, education and leadership. Plantation owners should also be encouraged to participate in such efforts. Larger scale source reduction may be used in certain situations where engineering skills are required - for example on the esteros (lagoons) of the Pacific coast, which are well-known anopheline breeding sites. Consideration should also be given to clearing clogged and overgrown irrigation and drainage ditches on the coast.

Source reduction can also reduce the dependence on pesticides, which must be purchased abroad with foreign currency, a major constraint to the malaria program in Guatemala at this time.

c) Other Means of Vector Control Biological control by means of predatory fish has a long history of use in Central America and may still be useful in certain, especially manmade, habitats.

Larvicides in general have not been fully tested. In addition to chemical larvicides, the use of the microbials (*Bacillus thuringiensis* H-14 and *B. sphaericus*) has had great success in certain areas. Their use is warranted where possible environmental contamination by chemicals may cause concern. New growth-regulating compounds have proved successful in other areas where larvicidal control is practical.

Other means currently being considered in Central America include use of permethrin (a synthetic pyrethroid insecticide), impregnated bed nets, and DEET repellent as means of personal protection.

1. Operations Research: In general, operations research has not been adequately employed for testing and improving methods of vector control, or for the surveillance system and coverage with therapeutic drugs, except as mentioned above. Despite restricted resources an emphasis on adequate operational research would provide not only new

avenues for control but would also stimulate interest and morale. Efforts should be made to include the national universities (both faculty and staff) in such research.

2. Stratification: At present the SNEM divides the country into three ecological zones (North, East-Central and South): data are collated by Departments as well and can therefore be superimposed on any analysis by region. The extensive networks collecting malaria information could also provide information on other factors influencing malaria transmission (e.g., socio-economic conditions, rainfall, temperature, and in selected areas, mosquito breeding and densities). Such data would allow for more specific stratification identifying areas of high risk, and would be consistent with recommendations made by PAHO (Program of Priority Health Needs in Central America and Panama (CAP), the PAHO-AID Agreement, Grant No. 1.597-0136, Malaria Component.)

3. Vector Ecology: There is a lack of information on the vetorial capcity of An-pseudopunctipennis and An-darling in Guatemala. In general, studies on vector ecology should lead to improvement in control and to determining the significance of relapses in case reporting.

8.5.5 Resources of the Malaria Division

The Division has received an average of approximately Q3.5 million/year from national funds for the last ten years. No outside funds have been received for pesticides, vehicles, or spraying equipment. A considerable number of grants for training abroad have been provided since 1977 by PAHO, and more recently (1986-to date) through PAHO/USAID assistance.

The PAHO/USAID Agreement (Malaria Component), Grant No. 1-597-0136 for 1986-1990 provides funding for research (although the national components of this research are poorly defined), training, coordination of epidemiology strategy, periodic meetings, etc. Funds for control operations are not available through this program..

The equipment of the Malaria Division (vehicles, boats and motors, and spraying equipment) are old and in need of replacement. Spare parts have been very difficult to obtain.

An emergency request for funds (supplies and equipment) has recently been made to AID/Guatemala . Another request, in conjunction with other Central American countries (El Salvador, México, and Honduras), to the Interamerican Development Bank is pending. The application from Guatemala to IDB is for a 4 year, US$ 15 million loan, for control of malaria and "other tropical diseases". The IDB is considering it at present for possible implementation in 1987 or 1988. If approved, it will be the first time IDB has funded a malaria project.

Funding would cover vehicles, supplies and physical installations, and, in addition will consider special programs, such as source reduction through drainage, damming, and others.

The evolution of the malaria problem(s) and the cost of traditional attack measures are forcing serious consideration of the redeployment of resources.

The primary case against continued dependence on household spraying is the recurrent cost of insecticides, equipment, and labor. The development of insecticide resistance requires the substitution of newer and generally more expensive insecticides. Ultimately the cost of total coverage is not sustainable. On the other hand, spraying on a focal basis to control local outbreaks can be effective and cost-effective if a proper surveillance system is in place, and such a technical unit should be retained. It can also have other benefits, such as control of Aedes Aegypti and onchocerciasis.

8.5.6 Vertical Malaria Control Programs versus Control Through Primary Health Care

Throughout the world there is conflict between the so-called "vertical" malaria control programs and the current emphasis on establishing primary health care systems which can incorporate some of the activities of malaria control. There has been a certain degree of resistance to the adoption of malaria control into PHC.

At present, the approach most generally proposed is to integrate surveillance and distribution of antimalarial drugs into the PHC system when it is capable of carrying out this function, and retaining the technical spraying capability as a coordinated vertical unit responsive to local needs, and results of vector surveillance. It is not assumed that spraying activities can be safely carried out by PHC workers, as a central administrative unit is necessary for logistic support. The technical personnel in the malaria control unit could then expand operations on source reduction and other preventive measures, and concentrate on improving this effectiveness through operational research projects.

The development of such integration depends heavily on the capability of the PHC system to assume the functions mentioned above, on the collaboration of the malaria control authorities, and on thier willingness to move away from the complete dependence on intra-domiciliary spraying with residual insecticides. Inherent also is the need to stratify malaria control within the country and develop improved methods of surveillance.

8.5.7 Summary

The Guatemalan malaria control program is efficiently run, operating in a traditional manner largely dependent on household spraying, with surveillance and anti-malarial drug therapy centered on a system of volunteer collaborators. It has received consistent, if inadequate, funding from national resources, which are now seriously threatened by the reduced buying power of the national currency. Insecticide supplies for future broad-scale spraying are inadequate, vehicles and equipment are old and need replacement.

Malaria has averaged 67,100 cases/year (7.9% *P. falciparum*) for 5 years (1981-1985); there was a 26% reduction in the confirmed number of cases in 1985, and this observed reduction continues in the first 6 months of 1986. Spraying has been reduced continually since 1980, because of diminishing resources. The reason for the reduction in the number of cases, especially on the Pacific coast, is not known, but a similar reduction is being observed in El Salvador in similar ecological settings.

The reduction in the spraying operations over the past five years has not resulted in an increase in malaria throughout the country. This may indicate that a large number of the reported cases may be due to relapses, which are unaffected by spraying. Studies on the man-mosquito contact notes could clarify this. If true, malaria control may be achieved through improved distribution, which may involve shifting certain aspects of surveillance and drug distribution to alternate services, such as the PHC system(s). In either case, improved knowledge of the dynamics of transmission and stratified surveillance are essential.

8.5.8 Recommendations

The malaria control program has reached what is viewed as a static operation. The limited financial resources available do not provide for replacement of old equipment or for purchase of insecticides to maintain coverage at past levels. However, the cost of insecticides, especially those needed to overcome the resistance which has developed to cheaper compounds, is prohibitive as the sole long-term solution to the malaria problem. In view of the ecological complexity of the malaria situation in Guatemala, the development of an integrated control program is both sensible and imperative. Therefore, assistance provided to the malaria control program should be accompanied by corresponding changes in the control options employed by the Division of Malaria.

Therefore, it is recommended that:

8.5.8.1 USAID support the Guatemalan malaria control programs, emphasizing the need to reduce dependency of household spraying with chemical insecticides. Support should focus on improvement of the surveillance network, increased knowledge on the ecology of the major vectors, operational research on alternate means of vector control, and improvement in the system of anti-malarial drug distribution.

8.5.8.2 USAID support multi-institutional (including universities) operational research on the various vectors involved in malaria transmission in order to develop new or more effective means of malaria control. Data on vector population densities, behavior, and relation to human activities should be considered and the results and data used in a stratification process.

8.5.8.3 USAID reinforce the system of malaria surveillance and treatment through volunteer collaborators. Especially important is the need to: a.) reduce the time between when slides are taken and follow-up (radical) treatment is administered; b.) increase the number and percent of persons receiving radical treatment; and, c.) identify and treat relapse cases, in the absence of vector control.

8.5.8.4 USAID promote better collaboration of the malaria control program with the general health services and primary health care systems in the country, as well as PVOs and elements of the private sector (such as plantation owners, agricultural cooperatives, etc.

8.5.8.5 USAID, in its technical assistance role, should place greater emphasis on stratification of malaria distribution, especially when the number of cases is reduced, so that more direct and focal action can be taken. This should include recording cases/unit of local population, vector distribution and density, breeding sites for source reduction, and socioeconomic measurements.

8.5.8.6 USAID support computerization of the malaria surveillance, treatment, and vector control data in Guatemala. The establishment of such a system will require training and a trial period of supervised operation.

8.5.8.7 USAID support educational efforts aimed at community acceptance and participation in malaria programs and increased awareness concerning malaria and other vector-borne diseases.

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8.5.8.8 USAID support, in view of the ecological complexity of the malaria situation in Guatemala, the development of an integrated control program. Such a program should be flexible enough to reduce general morbidity and respond to epidemic situations, while reducing recurrent costs.

8.6 Onchocerciasis - 1986 Status

8.6.1 Background and Issues

Due to recent advances in chemotherapy, accompanied by experience obtained in Guatemala and other countries, there exists a good opportunity for successful control and perhaps eradication of this disease in Guatemala.

In the 1977 Guatemala Health Sector Assessment, limited statistics indicated that 100,000 people were infected. At that time no drug therapy was considered safe for mass treatment in field situations, and control of the black-fly vectors (Simulium spp.) had not been attempted in Guatemala. Subsequently, the situation has been more clearly defined by a Japanese technical assistance program (completed in 1983). Suzuki and his co-workers in 1983 defined four zones of endemicity (Figure 8.6.1):

1) Northwestern Zone, Department of Huehuetenango in two foci, Cuilco y la Providencia, with 729 Km2 and 60,000 inhabitants;

2) Central Zone I, including 10 municipalities of the Departments of Suchitepequez, Solola, and Chimaltenango with a combined area of 1921 Km2 and 155,000 inhabitants;

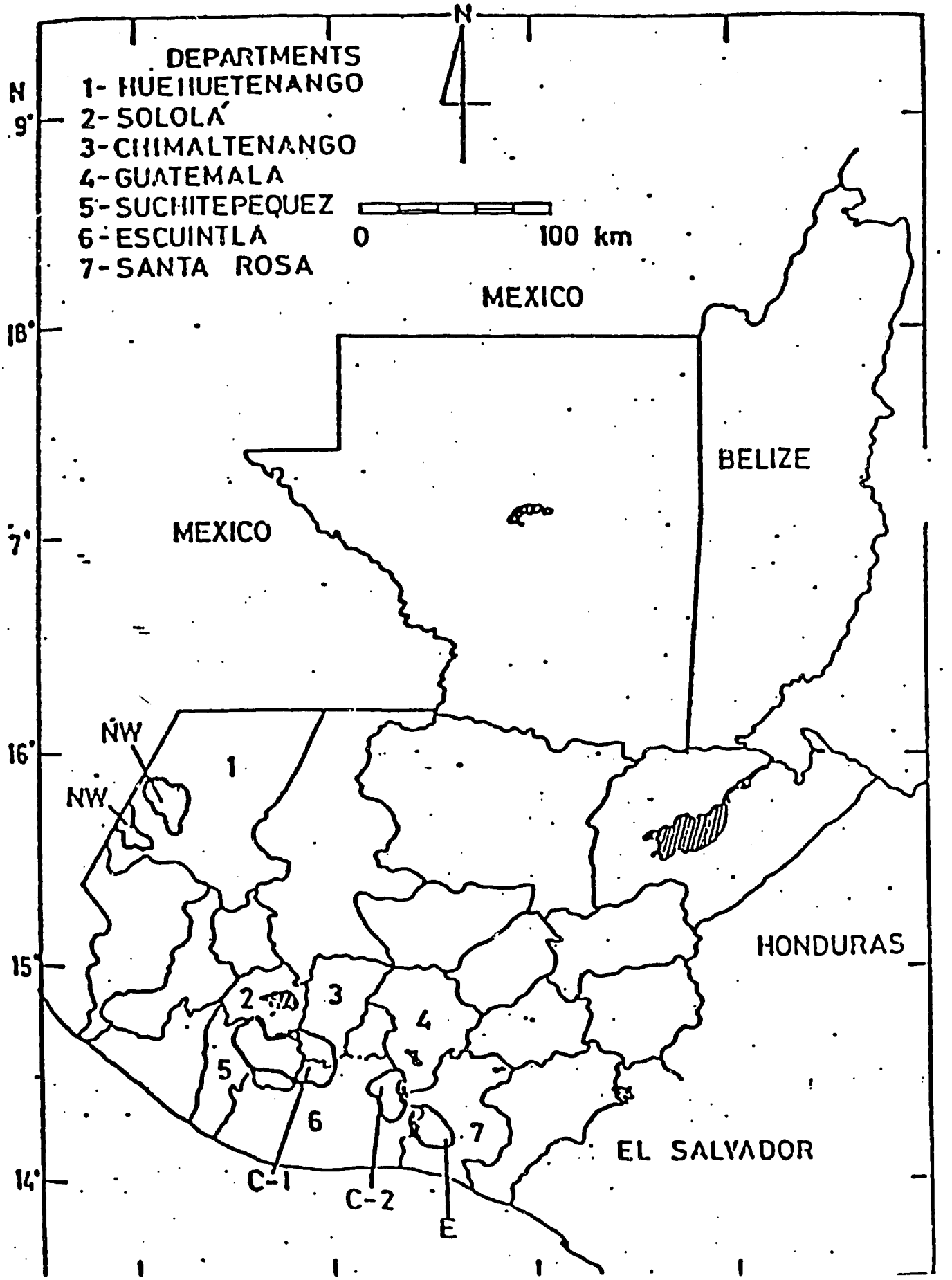
3) Central Zone II, including 6 municipalities in the Departments of Guatemala and Escuintla with 1468 Km2 and 165,000 inhabitants;

4) Eastern Zone. Department of Santa Rosa, 3 affected municipalities with 590 Km2 and 62,000 inhabitants.

The total endemic area totals 4,708 Km^2, with over 443,000 inhabitants (1983 figures), some 30-40,000 are estimated to be infected, based on parasitological examination of skin samples ("snips"). This examination has been found by several authors to underestimate the true prevalence by 40% to 60%, especially in mesoendemic and hypoendemic areas. Thus, potentially 60-80,000 people may be infected in Guatemala. Detailed ophthalmological studies have not been done, but depending on the criteria employed, blindness was estimated to range from 1% to 3% of those infected.[1/] The endemic areas are situated between 500-1500 meters of altitude, and generally coincide with the areas of coffee cultivation, where both resident and seasonal workers are exposed and infected. The cultivation of coffee in areas of steep, shaded slopes with swiftly small streams provides an ideal habitat for the major black-fly vector, Simulium ochraceum.

1/ Zea Flores, G., personal communication, 1986.

GRAFICA ONCOCERCOSIS No. 1



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Beginning in 1935, the Ministry of Health has conducted a systematic program of nodulectomy. From 1935-1980 over 1.5 million persons were examined, and nodules removed from 181,664 individuals (11.5%). An average of 1.4 nodules per person were removed from positive individuals. Zea Flores (1983) reports that the reduction of the nodular index has been as follows:

24.0% in 1935-39
13.1% in 1940-59
10.5% in 1960-69
8.7% in 1970-79

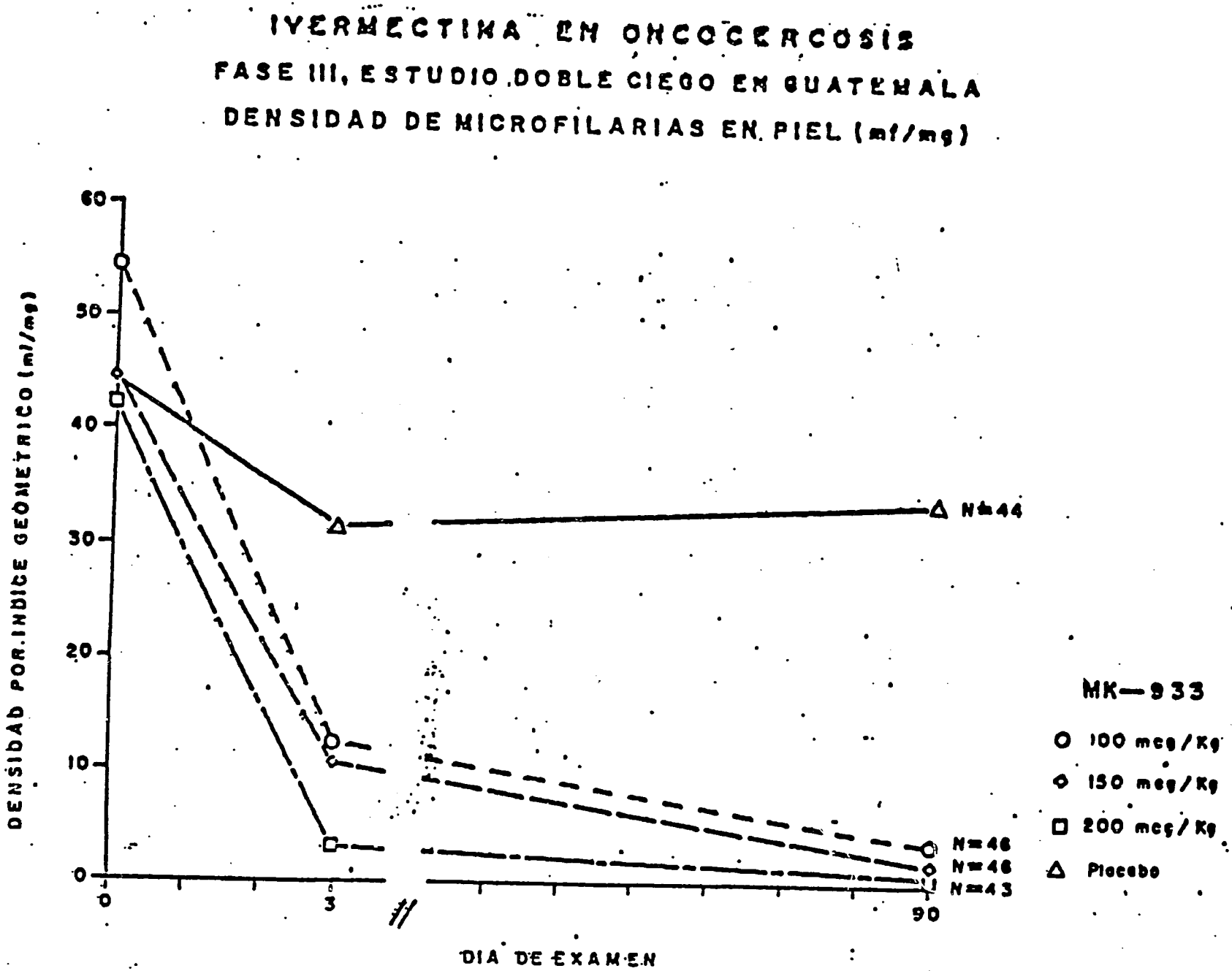
Due to the attention focused since 1975 on onchocerciasis in West Africa[2/] where the disease is highly prevalent and a major inhibiting factor to socioeconomic development due to the resulting blindness, considerable advances have been made that are applicable to Guatemala, where research on their use has already begun. Among these, two aspects are noteworthy:

A. Chemotherapy - The drug Ivermectin (tradename of Merck & Co.) has been demonstrated to be an efficient microfilaricide, reducing the number of microfilaria in infected individuals, reducing the disease symptoms and pathology, and potentially diminishing the potential for further transmission. In a preliminary unpublished study by Zea Flores, the density of microfilaria were reduced to 5% of their original level and remained at that low level for over 9 months after only one oral dose of Ivermectin. (Figure 8.6.2 shows the results after the first 3 months of observation). These results are similar to those obtained in West Africa. Further field trials are required before Ivermectin can be used on a broad scale. These will include:

Analysis of the length of time that one dose of Ivermectin will control the level of microfilaria at low levels that will not produce further pathology and/or support further transmission. The effects of onchoceriasis is a dependent on the accumulated "worm load" due to repeated human infections over a long period of time by multiple bites by infected black-flies which must themselves receive the infection from infected persons. Reduction of the parasitemia in infected persons should, therefore, reduce or completely interrupt the chain of transmission. This is especially true in Guatemala, where the

2/ The Onchocerciasis Control Programme (OCP) is jointly sponsored by UNDP, World Bank, FAO, WHO and country donors including the United States (USAID). It now operates in 11 countries in West Africa, expanded from the original 7 countries: The OCP is scheduled for 20 years (until 1995) and has enjoyed considerable success.

FIGURE IVERMECTINA EN ONCOCERCOSIS



principal vector Similium ochraceum is relatively "inefficient". Very few black flies biting infected persons become infective (the microfilaria must undergo further development within the black-fly before becoming infectious to man) and are able to pass the infection to further individuals. In contrast, the principal African vector, Simulium damnosum, is highly "efficient", and between 35-50% of the flies biting man become infective.

2) Although Ivermectin has not demonstrated any important side effects that would limit its use in mass treatment, further trials are required, especially in children and pregnant women.

B. Vector control: The black-fly vectors of onchocerciasis can be controlled by larviciding in the streams in which they breed. Insecticides are of little value (in Guatemala) for control of mature, biting flies. In the past, effective use of larvicides was of limited value due to the small size and the large number of such streams located in mountains covered by forests which Simulium ochraceum favors for breeding. Therefore, the aerial spraying of larvicides, as used in W. Africa is impossible.

At present, however, there are well developed techniques for control, utilizing both chemical and microbiological larvicides applied by hand in slow-release formulations that would be effective over a period of time. Both the organophosphate Abate (temephos) and the microbial Bacillus thuringiensis israeliensis (SH-14) have been demonstrated to be highly effective for black-fly control in both temperate and tropical countries when employed in this manner.

In 1979 a pilot project for vector control in the region of San Vicente Pacaya to test several techniques of application and different doses of the larvicide Temephos. Delivery was delivered by hand application to all black-fly breeding sites. After five years, in 1983, it was possible to decrease the vector annual biting rate to the provisional safe level planned from the beginning of the project (less than 8,000 total bites). At present, the controlled area has increased from 3 Km^2 to 108 Km^2 (see Figure 8.6.3) using only 1500 Kg of larvicide per year.[3/] However, Guatemala currently does not have the budget for larvicides to continue this project.[4/]

As the purpose of larvicide is to reduce, not eliminate, black-fly populations, their use in conjunction with chemotherapy for infected persons should complement each other, especially in cases of poor treatment compliance. These actions can reduce both populations of the microfilarial parasites and the vectors to a point where the chain of transmission can be completely broken.[5/]

8.6.2 Comments

The MOH Onchoceriasis Department has developed a plan of operations for further work on onchocerciasis in Guatemala, and some resources have been obtained from WHO for certain research elements of the program; others are pending.

Ivermectin has been provided at no cost by Merck and Company for the preliminary trials.

This program could be very successful, eliminating over a comparatively short period of time, the need for the nodulectomy program that the government has operated for 50 years,[6/] as well as recurrent costs. At present, national policies of the Ministry of Health policies contemplate the continuation of the onchocerciasis control activities, including research on treatment and nodulectomies. Resources currently used for onchocerciasis control could be channeled to other tropical vector-borne diseases that currently receive little funding --such as Chagas' disease or leishmaniasis. As most of the affected people are workers on coffee plantations, there is an opportunity to include the private sector in the program, as well as to promote community participation through education and presumptive diagnosis. Both of these components have been included in the operational plan.

8.6.3 Summary

A total of 433,000 inhabitants live in onchocerciasis endemic areas of Guatemala, where 60-80,000 infected cases are estimated. Severe cases of blindness are estimated to be 1 to 3% of those infected.

Recently, advances have been made in vector control techniques and treatment of the disease both in Guatemala and in West Africa. At present, there exists a good opportunity for conducting a successful control program, and perhaps an eradication program in Guatemala. As the purpose of vector control operations is to reduce, not eliminate, black -fly populations, their use in conjuction with chemotherapy for infected persons should be complementary and can break the chain of transmission completely.

3/ Op.Cit.[1/]
4/ Ibid.
5/ (Dietz, K. 1982. The population dynamics of onchocerciasis. pp. 209-241. In: Population Dynamics of Infectious Diseases - Theory and Applications. Edited by R.M. Anderson. Chapman and Hall, London.)
6/ Op. Cit.[1/]

8.6.4 Recommendations

It is recommended that:

8.6.4.1 USAID support: a.) study on the length of the microfilaricide action of one dose of Ivermectin as a means of reducing the potential for transmission of onchocerciasis, and; b.) further evaluation of Ivermectin for potential side effects.

8.6.4.2 USAID support vector-control studies to determine the best methods of pesticide application, perhaps using slow-release larvicides, to control the numbers of black flies by continuing the project of San Vicente Pacaya.

8.6.4.3 USAID support a national campaign to eradicate onchocerciasis in Guatemala. This should be based upon the provision of Ivermectin for treatment of the disease and a decrease in transmission potential, as well as focal control of the vectors in well defined areas of transmission.

8.6.4.4 USAID support operational research on black-fly control and conduct further community trials testing the impact of chemotherapy on transmission of onchocerciasis.

Plan of Operations
Onchocerciasis Department, Division of Malaria
(Courtesy of Dr. Guillermo Zea Flores)

Present Status	Investigation	Resources	Goals
1. Epidemiology Incidence Prevalence Ophthalmological rates	Census a) Population b) Rates c) Resources: - Community - Private - Official	Dept. of Onchocerciasis, Division of Malaria Dept. of Ophthalmology, Roosevelt Hospital	Study of risk factors Case finding Intersectorial cooperation
2. Diagnosis Skin biopsies Nodule detection Immunodiagnosis	Immunology of negative persons resident in endemic onchocerciasis areas Improve Immunodiagnosis: a) adult worm culture b) specific antigens of Onchocercosis	National Institutes of Health Bethesda, Maryland, U.S.A. Dept. of Onchocerciasis, Division of Malaria a) National Institute for Medical Research, London, England: Dept. of Onchocercosis b) Del Valle University, Guatemala Dept. of Oncocercosis	Vaccine? Rapid and accurate Serological diagnosis

(continued)

Plan of Operations (Cont')
Onchocerciasis Department, Division of Malaria
(Courtesy of Dr. Guillermo Zea Flores)

Present Status	Investigation	Resources	Goals
3. Therapy Nodulectomy Chemotherapy	Effects of Nodulectomy DEC-Lotion (Effects) Ivermectin (Effects	Dept. of Ophthalmology Hospital Roosevelt Dept. of Onchocercosis Hospital Rodolfo Robles Dept. Onchocercosis.	National Nodulectomy Campain and Evaluation of Anti-parasitic Treatment
4. Entomology Vector Control	Effects of DEC-Lotion on transmission Effects of Ivermectin on transmission Biological control Susceptability tests of insecticides	Dept. Onchocercosis (WHO Funds) Cornell University, New York, USA. Dept. Onchocercosis Div. of Malaria Dept. Onchocercosis Div. of Malaria	Vector Control (its necessity)

Source: Zea Flores, G., Personal Communication, 1986.

8.7 Dengue/Aedes aegypti

8.7.1 Background and Issues

a) Yellow Fever: At least 9 major epidemics of yellow fever occurred in Guatemala between 1860 and 1920, but no cases have been reported since 1921. It is not considered as a major threat to health at present, and the appropriate vector control operations are the same as for dengue fever (below), as both diseases share the same vector.1/

b) Dengue Fever: The last epidemic outbreak of dengue in Guatemala occurred in 1978 in the Department of Escuintla, following an epidemic of some 100,000 cases in San Pedro Sula (Honduras) which was considered the focus for outbreaks in other Central American countries. In 1981, a broad outbreak in the Caribbean included cases with a haemorrhagic syndrome (Dengue Haemorrhagic Fever or DHF), registering over 350,000 cases in Cuba with more than 150 deaths, primarily in children.2/

Although visitors to Guatemala very probably have carried the virus to the country, there have been no recently reported cases possibly due to the intensive control of the urban vector, Aedes aegypti throughout its range in Guatemala.3/

Aedes aegypti has been found in 401 localities in Guatemala: of these, 359 localities had been positive for the two years preceeding 1985, and the other 42 localities were recent infestations noted for the first time in 1985. Localities positve for Ae. aegypti (1972-1985) are shown on Figure 8.7.1, 8.7.2.

Control is based on surveillance of the vector's larval breeding sites in urban areas. These (tin cans, flowerpots, bottles, tires, or other such receptacles are then destroyed or treated with a larvicide (temephos=abate). Through community participation the local population is encouraged to practice sanitary measures by eliminating potential breeding sites on a routine basis. In some cases, adult mosquito control, employing Ultra low volume (ULV) treatment with either malathion and/or K-Othrine (a pyrethroid) is required.4/

In the Guatemalan System treatment for mosquito control has been either: a) Suppressive - consisting of immediate treatment where larvae suspected to be Ae. aegypti have been found; or b) Integral - where larval populations of Ae aegypti have been verified. Quantities of pesticides used (1985) exceed 5 metric tons of larvicide (Temephos) and 2 metric tons of adulticides (Malathion, K-Othrine).5/

1/ Godoy, Hector. Division of Malaria personal communication, 1986
2/ Ibid.
3/ (Memoria Anual, Division of Malaria, 1985).
4/ Op. Cit.1/
5/ Ibid.

8.7.2 Summary and Conclusions

The threat of dengue (and DHF) is very real in all of Central America; Guatemala is no exception. Surveillance for, and control of, urban *Aedes* sp. is clearly the most effective means of prevention and is to be encouraged in all countries at risk. This year (1986) CDC has reported circulation of several dengue serotypes in the Caribbean and South America (personal communication - to AAA) so that a DHF threat exists. A serious outbreak of dengue would not only produce a major national health problem, with the risk of epidemic childhood mortality, but could have serious economic effects on the tourist industry.

Chart 8.7.1

MINISTERIO DE SALUD PUBLICA Y A.S.
S.S.S.
DIVISION DE MALARIA
GUATEMALA, C.A. 1986.

LOCALIDADES CON HISTORIAL POSITIVO A A. AEGYPTI

1972-1985

		1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
CHIMALTENANGO	3													●●	
CHIQUIMULA	14		●●	●	●			●●		●●●	●●	●			
ESCUINTLA	121	●		●●●● ●●●	●	●●●	●●●●●	●●●	●●●●● ●●●●●	●●●●● ●●●●● ●●●●●		●●●●●	●●●	●●●●● ●●●● ●	●●
GUATEMALA	56									●●		●●●	●●●●●	●●●●● ●●●●● ●●●	●●●● ●●●●
IZABAL	7		●					●							●●●● ●
JUTIAPA	21					●	●●		●●●●	●●	●●			●	●
JALAPA	1											●			
EL PETEN	5						●			●●		●			
EL PROGRESO	12			●●		●	●●	●		●	●				●
BAJA VERAPAZ	1														●
QUETZALTENANGO	9						●●	●●	●	●●				●	
RETALHULEU	37						●●●●		●●	●●●	●●●	●	●●	●●●● ●	●●
SAN MARCOS	21						●●		●●	●●	●			●●	●●● ●●
SANTA ROSA	13		●			●●●	●●		●	●					●●
SUCHITEPEQUEZ	70						●●●●● ●●	●●	●●●●● ●●●●● ●	●●●● ●	●		●	●●●●● ●●●●●	●●
ZACAPA	9			●					●	●●	●				●●●●
SACATEPEQUEZ	1														●
TOTAL LOC.	401	1	4	19	8	13	48	14	59	66	16	16	19	32	42

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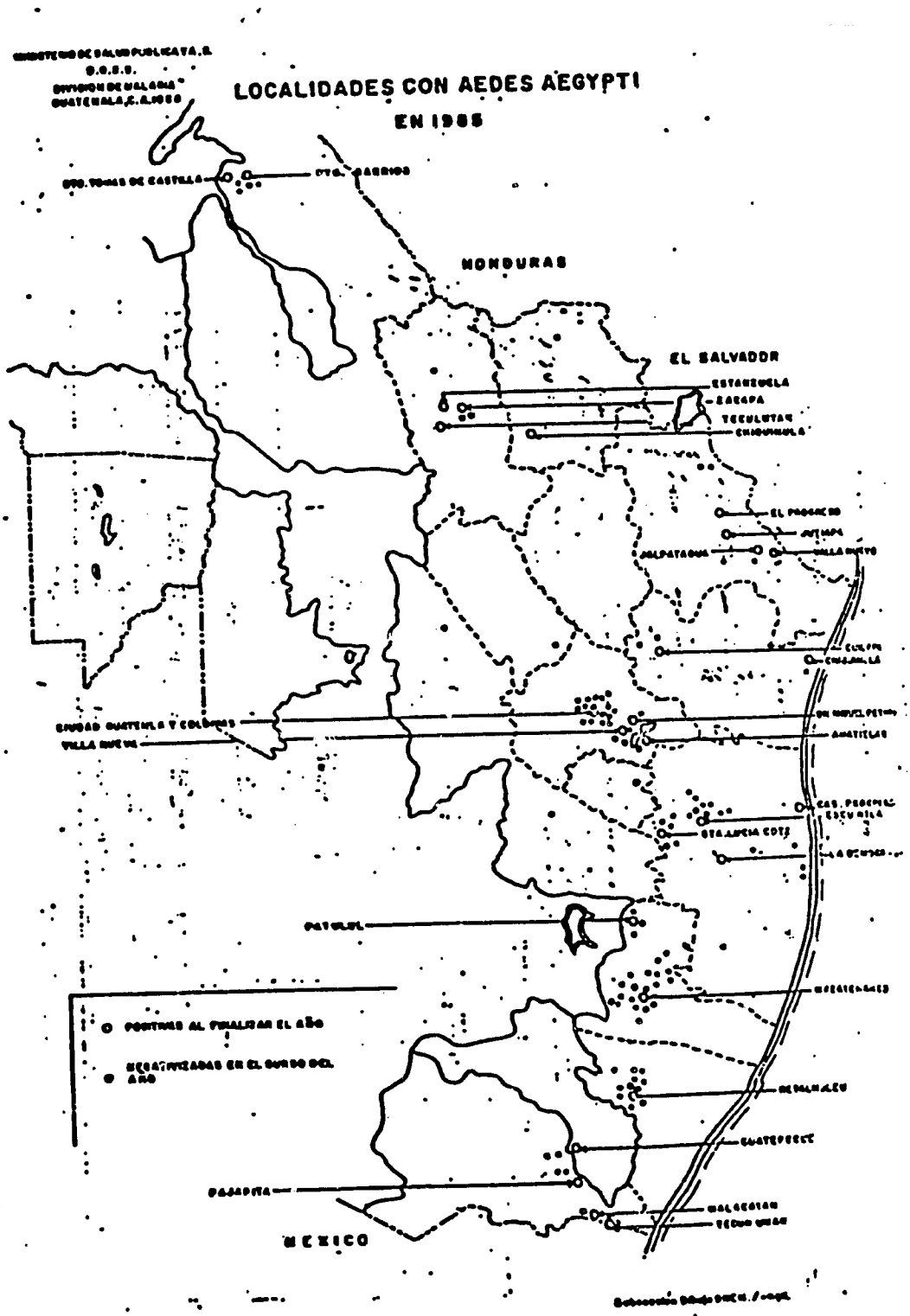
CHART 8.7 (2) LOCALIDADES



8.7.3 Recommendation

It is recommended that:

8.7.3.1 USAID support the Guatemalan Aedes control program because of the threat of dengue and Dengue Hemmorragic Fever throughout Central America. Control emphasis should remain on urban sanitation with insecticidal treatment reserved for epidemic situations.

8.8 Chagas' Disease

8.8.1 Background

Chagas' disease, or American Trypanosomiasis, was first studied in Guatemala in 1933 by Reichenov. His findings can be summarized as follows:

1. *Triatoma dimidiata* was frequently found in the south of Guatemala, and from 29% to 35% of this vector species was found infected with the parasite *Trypanosoma cruzi*;
2. *Trypanosoma cruzi* infection was found in 3 children and in 3 dogs.

Later, E. Blanco-Salgado found high-density infestations of the triatomine *Rhodnius prolixus* in households of the eastern departments of Guatemala. He also found high percentages of infection in insects sampled (100% in Sanarate).

Other studies in Guatemala have shown the presence of other potential vectors, human infection, and disease.1/ However, the importance of Chagas' disease as a public health problem in Guatemala is unclear due to a lack of epidemiological information.

Mortality from Chagas' disease is due to severe myocarditis or meningoencephalitis. These deaths and cases of disease usually occur in rural areas where the disease is endemic, and rarely are serological or parasitological studies performed to make the diagnosis.2/ Mild cases of Chagas' disease are difficult to identify clinically. Thus, reliable morbidity data are not available, not only in Guatemala but in most Latin American countries where the disease is known to be endemic.3/

8.8.2 Activities Carried Out by the MOH

The department of Parasitic Diseases of the MOH Applied Programmes Unit has carried out some epidemiological studies of this disease, including entomological studies, active case-finding, and research on diagnosis and treatment.4/ In 1953 studies were initiated on the geographical distribution of potential vectors and human infection (by vector studies, *in vitro* culture, serological tests, xenodiagnosis, and assessment of *T. cruzi* infection indices in

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1/ PAHO Document 1985.
2/ *Ibid*.
3/ *Ibid*.
4/ *Ibid*.

all potential vectors.[5] Results of these activities can be summarized as follows.[6]

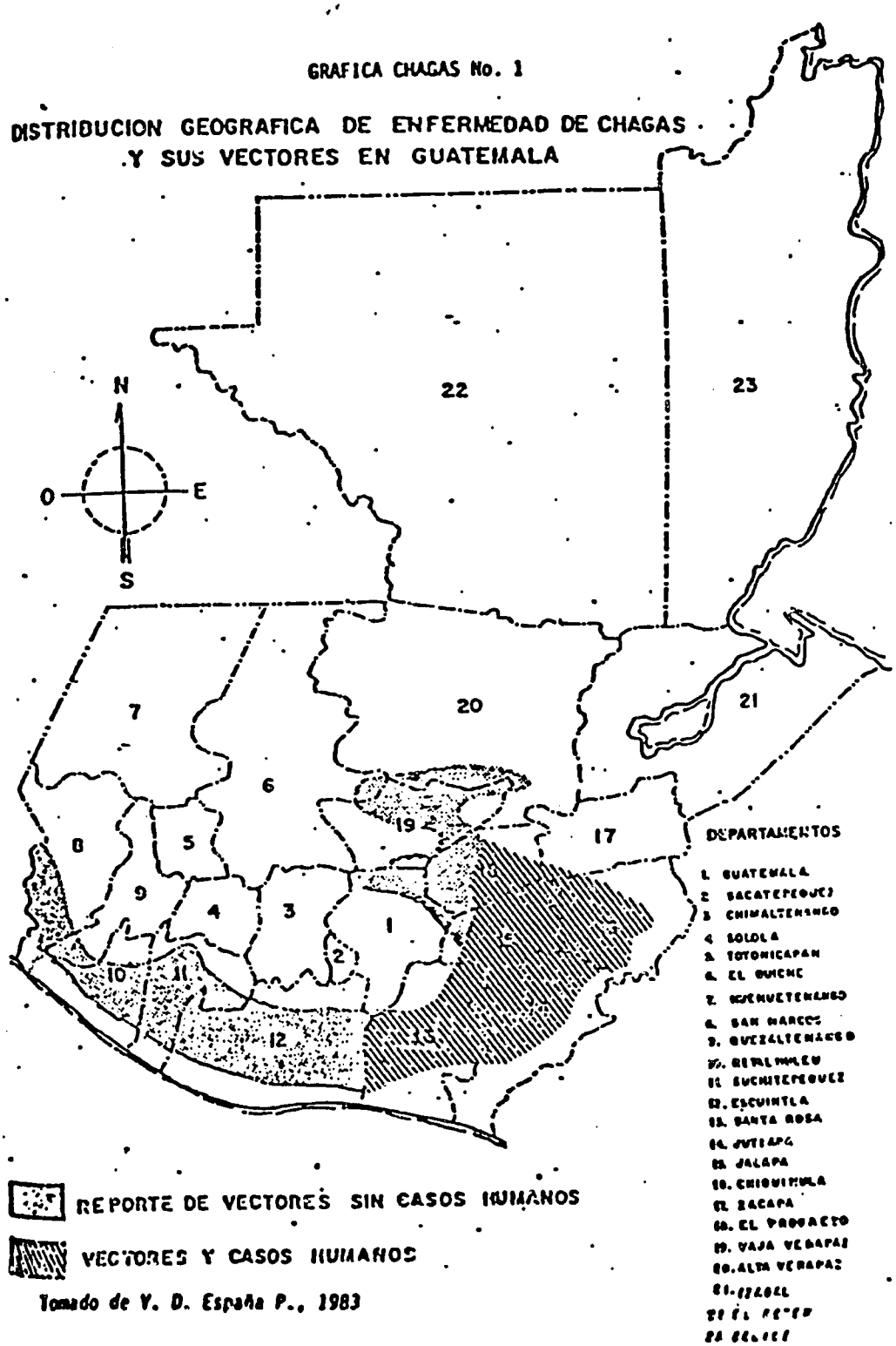
Of a total of 35,993 households surveyed from 1979 to 1982, about 50% were found infested with potential vectors, 24% of which were infected with unspecified tryparosomes.

Active case-finding from 1977 to 1980 showed only 17 cases for 1978 (0.2 per 100,000), and 5 cases for 1980 (0.1 per 100,000) through xenodiagnosis of 246 inhabitants of endemic areas.[7] However, V.D. Espana, using the direct hemoagglutination serological test, reported from 1979 to 1982 a prevalence rate of 27.6 % in a sample of 596 inhabitants of endemic areas in Guatemala.[8]

The population endemic areas of Guatemala, as reported by V.D. Espana (Figure 8.8.1) is about 1.5 million. By applying his results (27.6% prevalence), an estimated 14,000 people could be infected.[9] However, about half of this population lives in urban or sub-urban areas, where it is very unlikely that housing facilities are favorable for the breeding of triatomines.

5/ Ibid.
6/ Espana, V.M.: Enfermedades Parasitarias en Guatemala, 1983
7/ PAHO/WHO: Scientific Publication Number 427, 1982.
8/ Espana, V.M.: Enfermedades Parasitarias en Guatemala, 1983
9/ Ibid.

Grafica CHAGAS No. 1



Tomado de V. D. España P., 1983

Through passive surveillance, 2519 cases were identified between 1979 to 1982,[10/] in 18 of the 22 departments of the country (Figure 8.8.2 and Table 8.8.1).

It has been speculated that the incidence of Chagas' disease may have decreased in Guatemala[11/] due to several factors, including:

- Insecticide use by the malaria program in areas where Chagas' disease is also endemic;
- housing improvements involving changing thatched roofs for sheet metal roofs;
- frequent use of insecticides by the inhabitants of rural areas;
- the use of electric lighting.

However, there are no epidemiological data to document this hypothesis.

Cuadro Chagas No. 2

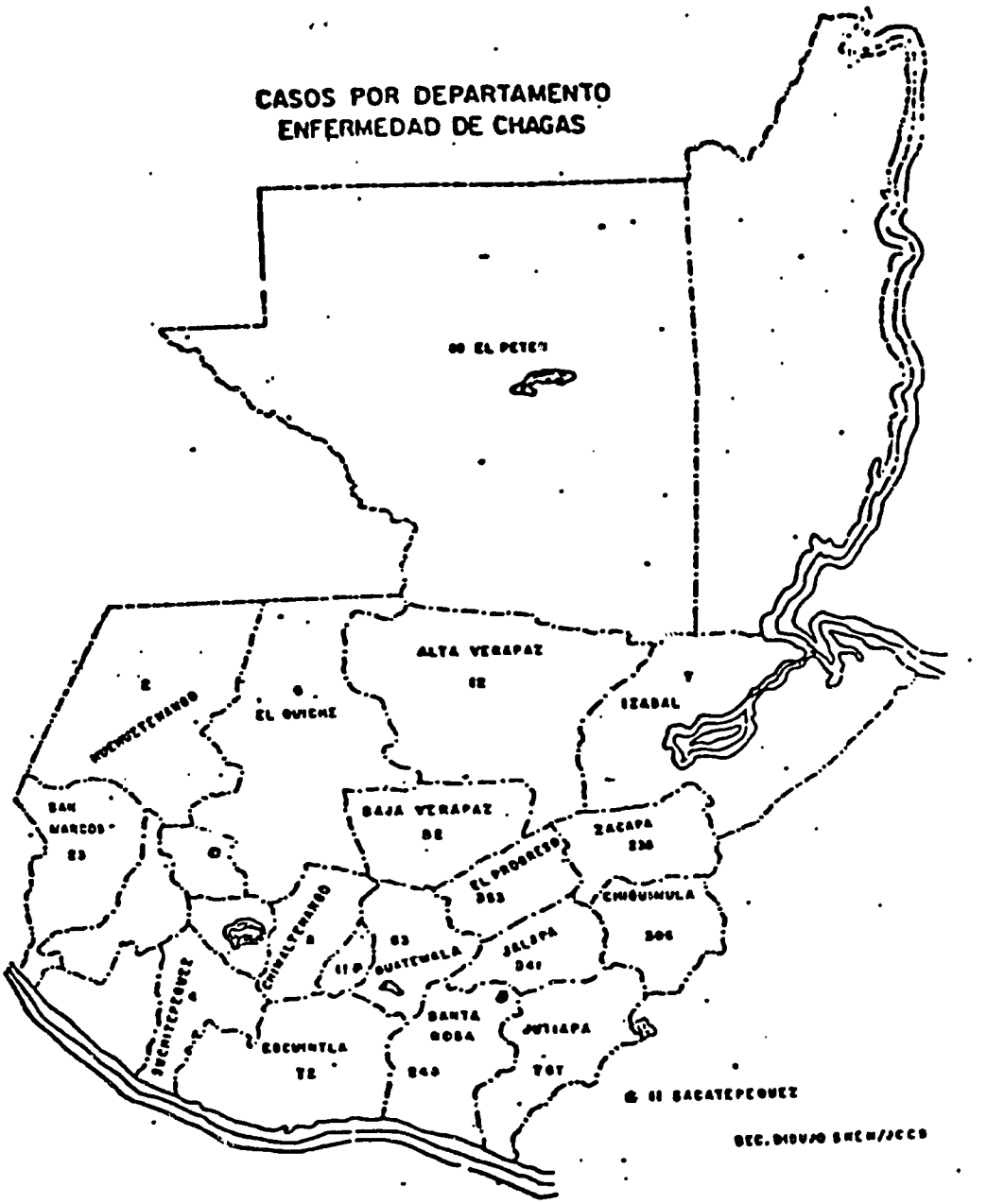


Table 8.8.1

Cases of Chagas' Disease by Department
Guatemala, 1979 - 1982

Department	Cases	Annual rate per 100,000
Petén	18	2.2
Alta Verapaz	12	1.2
Izabal	7	0.8
Baja Verapaz	32	6.6
Zacapa	238	47.3
Chiquimula	306	41.2
Progreso	353	96.6
Jalapa	341	60.4
Jutiapa	787	70.4
Santa Rosa	246	26.9
Guatemala	53	0.7
Sacatepequez	11	2.1
Escuintla	72	4.9
Chimaltenango	8	0.6
Suchitepequez	4	0.4
San Marcos	23	2.7
Hue		

Presently, the activities of the Department of Parasitic Diseases related to Chagas' disease are very limited. These include:

1. Entomological surveys in households, when requested by any health or civil authority.

2. Parasitological and serological diagnostic aid, when requested by hospitals or Health Centers.

3. A drug study with "Lampit" (nitrophurane) which was suspended after studying ten cases, due to lack of funds.

4. Epidemiological surveillance in school children in endemic areas, which has stopped due to the lack of funds.

8.8.3 Comments and Recommendations

Morbidity and mortality data due to Chagas' disease in Guatemala are not complete or reliable due to problems in the coverage of the medical care of MOH, and difficulties in diagnosing mild cases of the disease without laboratory facilities.

The reported index of households infested (50%) by potential vectors is high, as so is the trypanosome infection rate of 24% among triatomines. However, there are no data vector density per household, nor on the trypanosome species found in these vectors. These complementary data are important in order to assess the risk of transmission (e.g., distinguish T. cruzi from T. rangeli, which does not produce disease in humans).

Xenodiagnosis is of little value as it is difficult to carry out properly when used in large surveys. The use of serolcgical diagnosis such as direct hematoagglutination, which is a more appropriate and sensitive test, shows concordant results with the entomological findings. If the strain of T. cruzi is as pathogenic as in other countries (such as Venezuela), over 20% of the seropositive cases would be expected to show myocardial damage when electrocardiography is used in the diagnosis. There is no evidence that Chagas' disease in Guatemala produces pathology other than myocardial damage such as megacolon that is found in some parts of South America.

Special training on the basic epidemiolcgy of the disease for medical and paramedical personnel to identify high risk groups is needed. Residence or traveling in endemic areas, housing conditions, and presence of vectors in the households will facilitate the identification of suspected cases. Potential cases should be screened using acepted serological tests.

10/ Ibid.
11/ Op. Cit.8/

No effective treatment has been found for Chagas' disease. The most effective preventive measures in the endemic areas are improvement of housing facilities and health education to improve hygiene.

8.8.4 Recommendations

It is recommended that:

8.8.4.1 USAID support entomological and serological surveys, as needed, to assess the epidemiological situation of Chagas' disease in Guatemala and collaborate with the Department of Parasitic Diseases of the MOH in the study of pathology and clinical picture of the disease in Guatemala.

8.9 Leishmaniasis

8.9.1 Background

Leishmaniasis is a parasitic disease endemic in rural areas. In Guatemala it occurs in tropical areas where the vectors (Phlebotomus sp.) and other sand flies transmit the protozoan parasites Leishmania mexicana and Leishmania donovani. The first produces cutaneous or mucocutaneous leishmaniasis, and the latter visceral leishmaniasis.

Leishmania mexicana is primarily a parasite of wild rodents, producing characteristic lesions in these animals. Leishmaniasis typically has a sylvabic cycle through the interaction of the vector, parasite and wild rodents: man is infected only when he is in the bush or in isolated rural settlements in the tropical areas. Person-to-person transmission is very unlikely to occur since only a very small number of parasites are found in the skin lesions, the only sources from which the vector is infected.

In Guatemala only 6 cases of visceral leishmaniasis have been reported in the last 23 years: one in the Department of Santa Rosa. and the other 5 in the Department of El Progreso.[1/] All of them were children who died as a result of the disease. Cutaneous leishmaniasis is more frequently encountered, as this disease only produces lesions in the skin and mucous membranes. From 1979 to 1982, 785 cases were reported from six Departments (Figure 8.9.1). An average of 75 cases are reported every year.[2/] However, the incidence may increase due to migration and new settlements in the department of Peten, where the disease is most common.[3/]

8.9.2 Activities Carried Out by the MOH

The department of Parasitic Diseases of the Unit of Applied Programmes of the MOH carries out very limited activities. It encourages notification by offering clinical and laboratory diagnostic aid, as well as treatment. However, there is no active case finding program or any ongoing epidemiological reasearch.[4/],[5/]

1/ Espana, V.D.: Enfermedades Parasitarias en Guatemalam 1983.
2/ Ibid.
3/ Ibid.
4/ Espana, V.D.: Enfermedades Parasitarias en Guatemala, 1983.
5/ PAHO Document, 1985.

8.9.3 Comments and Recommendations

Very little is known about leishmaniasis not only in Guatemala, but in most Central American countries and Mexico. Further studies on the epidemiology of the disease are needed to learn more about the difference in transmission of the infection in different ecological situations. Domestic and peridomestic potential reservoirs are not well known in Guatemala. At present, the reduced number of reported cases indicates that leishmaniasis may not be a major public health problem in Guatemala. However, the number of cases may increase due to recent internal migration, and new settlements in those areas where cases have been reported. Close surveillance in such settlements is recommended.

Health education for medical and paramedical personnel, especially in endemic areas, is essential.

8.10 Rabies

8.10.1 Background

Rabies is a zoonosis of public health and economic importance, as it is fatal in man and animals, and produces important losses in the livestock industry.1/ Children under 5 years of age are the most frequently exposed group to be at risk of being bitten by dogs or other infected animals.2/

The main source of infection to man are infected dogs: the estimated canine population in Guatemala (1985) was over one million (one dog for every 7 inhabitants), and only 13.7% of the dogs in the country are vaccinated.3/

At present, the goals of the Department of Zoonoses of the Direccion General de Salud are focused on the prevention of human and animal cases. 4/

During 1985, 8,194 persons were bitten by domestic animals probably infected with rabies, and 1,391 persons were bitten by confirmed rabid domestic animals.5/ The number of people bitten by rabid animals and cases of human rabies increased in the last year, probably due to the lack of funds to carry out the annual canine vaccination campaign for 1984 in Guatemala City (Table 8.10.1), where 74% of all cases of canine rabies were reported from 1979 to 1983, and where 20% of cases in humans from 1979 to 1985 were identified. 6/,7/

1/ PAHO Document, Volume III, 1985
2/ Ibid.
3/ Unidad de Planificacion y Programacion. M.S.P.: Plan Operativo Nacional, 1985.
4/ Ibid.
5/ Unidad de Planificacion y Programacion. M.S.P.: Memoria de Labores a o 1985.
6/ Ibid.
7/ PAHO Document, Volume III, 1985.

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Table 8.10.1

Cases of Canine and Human Rabies in Guatemala
1979-1985

Year	Canine Rabies	Persons Bitten	Human Rabies
1979	218	ND	8
1980	183	ND	4
1981	255	935	3
1982	263	1174	10
1983	159	896	4
1984	NA	898	4
1985	NA	1391	7
NA: Data not available		TOTAL	40

Source: PAHO Document, Volume III.85
Memoria de Labores. M.S.P. 1981- 1985

Outside Guatemala City, the departments of Quetzaltenango, Chimaltenango, Suchitepequez, Sacatepequez, Escuintla, Solol , and Totonicap n show higher incidences of canine rabies than the other departments of the country. Cases of human rabies were also more frequently found in these departments between 1979 and 1983 (Table 8.10.2). However, the department of San Marcos reported 6 cases of human rabies and only 8 canine cases. 8/,9/

8/ Op. Cit. 5/
9/ Department of Zoonosis, DGSS, unpublished data, 1986.

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Table 8.10.2

Cases of Human and Canine Rabies
Selected by Departments
Guatemala 1979-1983

Department	Canine Rabies Cases	%	Human Rabies Cases	%
Guatemala	1078	74	8	28
Quetzaltenango	75	5	2	7
Sacatepéquez	39	3	2	7
Suchitepéquez	32	2	1	3
Chimaltenango	31	2	0	0
Solol	27	2	0	0
Totonicapin	23	2	0	0
Escuintla	19	1	1	3
All others *	379	9	15	52

* The Department of San Marcos reported 6 cases of human rabies and only 8 cases of canine.

Source: PAHO Document, Volume III. 1985
Department of Zoonoss, M.S.P.
Unpublished data. 1986.

Diagnostic facilities and vaccine for dogs are only found in Guatemala City. Human vaccine is not always available in hospitals or health centers except for those located in major cities such as Guatemala City and Quetzaltenango, although the biological laboratory of the MOH produces both human and canine vaccines, and this laboratory has been recently designated as the Central American Regional Center for production of rabies vaccine.[10/]

CHAPTER 9

WATER AND ENVIRONMENTAL SANITATION

9.1 Water and Basic Sanitation

Nine (9) official national organizations are involved in this area, coordinated by a National Council (SEGEPLAN). These are:

1. EMPAGUA (Empresa Municipal de Agua de la Cioudad de Guatemala)
2. INFOM (Insituto de Fomento Municipal)
3. UNEPAR (Unidad Ejection del Programa de Acceeducts Rurales)
4. DSM/MSP (Division de Saneamiento del Medio)
5. ERIS (Escuela Regional de Ingenicna Sanitaria)
6. MSPAS (Ministerio de Salud Publica y Asistencia Social)
7. MFP (Ministerio de Finanzas Publicas)
8. INSVUMEH (INstituto de Sismologia, Vulcanologia, Meterologia e Hidrologia
9. Corporacion Municipal y Comites Rurales de Agua Potable

A summary of the services available and projected for urban and rural populations, shown as a percent of population served, is as follows:

	Drinking Water Supply			Sewerage and Excreta Disposal		
Year	Total	Urban	Rural	Total	Urban	Rural
1980	45%	89%	18%	29%	35%	20%
1983	57%	89%	38%	50%	49%	37%
1985	58%	89%	39%	54%	50%	42%
1990*	73%	93%	60%	73%	57%	60%

* Planned Goal

In all categories of services, Guatemala ranks close to the median for the 26 countries in Latin America and the Caribbean listed by PAHO.

Goals for the drinking water and sanitation decade in Guatemala focus on 6 basic categories of population concentration, and the corresponding coverage targets for 1990:

	Drinking Water				Waste Disposal			
	Home Conn.		Public Tap		Home Conn.		Latrine	
Urban	1985	1990	1985	1990	1985	1990	1985	1990
>50,000	64.7	77.5	22.7	19.5	59.3	64.2	17.6	32.8
10,000-50,000	63.0	77.0	33.8	20.0	45.6	55.0	33.8	42.0
2,000-10,000	47.1	64.0	24.2	16.0	33.0	43.0	29.2	37.0
< 2,000	62.9	77.0	28.9	15.0	33.9	44.0	28.9	48.0
Rural								
Concentrated	37.7	48.0	9.4	12.0	-	3.0	31.5	57.0
Disperse	-	-	30.8	60.0	-	-	51.2	60.0

Additional details on coverage, projections, projects, and costs are available in EMPAGUA, INFOM, UNEPAR, DSM/MSP, and PAHO reports on the Water and Sanitation Decade.

Achieving the projected goals for 1990 will cost an estimated US$158 million for potable water ($115 million for urban and $43 million for the rural areas), and $87 million for sanitation ($63 million for urban and $24 million for the rural areas). Seventeen (17) major projects have been designed to meet the projected 1990 needs at an estimated cost of US$196 million, of which $49 million (25%) is to be provided through national funding.

Although all projects providing water and sanitation should be beneficial, evidence for the impact of water quality on health is weak. Three of the 17 projects planned are of particular interest, as 65% of the funding will come through the MOH for these three projects. A small project, for surveillance of potable water quality is currently funded by USAID, and should be expanded to other areas of the country, including the periurban zones.

The most serious constraints identified by Guatemalan authorities have been imbalance between costs and recovery, lack of community participation, and lack of educational activities concerning sanitation.

The lack of coordination between the nine governmental and three non-governmental organizations involved with provision of potable water and sanitation services is also a problem, as the National Committee for Planning "does not have the authority to establish programs and to assign resources". (PAHO 1986 Survey) 1/

1/ Salud Ambiental en Recopilacion y Ordenamiento de Informacion para Diagnostico de la Situacion de Salud y su Relacion con el Desarrollo Economico, PAHO, 1985.

9.1.1 Summary and Conclusions

For this report, data on the status and proposals for development of both water and sanitation facilities have been assembled from several sources. It has not been possible to evaluate the physical condition of these facilities, nor to evaluate if the stated coverage of the populations served is correct. A particular case concerns the expanding periurban populations, i.e., the urban slums and the urban poor. It is certain that large sections of the periurban populations do not have the same facilities as may be found in the cities proper, and, the numbers of such unserved persons are not accurately known. It is questionable which national organization is responsible for planning and development of such facilities in areas that may lie outside of municipal boundaries, yet be populated by people who essentially belong to the urban community.

The second observation concerns the apparent lack of coordination between the various national organizations in the planning process. This was evident in the interviews the team conducted, in the PAHO report quoted above, and in documents on water and sanitation prepared by national authorities.

The third observation is that the only geographic area in which the quality of drinking water is tested is the capital (EMPAGUA and Division de Saneamiento del Medio). Extension of these services throughout the country would be highly desirable. Because provision of water is important for prevention of illness (especially diarrhea), major expenditures on provision of water supplies without facilities for determining quality are not cost-effective. Similarly, projects associated with disposal of excreta should be evaluated, particularly in relation to the health of children in the populations served.

The statistics for current and proposal services for potable water, sewerage and disposal of excreta are simplistic, essentially defining populations as urban or rural. In view of the influx of people into the urban areas, and the growth of periurban populations, planning for future services should be enhanced. Due to the often disproportionate growth of urban slums it is possible that a far greater percentage of the "urban" population lacks water and sanitation than is shown in governmental statistics. Unless there is a better understanding of the urbanization phenomenon there will not be proper planning for such essential services.

Although community participation is often considered essential in developing water and sanitation projects, it cannot be expected without a basic level of understanding. Emphasis should be placed on the education of children through the schools, and on the women. This is an area where the PVO network can be particularly effective, given the resources.

9.1.2 Recommendations

It is recommended that:

9.1.2.1 USAID use its influence as a major donor to help achieve better planning and coordination between the various national organizations engaged in water and sanitation projects. Case studies of the quality of delivery systems and their relation to health would be appropriate

9.1.2.2 USAID, in the design and implementation of future water and sanitation projects, place more emphasis on the provision of water in periurban areas of the capital city and smaller cities of the country.

9.1.2.3 USAID suggest studies in Guatemala City and one or more smaller cities to define what consitutes an urban population.

9.1.2.4 USAID support efforts to provide education concerning sanitation at the household level, focusing on education of children in the school system and women .

9.2 Public Health Aspects of Pesticide Usage

Pesticides are used both in agriculture and public health. The small amounts of pesticides used in public health (for control of malaria and urban mosquitoes, e.g., *Aedes aegypti*, the vector of dengue and yellow fevers) are applied by trained personnel of the Division of Malaria and are not considered a threat to human health.

9.2.1 Pesticides in Agriculture

The use of pesticides in agriculture, however, poses a considerable problem that has only recently been recognized. This problem is difficult to cope with, as it involves production, importation, formulation, transportation, storage, and application as well as determination of food residues, etc. In addition, there may be environmental contamination of water and food supplies due to

accidents in transport and storage of pesticides. Recognizing this, Guatemala recently (1985) established a "Comision Interministerial de Plaguicidas," which includes representatives of the Ministry of Health, IGSS, and the Ministry of Agriculture, among others. The purpose of the commission is to regulate importation and formulation, provide for registration and proper labeling of products, and surveillance (by IGSS) of cases of intoxication and death caused by pesticides.

A number of factors make these tasks difficult:

a) Very few health workers, including physicians, are trained in diagnosing and treating cases of chemical intoxication, especially in rural areas where the majority of cases occur, nor do they always have appropriate antidotes.

b) Most agricultural workers are poorly educated and untrained concerning the hazards associated with pesticides, or chemicals in general. Labeling of pesticides is often not clear to laborers, if the containers they handle are labeled at all. Often, pesticides are repackaged several times with no labels attached to the smaller quantities. Many pesticide products are sold under a variety of names and the quantity of active ingredient (i.e., the toxic component) in the formulation can differ greatly from product to product, increasing the hazard in handling.

   Another risk factor is the frequent re-use of containers in which pesticides are packaged. Often, the drums, tins, and even strong plastic bags have some value in rural communities where they may be used for storage--especially of water. There is generally a lack of information and training concerning the hazards involved, or the proper means to dispose of the used, contaminated containers.

c) The greatest risk to pesticide intoxication occurs in the cultivation of the so-called "industrial crops," especially cotton, which requires a great deal of protection against pests during various phases of the growing cycle. This extensive use of pesticides on cotton has also resulted in the development of insecticide resistance by the mosquito vectors of malaria on the Pacific coast from southern Mexico to Nicaragua. In principle, the opportunity for training workers in proper handling of insecticides should be greatest in the plantation system (cotton, coffee, sugar cane, bananas, etc.) through involvement of the private sector and plantation management.

The IGSS has provided the following data on diagnosed cases of pesticide intoxications:

TABLE 9.2.1

PESTICIDE INTOXICATION BY YEAR
IGGS: GUATEMALA
1981-1985

Year	# of Cases
1981	787
1982	613
1983	768
1984	636
1985	797

N.B.: These figures are only of those cases seen by IGSS.
Source: IGSS 1985 Annual Report

Most cases occur during the May-July period associated with agricultural activities. About half (49.5%) of the cases are associated with organophosphate compounds (e.g., malathion, fenitrotion, and many others); Carbamates (15.5%), and organochlorines (12%), and others account for the remainder. The organochlorines (e.g. DDT, Dieldrin, etc.), once the most commonly used compounds, are not as widely used because the target agricultural pests have become resistant.

An analysis of the 768 reported cases seen in 1983 was carried out by IGSS: the case incidence rate using the national rural population (c. 4 million) would be 20.25 per 100,000 people, but using the 800,000 people covered by IGSS as the denominator, the rate would be 96 per 100,000 persons. As mentioned above, few cases of pesticide intoxication are treated medically, so the true incidence could be considerably higher.

The most effective means of reducing cases of pesticide intoxication is through education, especially in the farming communities. Additional training of health personnel is required for proper prevention, diagnosis and treatment, especially with the commonly used organophosphate compounds, which produce acute cholinesterase depression. Proper antidotes at rural health centers should be stocked, along with manuals for diagnosis and treatment that are available in Spanish through PAHO's Center for Human Ecology and Health in Mexico.

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Just as important is the enforcement of legislation concerning registration, labeling, storage, transportation and handling of pesticide products, the obligatory cleansing or disposal of pesticide containers, and the proper use of protective clothing for those at high risk in formulation and transport activities.

9.2.2 Residual Pesticides in Food Products

Pesticide residues in food products in Guatemala have been measured for a number of years by the Laboratorio Unificado de Control de Alimentos y Medicamentos (LUCAM) located at INCAP. Regular monthly samples of common foods are taken (tortillas, vegetables, meats, milk, fish, fruits, etc.) in the markets of Guatemala City and environs and tested for residues. Earlier in the 1960 and 70's attention was paid to the organochlorine DDT and its metabolites (DDa and DDb, dieldrin and HCH), which are easily accumulated in fatty substances (meat and milk, for example). At present (1986) such compounds are generally found in low quantities (1 ppm to traces), as these compounds are not used as frequently in agriculture as before. Most results fall within acceptable tolerance limits, except for endrin. Residues of the less persistent, biodegradable compounds in common use (malathion, carbamates, etc.) are being found more frequently. Such residues occur when crops are harvested too soon after spraying. It is generally recommended that crops remain in the field for a certain period after spraying (variable with the compound used) and before harvesting for market.

In one study on contamination of human breast milk with DDT, it was shown that residues had diminished in samples taken between 1971 and 1982, due to lowered use of DDT over this period. Seven localities were tested and the principal crops recorded: milk residues were highest in areas where cotton was grown.

9.2.3 Recommendations:

It is recommended that:

9.2.3.1 USAID support public instruction in the safe use of pesticides through the development of teaching aids for the general public, as well as training through schools and health clinics. More rigid training should be enforced in the industrial sectors dealing with insecticides, herbicides and mercurous seed dressings.

9.2.3.2 USAID subsidize efforts to improve the training of health personnel at all levels (physicians, nurses, auxiliaries, etc.) in the recognition and treatment of pesticide poisoning. Proper supplies of pesticide antidotes should be made readily available.

9.2.3.3 USAID encourage and assist appropriate Guatemalan authorities to enforce training on the safe use of pesticides in all of its agricultural projects.