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REPORT ON THE STATUS OF MALARIA ERADICATION IN THE AMERICAS

XIV REPORT

TABLE OF CONTENTS

		Page
Introduction		1
I.	A Decennium of Progress	1
	A. Beginnings	1
	B. Early operations	2
	C. First biological problems	2
	D. Years of expansion	10
	E. Methodological advances	11
	F. Years of differential progress - 1963-1964	12
	G. Where do we stand?	13
II.	Status of the Malaria Eradication Programs	22
	A. General picture	22
	B. Current extent of the problem	28
	C. Statistics of field operations	37
III.	Special Technical Problems	130
	A. General	130
	B. The status of specific problems	130
	1. Physiological resistance of vectors	130
	2. Irritability	130
	3. Resistance of P. falciparum strains to chloroquine	131
	4. Migration and colonization	131
	C. Methods for solving technical problems	132
	1. Change to an alternate insecticide	132
	2. Anti-larval measures	132
	3. Re-scheduling or increasing the cycles of DDT	132
	4. Mass drug distribution	133
IV.	Research	134
	A. Insecticide Testing Team - AMRO-0209	134
	B. Malaria Eradication Epidemiology Team - AMRO-0210	135

TABLE OF CONTENTS (Cont.)

		Page
	C. Study of Resistance of Malaria Plasmodia to Drugs - AMRO-0212	136
	D. Field Investigations of Mass Drug Treatment - AMRO-0217	136
	E. Malaria Eradication in Problem Areas (Morelos Project) Mexico-0201	136
	F. Study of Drug Therapy on Malaria - Colombia-0201	136
V.	International Cooperation	137

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FIGURES, MAPS AND TABLES

Figure:		Page
1	Status of the Antimalaria Campaign, 31 December 1956	3
2	Schematic history of malaria eradication operations, 1956-1965	5
3	Annual malaria incidence - Dominican Republic	15
4	Annual malaria incidence - Cuba, Dominica, Grenada, Guadeloupe, St. Lucia, Jamaica, Trinidad and Tobago	16
5	Annual malaria incidence - El Salvador and Costa Rica	17
6	Annual malaria incidence - Panama	18
7	Annual malaria incidence - Bolivia and Ecuador	19
8	Malaria Eradication in the Americas - Expenditures, 1956-1965, and cost estimations 1966-1975	20

Maps:		
1	Status of the Malaria Eradication Program in the Americas, 31 December 1964	24
2	Status of the Malaria Eradication Program in the Americas, 31 December 1965	25

Tables:		
1	Status of Malaria Eradication in the Americas, by Population, 1956	8
2	Status of Malaria Eradication in the Americas, by Population, 1965	9
3	Summary of Malaria Eradication expenditures in the Americas, by source, 1956-1965	21
4	Comparison of 1964 and 1965 population and area in various phases of the Malaria Eradication Programs in the Americas, and Percentages of change by phase	23
5	Progress in Malaria Eradication Programs in the Americas	23
6	Status of Malaria Eradication in the Americas, by Area, 1965	27
7	The Extent and Nature of Problem Areas and remedial Measures taken and Planned as of December 1965	30
8	Mass Drug Programs in the Americas, 1965	35
9	Personnel Employed in Malaria Eradication Programs in the Americas, 31 December 1964 and 1965, by Category	38
10	Personnel Employed in Spraying Operations in Malaria Eradication Programs in the Americas - 31 December 1965	39

Tables: (Cont.) Page

11 Personnel Employed in Epidemiological Evaluation in Malaria Eradication Programs in the Americas - 31 December 1965 40

12 Personnel Employed in Administrative and Other Services in Malaria Eradication Programs in the Americas - 31 December 1965 . 41

13 Personnel Employed in Transport Services in Malaria Eradication Programs in the Americas - 31 December 1965 42

14 Means of Transport in Malaria Eradication Programs in the Americas - 1965 43

15 National Budgets for Malaria Eradication in the Americas, 1964-1966 44

16 Summary of Case Detection in the Americas, 1958-1965 45

17 Comparative Results of Active and Passive Case Detection in Malaria Eradication Programs in the Americas, 1965 46

18 Malaria Cases Diagnosed in Colombia, by Species and Year 131

19 PAHO/WHO Full-time Professional and Technical Staff Assigned to Country, Inter-Country, and Inter-Zone Malaria Eradication Projects in the Americas, from 1963 to May 1966 138

20 Equipment and Supplies, Excluding Drugs, contributed by PAHO to Malaria Eradication Programs in the Americas, 1958 to December 1965 139

21 Drugs Provided by PAHO to Malaria Eradication Programs in the Americas, 1958-1965 140

22 International Contributions to Malaria Eradication Programs in the Americas, 1965 and Estimated 1966 141

Country Tables showing the Status of the Malaria Eradication Programs at December 1965:

Argentina 47

Bolivia 50

Brazil (Excl. São Paulo) 53

Brazil (São Paulo) 56

Colombia 59

Costa Rica 62

Cuba 65

Dominican Republic 68

Ecuador 71

El Salvador 74

Country Tables: (Cont.) Page

Guatemala 77

Haiti 80

Honduras 83

Jamaica 86

Mexico 88

Nicaragua 91

Panama 94

Paraguay 97

Peru 100

Trinidad and Tobago 103

Venezuela 105

British Guiana 109

British Honduras 112

Dominica 114

French Guiana 116

Grenada and Carriacou 119

Guadeloupe 121

Panama Canal Zone 123

St. Lucia 125

Surinam 127

REPORT ON THE STATUS OF MALARIA ERADICATION IN THE AMERICAS

XIV REPORT

Introduction

The Director of the Pan American Sanitary Bureau has the honor to present to the XVII Pan American Sanitary Conference the XIV Report on the status of malaria eradication in the Americas.

The report consists of five chapters. The first contains a brief history of the campaign during the decade 1956-1965, giving the high-lights from the annual Status Reports presented during these years and summing up the current situation from the vantage-point of ten years' experience. The remaining four chapters present information on the general status of the program, special technical problems, research currently in progress, and international cooperation.

I. A DECENNIUM OF PROGRESS

Eradication of a disease was conceived as a concept and authorized as an operational program by the XIII Pan American Sanitary Conference in Ciudad Trujillo in 1950, with reference to smallpox and malaria. A coordinated campaign for the eradication of malaria from the Hemisphere was initiated in 1954 and was extended world-wide by WHO in 1955. UNICEF lent its support to this major venture with provision of essential imported supplies and equipment. ICA (US) (now AID), already involved in malaria control programs in a number of American countries, accepted the eradication goal and evidenced its support by annual contributions to the PAHO Special Malaria Fund.

Malaria remains the first and the foremost of the eradication campaigns so far undertaken, although other diseases have also been named as targets. A brief review of the campaign in the Americas from its inception, surveying the various kinds of problems which have arisen, the solutions found and proposed, the successes achieved and the battles yet to be won, may be useful.

A. Beginnings

The first requirements of the new campaign naturally centered on organization. Some countries had had control programs, which could serve as the nucleus of a malaria eratication service. In others, the service had to be established without this foundation. A malaria eradication campaign requires detailed planning of a multitude of operations based on information collected from many sources, and the collection, analysis and translation of such data into plans of operation sometimes required a year or more where information was scanty. In 1955 PAHO established an Office for Coordination on Malaria Eradication Programs (COMEP) in Mexico, and the small staff of this office undertook to assist in formulating plans of operation for the various countries.

The emphasis of these early years, and the progress achieved by December 1956 in converting control programs to eradication programs and establishing new services where none had existed, is shown in Figure 1, which is a reproduction of a chart originally presented in 1957. Even the familiar terminology of malaria eradication had not yet come into use and "advanced" here means that attack measures were well under way.

By way of comparison, Figure 2 shows the year-by-year history of each campaign, in terms of the percentage of the population of the malarious area in each phase of the program. It can be seen that many programs have progressed steadily through the various phases and some are now in maintenance of eradication, while others have remained wholly or in considerable part in attack and there is even one still (or rather again) in the preparatory phase.

Tables 1 and 2 give population data by country for the areas in the Americas in the various phases of the campaign (using current terminology) in 1956 and at the end of 1965. The number of persons who lived in areas from which malaria had been nearly or completely eliminated (consolidation and maintenance phases) constituted 39 per cent of those in originally malarious areas in 1956,

and 67 per cent by December 1965. If the inhabitants of countries where malaria had been eliminated before 1955 are subtracted and comparison made of populations by phase in countries which actually suffered from malaria at the beginning of the period, the percentage distribution is as follows:

Percentage of population of malarious areas

Phase	1956	1965
Preparatory	59	12
Attack	35	38
Consolidation	1	39
Maintenance	5	11

B. Early operations

Great emphasis was necessary during the beginning years on obtaining for the new services a proper organizational structure, appropriate placement within the Ministry of Health, and authorizing and supporting legislation. It was recognized from the beginning that to achieve eradication a National Malaria Eradication Service (NMES) must be autonomous within the Ministry and have very considerable administrative flexibility in the handling of funds and the appointment and disposition of personnel, as well as priority in the receipt of financing. These were not easy to achieve; indeed they are still lacking (and their absence a serious handicap) in some services.

Training of personnel was a big problem, and it became necessary for PAHO to train its own personnel in new techniques, as qualified personnel thoroughly versed in malariology could not be recruited from government services, which were themselves under-supplied. Training centers were established in several places —Mexico, Jamaica, São Paulo— and those already in existence in Maracay, Venezuela, were extensively (and gratefully) used. Over 800 professional personnel and a large number of semi-professionals have been trained over the ten-year period in these centers, many of them PAHO/WHO staff and the others sent by national malaria eradication services.

Most of the national campaigns were originally planned on the base of spraying houses with dieldrin once a year. Although requiring protective clothing and considerable caution for its application, the advantage expected from the long residual action of dieldrin was strong recommendation. Drugs were used for presumptive treatments; it was recommended that radical cure treatment be administered by local health services, including hospitals. Evaluation activities were, then as now, primarily based on the taking of blood samples, but in early years the NMES itself had to perform this work by detailing evaluators for surveys and for case detection in what is now termed "active evaluation". With time the idea and then the development of a network of "passive case-detection" posts, mostly voluntary collaborators, were worked out; by 1958 over half the total number of blood-smears made were produced by the voluntary collaborators, permitting an improvement in the number and coverage of smears which the financial capabilities of the campaigns could not have afforded through active case-detection.

C. First biological problems

By 1958 tests were beginning to be made regularly on vector mosquitoes to determine their susceptibility to insecticides, and in Central America, Mexico and Jamaica they showed resistance to dieldrin. Change-overs began to be made to six-monthly spraying with DDT, entailing much additional planning and personnel expense. DDT had the advantage, however, of being easier to handle as it is less toxic to humans.

Other problems also began to be identified. It was found that even where dieldrin was still deadly to the vector species, annual spraying was sometimes insufficient to interrupt transmission, and investigation indicated that the number of new houses built, the number of new walls and new roofs and new lean-tos occurring in existing houses, and the number of washings and paintings and other "aggressions" against sprayed surfaces made during the course of a year was much higher than had been foreseen, resulting in higher proportions of unsprayed surfaces than could be tolerated for a successful residual-insecticide campaign. This was thus another motive for changing over to twice-yearly spraying.

FIGURE I.

STATUS OF THE ANTIMALARIA CAMPAIGN, 31 DECEMBER 1956

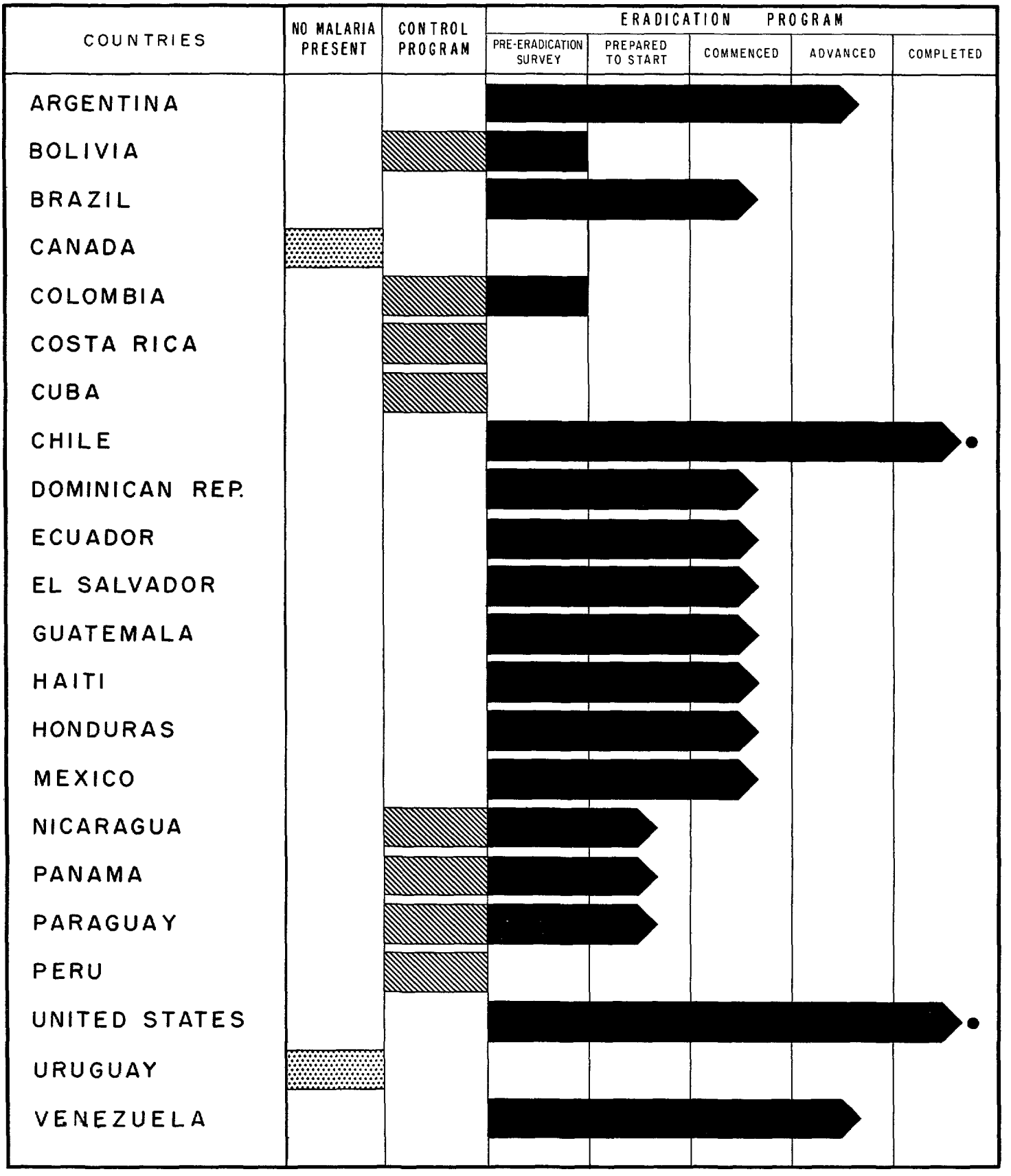


FIGURE 1.

STATUS OF THE ANTIMALARIA CAMPAIGN, 31 DECEMBER 1956

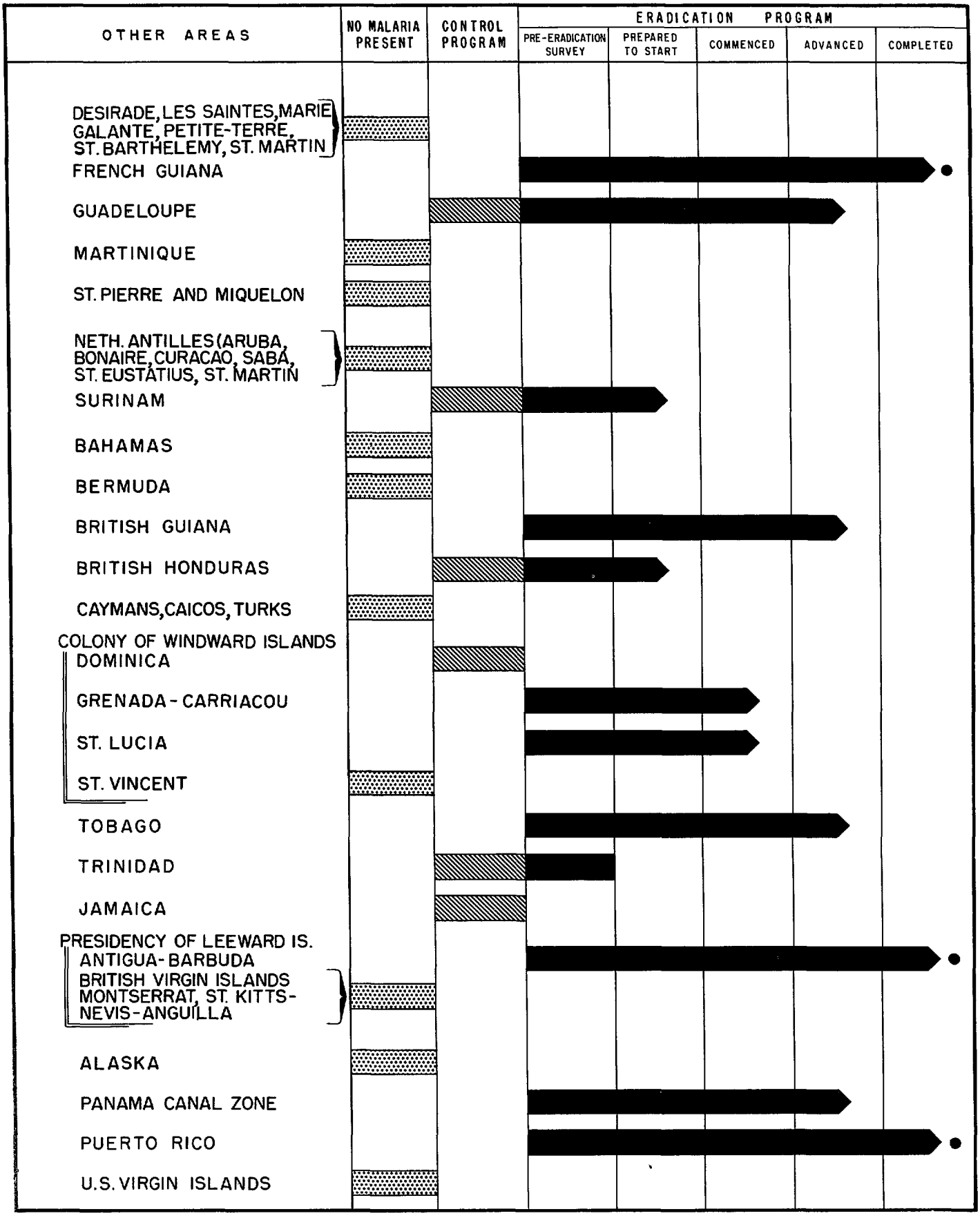
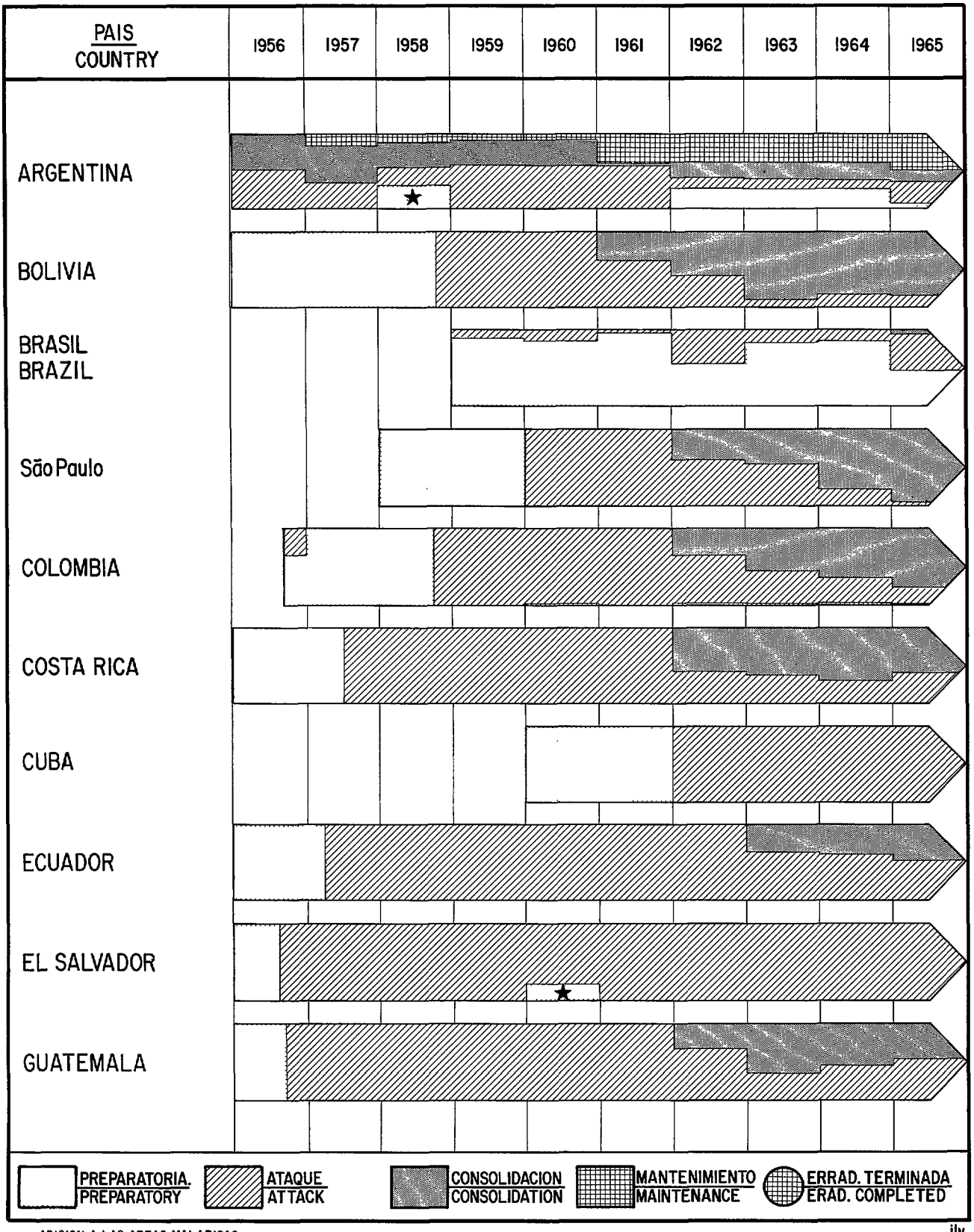


FIGURA 2.— FIGURE 2.

ESQUEMA HISTORICO DE LAS OPERACIONES DE ERRADICACION DE LA MALARIA, 1956-1965.
SCHEMATIC HISTORY OF MALARIA ERADICATION OPERATIONS, 1956-1965.
(% DE POBLACION DE LAS AREAS MALARICAS—% POPULATION OF MALARIOUS AREAS)



★ ADICION A LAS AREAS MALARICAS
ADDITION TO THE MALARIOUS AREAS

jlv.

ESQUEMA HISTORICO DE LAS OPERACIONES DE ERRADICACION DE LA MALARIA, 1956-1965
SCHEMATIC HISTORY OF MALARIA ERADICATION OPERATIONS, 1956-1965
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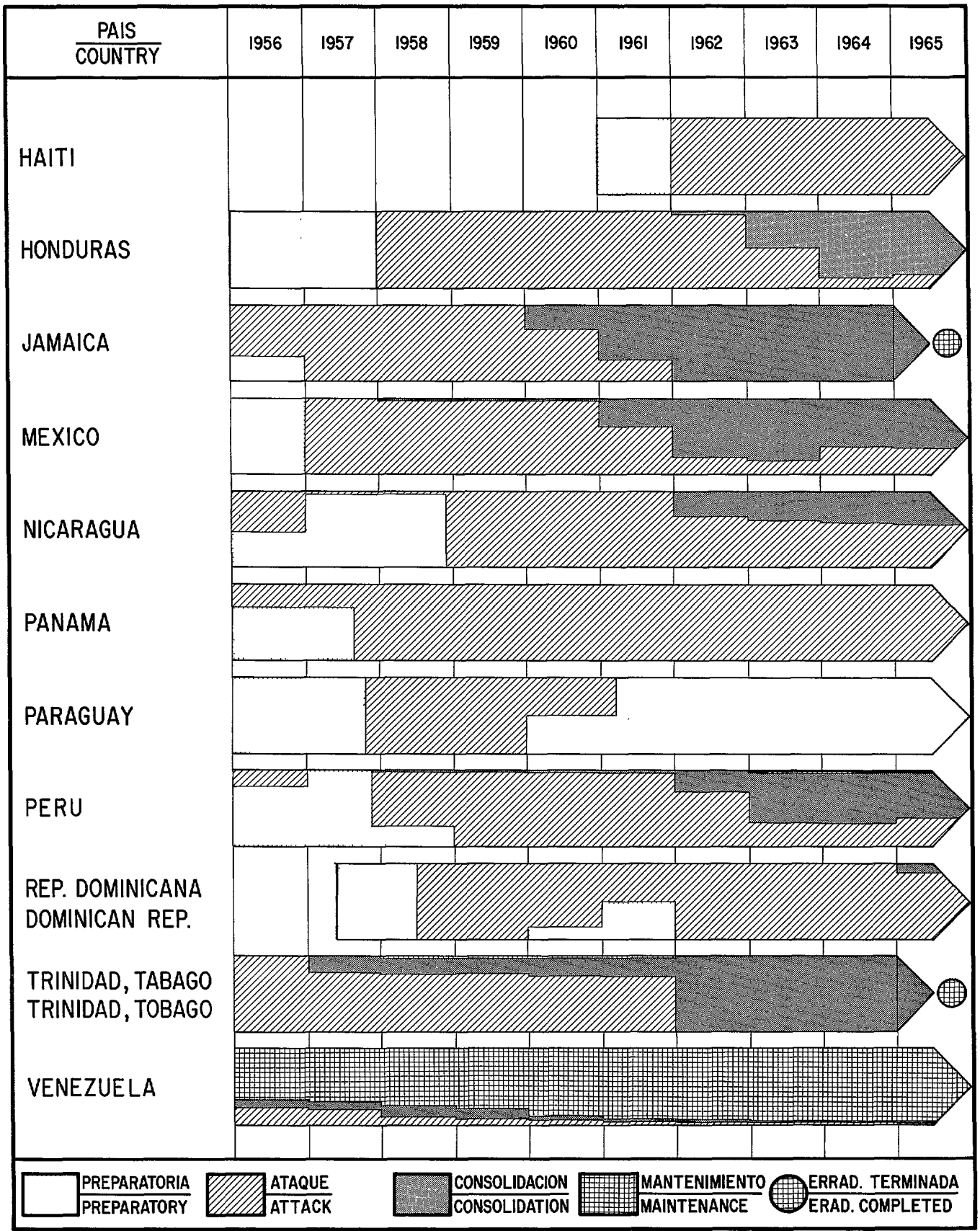

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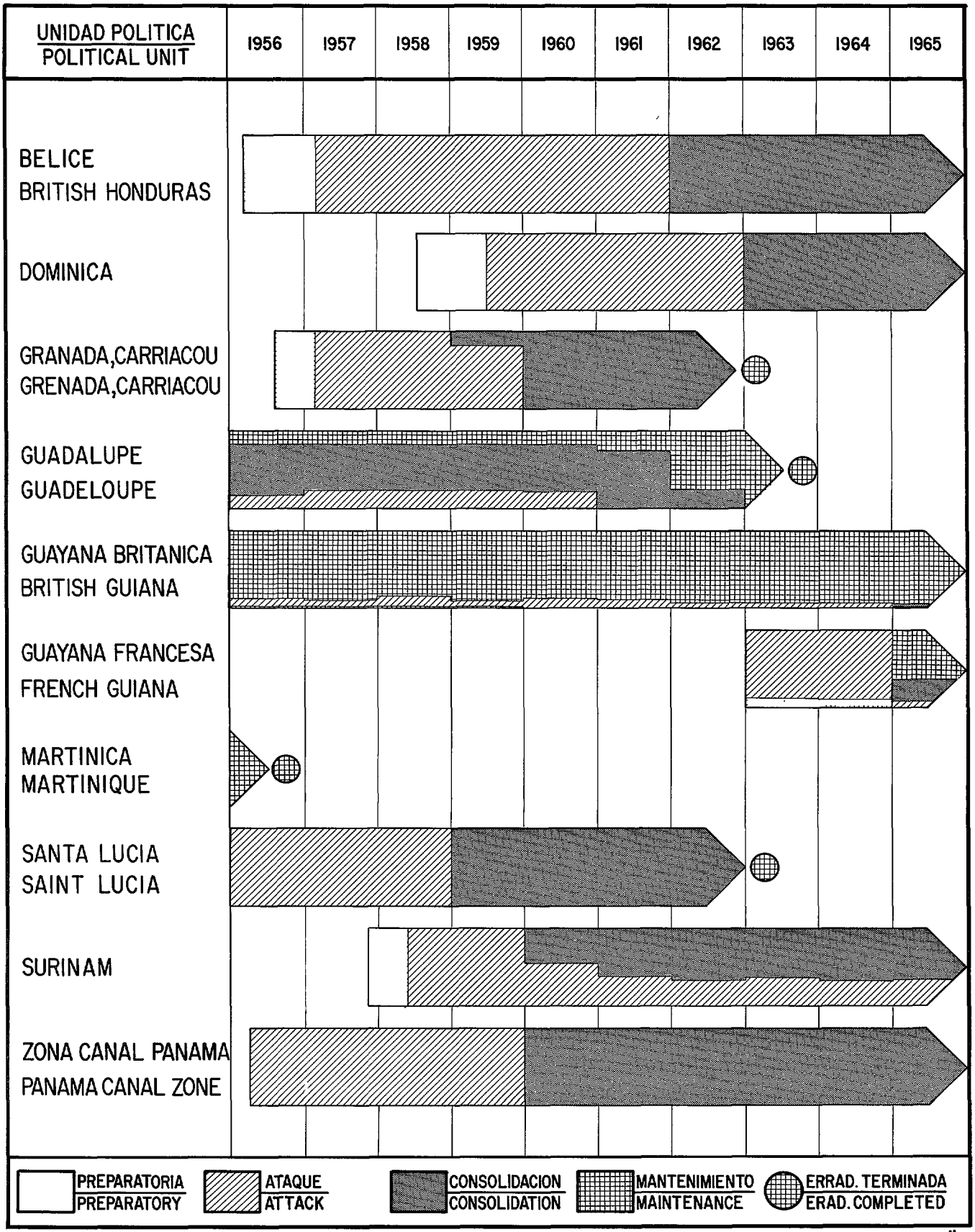

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Table 1

STATUS OF MALARIA ERADICATION IN THE AMERICAS, BY POPULATION, 1956

(Population in thousands)

Country or other political unit	Total population	Population of originally malarious areas				
		Total	Malaria eradication claimed (maintenance phase)	Consolidation phase	Attack phase	Prep. phase or program not yet started
Argentina [a]	19 250	1 430	-	660	770	-
Bolivia	3 269	1 087	-	-	-	1 087
Brazil	61 981	29 495	638	-	19 921	8 936
Canada	16 123	-	-	-	-	-
Chile	6 962	112	112	-	-	-
Colombia	13 576	9 796	-	-	3 348	6 448
Costa Rica	988	329	-	-	-	329
Cuba	6 280	1 685	-	-	-	1 685
Dominican Republic	2 611	2 418	-	-	-	2 418
Ecuador	3 825	2 036	-	-	-	2 036
El Salvador	2 196	1 900	-	-	-	1 900
Guatemala	3 373	1 360	-	-	1 360	-
Haiti	3 814	2 455	-	-	-	2 455
Honduras	1 625	1 282	-	-	-	1 282
Jamaica	1 525	1 287	-	-	861	426
Mexico	30 942	16 995	-	-	-	16 995
Nicaragua	1 255	1 034	-	-	565	469
Panama	952	910	-	-	268	642
Paraguay	1 613	700	-	-	-	700
Peru	9 004	2 878	-	-	595	2 283
Trinidad and Tobago	743	702	-	-	702 [b]	-
United States of America	168 088	42 366	42 366	-	-	-
Uruguay	2 397	-	-	-	-	-
Venezuela	6 393	4 386	2 879	441	1 066	-
Antigua	51	-	-	-	-	-
Bahamas	110	-	-	-	-	-
Barbados	231	228	228	-	-	-
Bermuda	40	-	-	-	-	-
British Guiana	494	494	441	-	50	3
British Honduras	82	82	-	-	82	-
Dominica	56	10	-	-	-	10
Falkland Islands	2	-	-	-	-	-
French Guiana	28	28	-	-	28	-
Grenada and Carriacou	84	24	-	-	18	6
Guadeloupe	244	193	35	124	34	-
Martinique	253	45	45	-	-	-
Montserrat	13	-	-	-	-	-
Netherlands Antilles	182	-	-	-	-	-
Panama Canal Zone	40	40	-	-	40	-
Puerto Rico	2 299	2 263	2 263	-	-	-
St. Kitts-Nevis-Anguilla	54	-	-	-	-	-
St. Lucia	82	57	-	-	57	-
St. Pierre-Miquelon	5	-	-	-	-	-
St. Vincent	75	-	-	-	-	-
Surinam	251	250	124	-	97	29
Virgin Islands (U. K.)	7	-	-	-	-	-
Virgin Islands (U. S.)	28	28	28	-	-	-
Total	373 496	130 385	49 159	1 225	29 862	50 139

- None.

(a) Situation as of April 1957. (b) Since 1953, no autochthonous cases have been found in Tobago, (34,000 inhabitants); surveillance operations not yet started.

Table 2

STATUS OF MALARIA ERADICATION IN THE AMERICAS, BY POPULATION, 1965

(Population in thousands)

Country or other political unit	Total population	Population of originally malarious areas				
		Total	Malaria eradication claimed (maintenance phase)	Consolidation phase	Attack phase	Prep. phase or program not yet started
Argentina	21 860	2 788	1 356	449	783	200
Bolivia	4 373	1 387	-	1 173	214	-
Brazil	80 932	25 397	-	5 205	10 270	9 922
Canada	19 571	-	-	-	-	-
Chile	8 656	101	101	-	-	-
Colombia	17 872	9 293	-	7 071	2 017	205 a)
Costa Rica	1 438	441	-	263	178	-
Cuba	7 390	2 296	-	-	2 296	-
Dominican Republic	3 573	2 930	-	346	2 584	-
Ecuador	4 957	2 692	-	1 288	1 404	-
El Salvador	2 918	2 451	-	-	2 451 b)	-
Guatemala	4 411	1 944	-	887	1 057	-
Haiti	4 500	3 500	-	-	3 500	-
Honduras	2 122	1 851	-	1 518	333	-
Jamaica	1 791	1 432	1 432	-	-	-
Mexico	40 707	20 485	-	12 995	7 490	-
Nicaragua	1 783	1 713	-	730	983 c)	-
Panama	1 244	1 194	-	-	1 194	-
Paraguay	2 144	1 781	-	-	-	1 781
Peru	11 107	3 879	46	2 334	1 499	-
Trinidad and Tobago	990	846	846	-	-	-
United States of America	194 300	47 100	47 100	-	-	-
Uruguay	2 715	-	-	-	-	-
Venezuela	8 579	6 402	6 028	132	242	-
Antigua	63	-	-	-	-	-
Bahamas	140	-	-	-	-	-
Barbados	245	241	241	-	-	-
Bermuda	49	-	-	-	-	-
British Guiana	638	638	602	26	10	-
British Honduras	105	105	-	105	-	-
Dominica	64	15	-	15	-	-
Falkland Islands	2	-	-	-	-	-
French Guiana	38	38	24	11	3	-
Grenada and Carriacou	95	32	32	-	-	-
Guadeloupe	300	267	267	-	-	-
Martinique	319	198	198	-	-	-
Montserrat	13	-	-	-	-	-
Netherland Antilles	210	-	-	-	-	-
Panama Canal Zone	50	50	-	49	1	-
Puerto Rico	2 626	2 572	2 572	-	-	-
St. Kitts-Nevis-Anguilla	63	-	-	-	-	-
St. Lucia	102	87	87	-	-	-
St. Pierre and Miquelon	5	-	-	-	-	-
St. Vincent	88	-	-	-	-	-
Surinam	328	200	-	134	66	-
Virgin Islands (U. K.)	8	-	-	-	-	-
Virgin Islands (U. S.)	43	43	43	-	-	-
Total	455 527	146 389	60 975	34 731	38 575	12 108

- None.

(a) Area in which the program is not yet started. (b) 199,500 inhabitants covered by mass drug program; 2,251,793 were living in areas in which spraying has been suspended due to financial difficulties, and from these, 1,545,258 are under epidemiological vigilance. (c) Includes inhabitants in areas in which spraying was suspended.

PAHO was naturally interested in discovering the optimum timing and dosage of insecticide, with a view to obtaining the best results for the least expenditure, and 1959 saw the birth of the insecticide testing unit now known as AMRO-0209. It began by investigating the residual activity of DDT sprayed at different dosages and intervals.

By the following year, anopheline resistance to DDT had been discovered in some areas, and in Central America some small areas were already known to have vectors resistant to both dieldrin and DDT. A committee of experts on insect genetics had been convoked in January 1959 to recommend the most fruitful avenues for research and the work of AMRO-0209 was broadened to include investigations of new insecticides. Malathion and Bayer 2949 were laboratory-tested.

D. Years of expansion

During 1958 and 1959, meanwhile, operations were expanding in other parts of the Hemisphere too. In Peru, the last malarious area not so far covered by the program, i. e., the fluvial area of the upper Amazon basin, was brought under attack. In Brazil, attack on the whole of the Brazilian Amazon was initiated by means of a chloroquinated-salt program. In Trinidad, collective treatment with chloroquine-primaquine in monthly cycles was begun in an interior area in which the vector bred in bromeliad plants and could not be reached with residual spraying alone, this being the last part of the island to have continuing transmission. The island of St. Lucia entered the consolidation phase.

As programs progressed, greater emphasis had to be placed on evaluation of results, and a seminar was held in Brazil to disseminate information and further the exchange of experience in this field.

The last two malarious American countries without an eradication program—Cuba and Haiti—began the preparatory phase in 1960-1961. The first area in the world to receive certification as an area in which malaria had been eradicated was delineated in Venezuela, after considerable study concerning the criteria which should be established as prerequisites to certification, and intensive evaluation of the current situation and records in Venezuela.

By 1960, eradication programs in the Hemisphere could already be divided into three categories which still obtain today (although some campaigns have shifted from one category to another in different periods): those with proper financing and administration and no technical problems, in which progress was steady and often rapid; those with technical problems preventing success with the standard attack measures, in which progress was delayed pending the working-out of new techniques and the provision of funds to employ them; and those with no actual technical problems, in which inadequate financing, poor administration, and/or inefficient operations kept the impact of attack below the critical level necessary to achieve eradication.

The roster of technical problems, which already included double resistance of vectors, was expanded during 1960 with the discovery of chloroquine-resistant cases of P. falciparum in the Magdalena Valley in Colombia and in Tachira and Trujillo states in Venezuela. As this did not occur in areas with vector resistance, the impact was not great in these programs.

To aid in overcoming difficulties in problem areas, PAHO established a new research unit, now known as AMRO-0210, to carry out studies on the reasons for the persistence of transmission in difficult areas. The unit began field operations in Costa Rica and moved to El Salvador in April, 1961.

Financial difficulties became acute in some programs in 1961. In Paraguay, attack operations had to be completely suspended, and in Argentina and Panama retrenchment was necessary. On the other hand, Ecuador re-initiated attack on a more complete scale, and the area in consolidation phase in various programs swelled very satisfactorily.

In British Guiana, the first significant instance of re-invasion by malaria of a cleared area occurred along the Demerara River below Georgetown –an area in which malaria had been eradicated before 1955. Counter-attack with spraying and focal collective treatment was successful. A chloroquinated-salt program was initiated in the interior of the country, and despite cases of dermatitis which occurred in some persons, the program was successfully continued.

The medicated-salt program in the Brazilian Amazon basin was concluded at the end of the year, after evaluation of the results indicated that it was not sufficiently effective. Insufficient coverage complicated by the existence of chloroquine-tolerant cases of P. falciparum appeared to be the underlying factor in the failure of the attempt.

E. Methodological advances

By this time (1961), it was clear that the simplistic approach to eradication, relying entirely on residual-action insecticides sprayed inside houses, was not sufficient to cover all situations and that the selective application of other methods of attack was necessary in many areas.

Pilot studies of supplementary attack methods were being carried out in a number of areas –larviciding was employed in Mexico, Guatemala and Nicaragua, collective treatment with anti-malarial drugs in El Salvador, medicated salt had been introduced for the interior of British Guiana, and extensive radical cure of P. vivax cases was employed in foci in Costa Rica and Nicaragua and to wipe out the remaining vestiges of transmission in Jamaica and British Honduras. AMRO-0209 began a study of the costs and effectiveness of larviciding in various field situations, and continued its studies of alternative methods of utilizing DDT. It became clear that epidemiological as well as entomological evaluation of results was required in order to determine the usefulness of particular measures in interrupting transmission.

Larviciding continued to be investigated in 1962, and was utilized in several suitable areas with considerable success– the city of Guayaquil in Ecuador was protected in this way, the shores of Lake Managua in Nicaragua were treated, a focus in an area of double insecticide resistance in the Sanarate Valley in Guatemala was successfully eliminated.

Further experiments were also carried out with collective treatment, in an area in Mexico with PAHO financial support and in Guatemala where an effort was made to stretch the funds available by developing a program in cooperation with the managements of cotton plantations and the United Fruit Company. The program in El Salvador continued to give excellent results in the area under treatment.

In the field of attack on adult vectors through insecticide, an experiment was begun in Haiti, in conjunction with the U. S. Public Health Service, to gauge the effectiveness of the fumigant insecticide, DDVP. In Guatemala, a variation of DDT spraying was tried with an experiment in continuous spraying to maintain complete coverage with residual DDT in the face of rapid building of new houses in a colonization area. Spraying of a new insecticide, malathion, in areas in which the vector was resistant to dieldrin and DDT was initiated in three sugar estates of high malaria incidence in Nicaragua as a field experiment, while laboratory studies of the activity of the compound were made by AMRO-0209. The AMRO project also completed its studies of DDT, and one of the results, later to be of considerable value, was the conclusion that DDT deposits on certain hard surfaces retained their activity for considerably longer than had been believed, and were generally active so long as they were visible.

PAHO was also working in another aspect of insecticide coverage, testing a simple disc flow regulator for spray pumps, to equalize the pressure with which the mixture was sprayed and therefore produce a more uniform deposit on the wall.

This device was developed by the H. D. Hudson Manufacturing Co., based on an idea which originated in the Technology Branch of the USPHS Communicable Disease Center.

AMRO-0210 completed 18 months of intensive study of two localities in El Salvador to isolate the factors responsible for persistence of transmission, and initiated a series of selected measurements of chosen factors in a group of differing localities, to perfect methods for identifying operative causes with greater rapidity. A useful tool for the detection and quantification of the irritability and repellent action of an insecticide on mosquitoes was developed by the unit and named the Excito-Repellency or E-R Box.

The need to obtain more precise information concerning chloroquine tolerance or resistance in P. falciparum strains was recognized in 1962 by creation of AMRO-0212, a center for the study of drug resistance in Ribeirão Preto, São Paulo, Brazil. Subinoculation of suspected resistant strains was begun in April, 1963.

The problems of poor administration continued to rank high as a cause of unsatisfactory progress, and a great deal of effort was devoted to convincing national authorities of the need for revamping inefficient methods and for according the requisite funds and flexibility to their eradication service. Poor administration and lack of money continued to overshadow technical problems as obstacles to consistent progress in the Hemisphere, although as usual the more novel technical difficulties received more public attention.

The necessity for close coordination among the six eradication programs of the problem belt of Central America and Panama was recognized at a PAHO-sponsored meeting of the Ministers of Health of these countries, at which the establishment of a coordinated program for the region was discussed.

F. Years of differential progress - 1963-1964

Explorations continued in many directions during this period, and good progress in some campaigns advanced the Hemisphere toward the goal while in other areas the program was temporarily stalemated.

On the administrative front, great gains were made in the Dominican Republic, in Colombia, and in Brazil. The Dominican Republic requested PAHO to nominate a co-director for the program, Colombia re-organized its service and re-trained the entire NMES staff, while in Brazil a new plan of operations was worked out to substitute a true eradication program for the previous activities of mixed eradication and control work. An agreement was signed ad referendum in 1963 by the Ministers of Health of Central America and Panama for establishment of a coordinated campaign in the six countries, but the projected organization could not be formulated acceptably within the frame-work of the different legal systems and no unified campaign was achieved during the period.

On the financial front, the problems became acute in Central America, Mexico and Panama and conditions continued to be unsatisfactory in several programs in South America. Bolivia experienced a sharp crisis in 1963-1964 as did Honduras.

Despite these difficulties, important advances were made. Population in areas in the consolidation phase increased by a third in 1963, and further increases occurred in numerous programs in 1964. Maintenance areas increased in Venezuela and Guadeloupe, some areas reached this phase in Peru, and the entire malarious areas of Jamaica and Trinidad and Tobago achieved maintenance at the end of 1964 and were certified as areas with malaria eradicated in the following year.

As more programs came in view of final eradication, the need for procedures for transferring responsibility for vigilance activities to the general health services and for the antecedent provision of suitable coverage and training within the general health services became even more urgent. In an effort to spur activities toward this end, PAHO organized two seminars concerning the role of the general public health services in malaria eradication, attended by the directors of the general health services and the directors of the malaria eradication services. The first of these took place in 1964 in Poços de Caldas, Minas Gerais, Brazil, and the second the succeeding year in Cuernavaca, Morelos, Mexico.

The fight continued against technical problems –insecticide resistance, excito-repellency, outdoor biting and resting, drug resistance of malaria parasites– and against operational difficulties such as unusual degrees of mobility in the human population, construction of new houses or alterations of old ones, openness of construction providing little surface for spraying, and outdoor sleeping habits.

The experiments with alternative insecticides to attack doubly-resistant species continued and expanded. Malathion spraying continued in Nicaragua and was initiated in the problem area of Honduras, with quarterly cycles, although financial problems interfered with the regularity of the cycles in the latter. Some beginnings of malathion tolerance were noted in vectors during 1964. The DDVP trials in Haiti were not particularly promising but were extended during 1963 to confirm the results; in 1964 they were stopped, with the conclusion that the fumigant was unable to interrupt transmission under Haitian conditions. In Panama, dieldrin was adopted in an area in which the

excito-repellency of DDT appeared to be reducing the effectiveness of spraying and dieldrin resistance had never appeared. AMRO-0209 investigated the effects of various new candidate insecticides when sprayed over existing layers of DDT, finding that non-irritating insecticides apparently neutralized the repellent effect of the DDT and had such a rapid knock-down effect that the irritability factor had no time to affect the mosquito. The unit also experimented with various substances as possible pre-treatments to reduce the rapid loss of activity of the new insecticides when applied to sorptive mud surfaces; no effective substance cheap enough to be feasible could be found.

Meanwhile, insecticide problems in "difficult" areas without vector resistance, in which human factors tended to interfere with complete coverage or vector habits reduced effectiveness, were also attacked. In Mexico, experiments were made with four-monthly cycles of DDT at varying dosages; in Colombia, inter-cyclic spraying by special brigades was instituted in an area bordering Venezuela; in Ecuador, intense spraying of additional surfaces scheduled at shorter invervals was tried in a limited area. These measures generally reduced transmission without interrupting it completely.

Larviciding continued to be employed in Nicaragua, and the use of fenthion in the Sanarate Valley in Guatemala was successful and could be terminated in 1963 (the valley became re-infected with malaria in 1964 and was again placed under fenthion larviciding). The city of Guayaquil, Ecuador, which had been principally protected through larviciding, successfully reached the consolidation phase.

Collective treatment programs were limited in 1963 by lack of funds — the programs in Guatemala and El Salvador could not be extended; that in Mexico was stopped and the area later re-infected. In Nicaragua, an area near Managua was placed under collective treatment when larviciding on the borders of Lake Managua proved insufficient to control transmission. During 1964, a pilot project of collective treatment was inititated in Petit Goâve in Haiti, employing chloroquine-pyrimethamine in three-weekly cycles; some extension of the drug program was made in El Salvador, with somewhat lesser success than in the first program because of less thorough preparation; and in Nicaragua, programs begun in Madriz and Esteli were found inadequate to interrupt transmission in the face of low acceptance by the population. These various drug programs provided a considerable experience on which conclusions could be based concerning the requirements for successful attack on transmission with this arm: the requisite preliminary education of the population, appropriate work-loads, suitable methods of work, length of the program, optimum timing, vigilance required after termination and many other aspects.

The primary conclusion reached during this biennium was that combined use of various attack measures selected after study of a given local area was the most fruitful avenue in problem and "difficult" areas. Insofar as financial limitations permitted, combined attacks were utilized –larviciding as a supplement to collective treatment in localities in Nicaragua, intensive case-finding and radical cure with supplementary spraying in Ecuador, focal spraying and rapid radical-cure treatment in Bolivia. Many of these trials demonstrated the effectiveness of the measures, but because of the impossibility of applying them on the scale required with the budget provided, the malaria situation worsened in parts of the problem area and little progress was made in areas of refractory malaria elsewhere.

AMRO-0210 finished and published the results of the series of synoptic two-week studies to determine causes of persistent transmission, but its activities were interrupted during most of 1964 by the untimely death of the team leader, Dr. René Rachou. The methodology was later employed in Mexico, where the unit itself was later re-constituted and where it undertook the study of persistence and of the effectiveness of certain attack measures.

The possibility of a long-acting anti-malarial drug was not neglected during this period, but a projected trial of cycloguanil pamoate was postponed when dosages in children were found from experiments in other parts of the world to be inadequate and to require adjustment.

G. Where do we stand?

After ten years of effort, how far along the road have we come? In the Caribbean, the job is well along toward completion, with eradication certified in six programs, two others which had late starts nearly ready for consolidation phase, and the remaining one (Haiti), which encountered some technical difficulties, making progress with its collective treatment program.

The record of blood-smears examined and cases found in these programs provide excellent examples of successful programs. The history of the Dominican Republic campaign (Fig. 3), from the control period through several false starts to the present is especially instructive. The rapid rate of decline of positivity (indicated by the quick divergence of the line showing cases found from the line showing smears examined) after an adequate, efficient program was achieved at the beginning of 1963 is very evident. Cuba presents an equally good picture (Fig. 4). The quick reduction in positivity in the six programs now in maintenance is also shown in Fig. 4; the levelling-out at around five cases per year after 1962 reflects cases being imported from other areas and occasional cases of P. malariae discovered.

Venezuela and the Guianas have some areas which have not responded well or in which attack is rendered exceedingly onerous by difficulty of access or the hostility of the population; drugs, as collective medication in Venezuela and in the form of medicated salt in British Guiana and Surinam are primarily being used against these problems. Medicated salt has given excellent results in British Guiana and has had promising beginnings in Surinam.

In Mexico, Central America and Panama, the long struggle to identify the reasons for the inability of the classical residual-insecticide attack to interrupt malaria transmission, and then to procure the resources needed to adopt the attack methods found to be required has brought the eradication campaigns to a brighter threshold. Funds are being provided, in part through long-term loans from USAID, to finance adequate attack measures for the next three years in Central American and Panamanian programs. The knowledge and experience accumulated in the many trials and limited-scale programs carried out during the years when restricted budgets forced the programs to attack only the hottest fires now provide a firm basis for scheduling and implementing attack on transmission at its most vulnerable points in each situation. Coordination machinery has been established for Central America and Panama. The next few years will be the crucial ones in this problem-plagued area. Figures 5 and 6 present examples of the results of technical problems combined with under-financing (El Salvador), and of under-financing without serious technical problems (Panama and Costa Rica).

In South America the most serious obstacle to be overcome remains that of providing adequate funds. Several programs have "difficult" areas in which malaria does not cede to routine attack measures, but more frequent or thorough application of the familiar spraying techniques, and where necessary a supplementary push from inter-cyclic spraying, intensive radical-cure treatment, focal collective treatment or perhaps larviciding can be expected to conquer the difficulty when money becomes available to apply these in a consistent and timely manner. Eradication programs must maintain a certain rhythm, there is a minimum speed of operation and the program which falls below this minimum runs the risk of losing the essential cooperation of the population and also of the government. Initial plans for eradication programs did not include the large sums necessary to maintain early gains for years while funds are not quite adequate to push attack to completion in the remaining pockets of transmission and re-infection is continually threatened or occurring. Some of these programs are increasing the cost of eradication by continual under-financing. In Figure 7 the graph for Bolivia, for example, shows the effect of the sharp reduction in activities caused by the budget cut in 1963 and 1964 in turning the minor increase of positivity in 1962 into major outbreaks; and the subsequent re-affirmation of control over this situation in 1965 when an adequate budget was again provided is very clear. The graph for Ecuador shows the braking effect on progress which results from continual insufficiency of funds for a thorough-going attack.

The Brazilian program, covering half a continent all by itself, is moving forward with better momentum than ever in the past. Because of the magnitude of the problem, this program is scheduled to be implemented successively in different parts of the country, and here too a not-quite-adequate budget has reduced the speed with which the plan can be carried out. Great improvements have been brought about in this campaign, however, and if the gradual inclusion of the whole malarious area is not allowed to fall too far behind schedule, good results can be expected. According to present plans, the last areas to come under attack will enter that phase in 1968.

Detailed projections of the expected duration of the individual campaigns and the budgets which will be required for their prosecution, both from national sources and from international, are set forth in Document CSP17/5. The total of past expenditures, and projected costs, for all malaria eradication programs assisted by PAHO/WHO, over the period 1956-1975, is presented graphically in Figure 8; the overshadowing role of local costs, almost entirely provided by national governments,

FIG. 3

INCIDENCIA PALUDICA ANUAL
ANNUAL MALARIA INCIDENCE

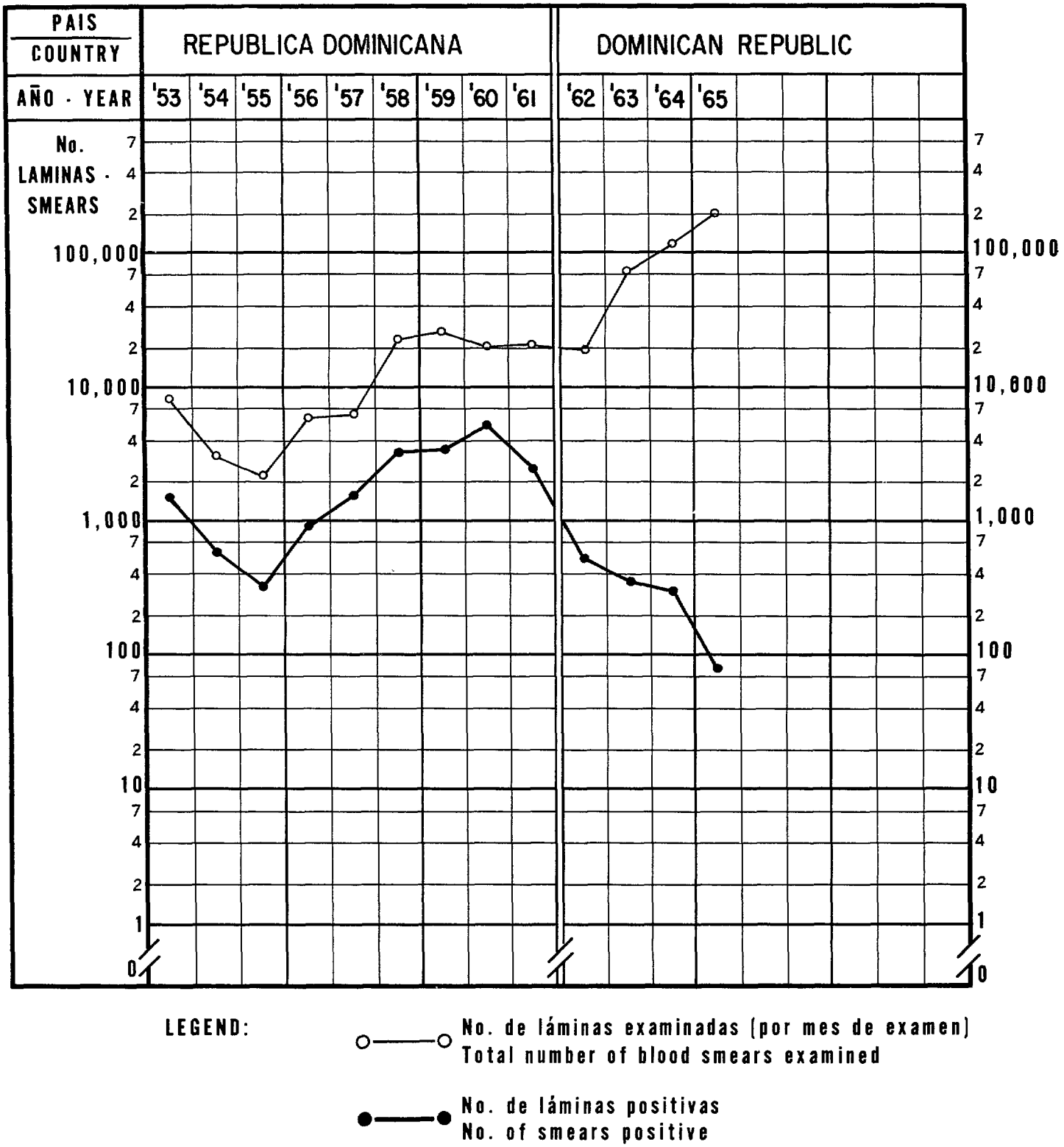


FIG. 4

INCIDENCIA PALUDICA ANUAL
ANNUAL MALARIA INCIDENCE

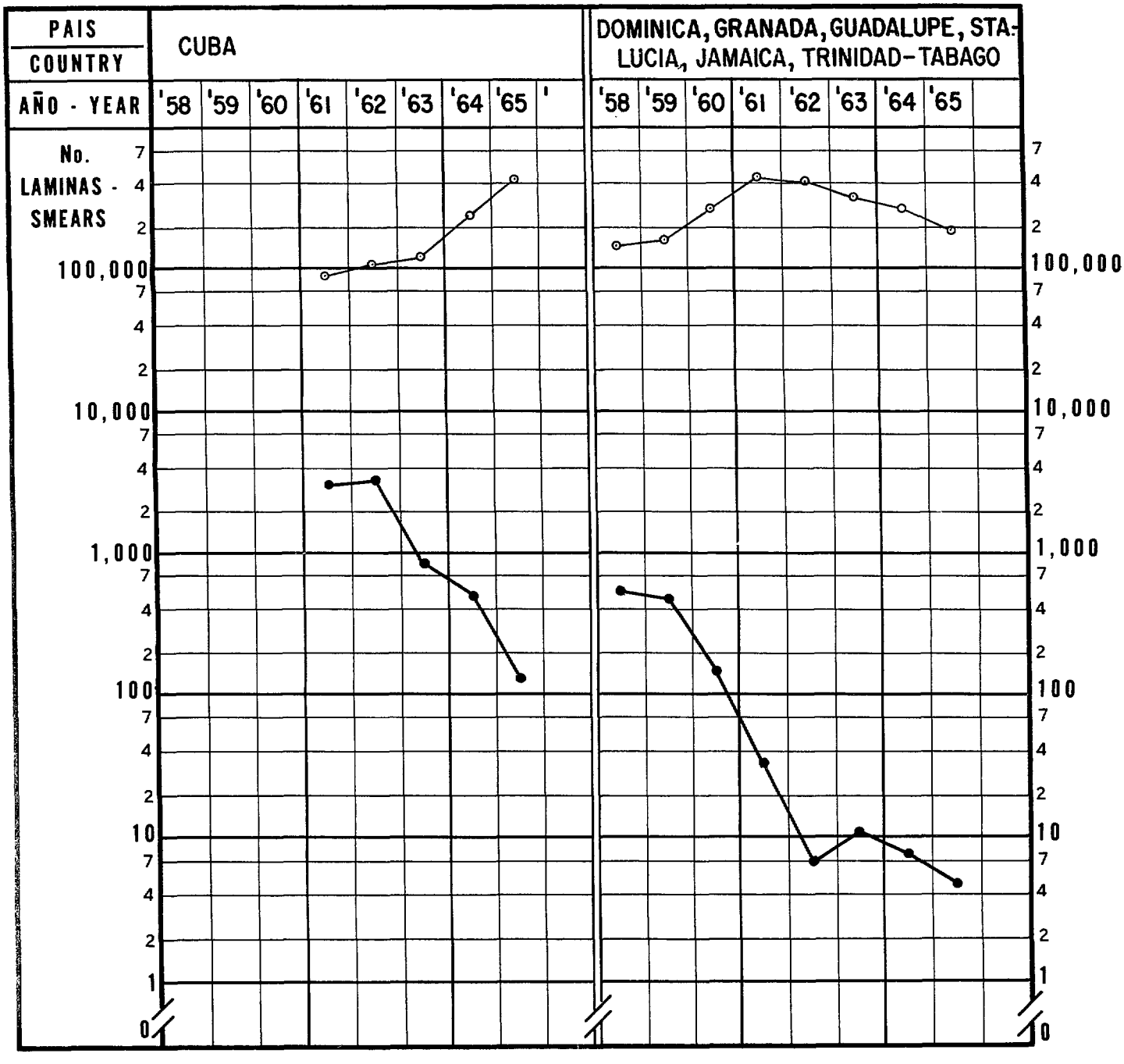


FIG.5

INCIDENCIA PALUDICA ANUAL
ANNUAL MALARIA INCIDENCE

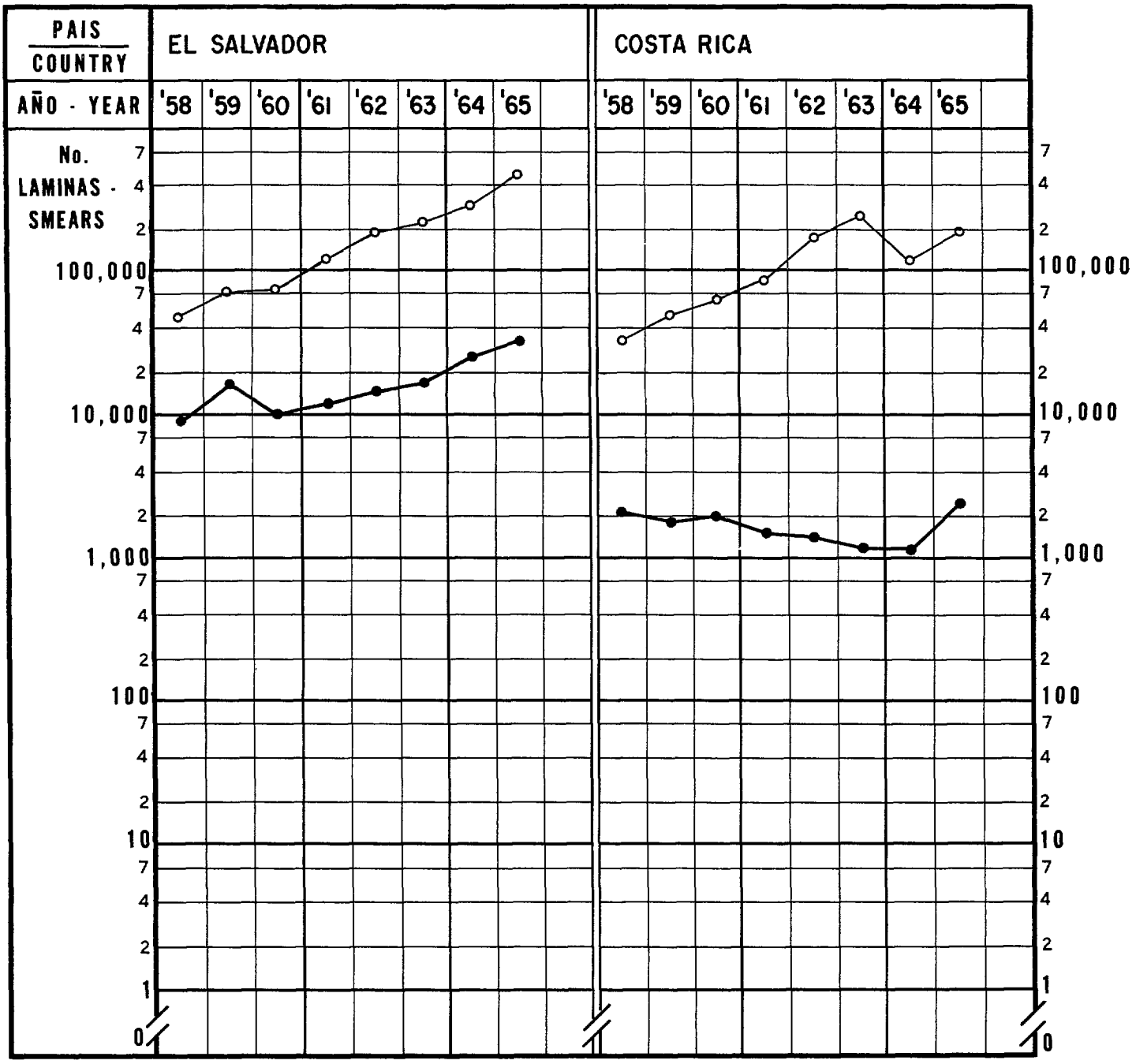


FIG.6

INCIDENCIA PALUDICA ANUAL
ANNUAL MALARIA INCIDENCE

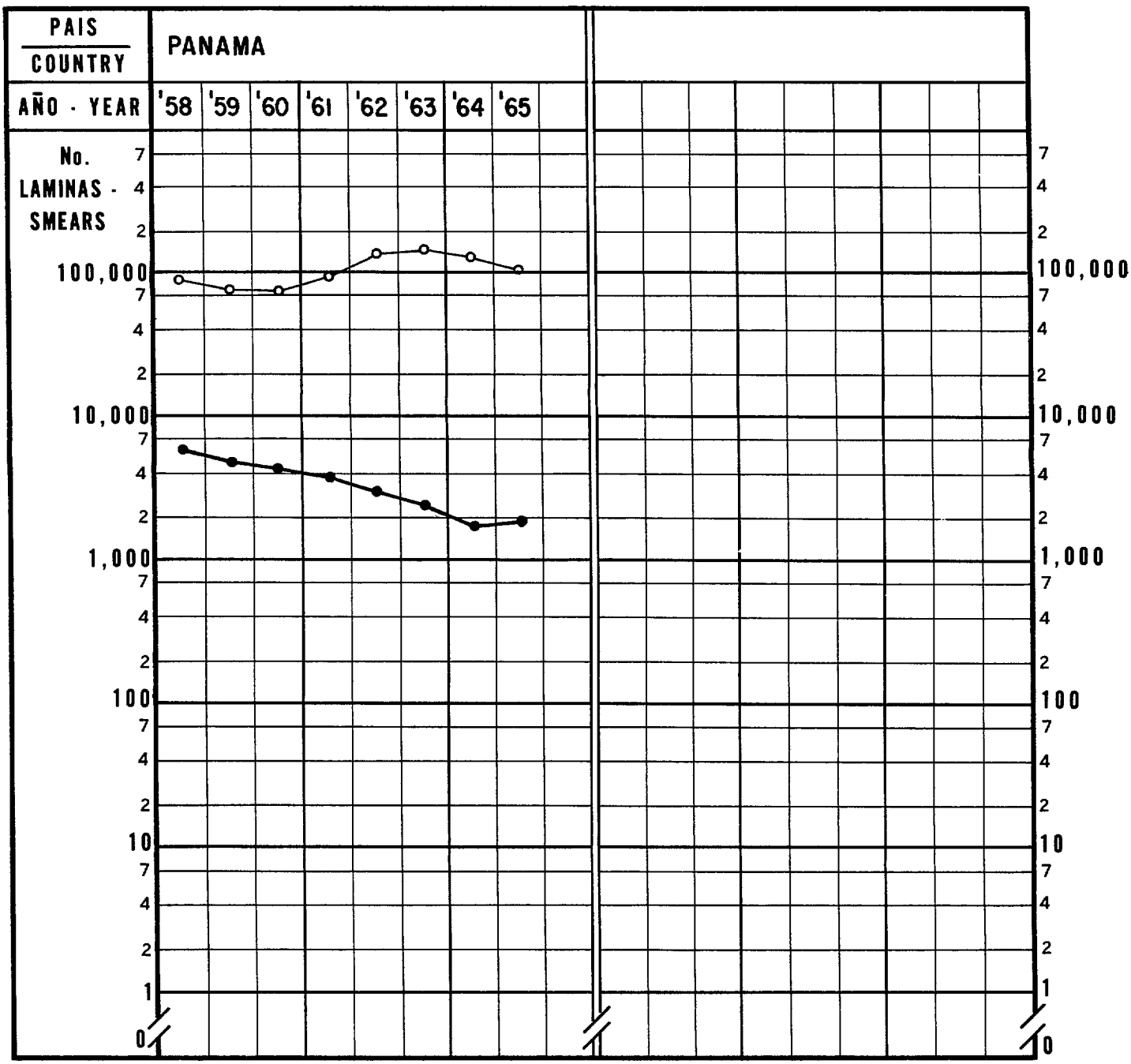


FIG. 7
INCIDENCIA PALUDICA ANUAL
ANNUAL MALARIA INCIDENCE

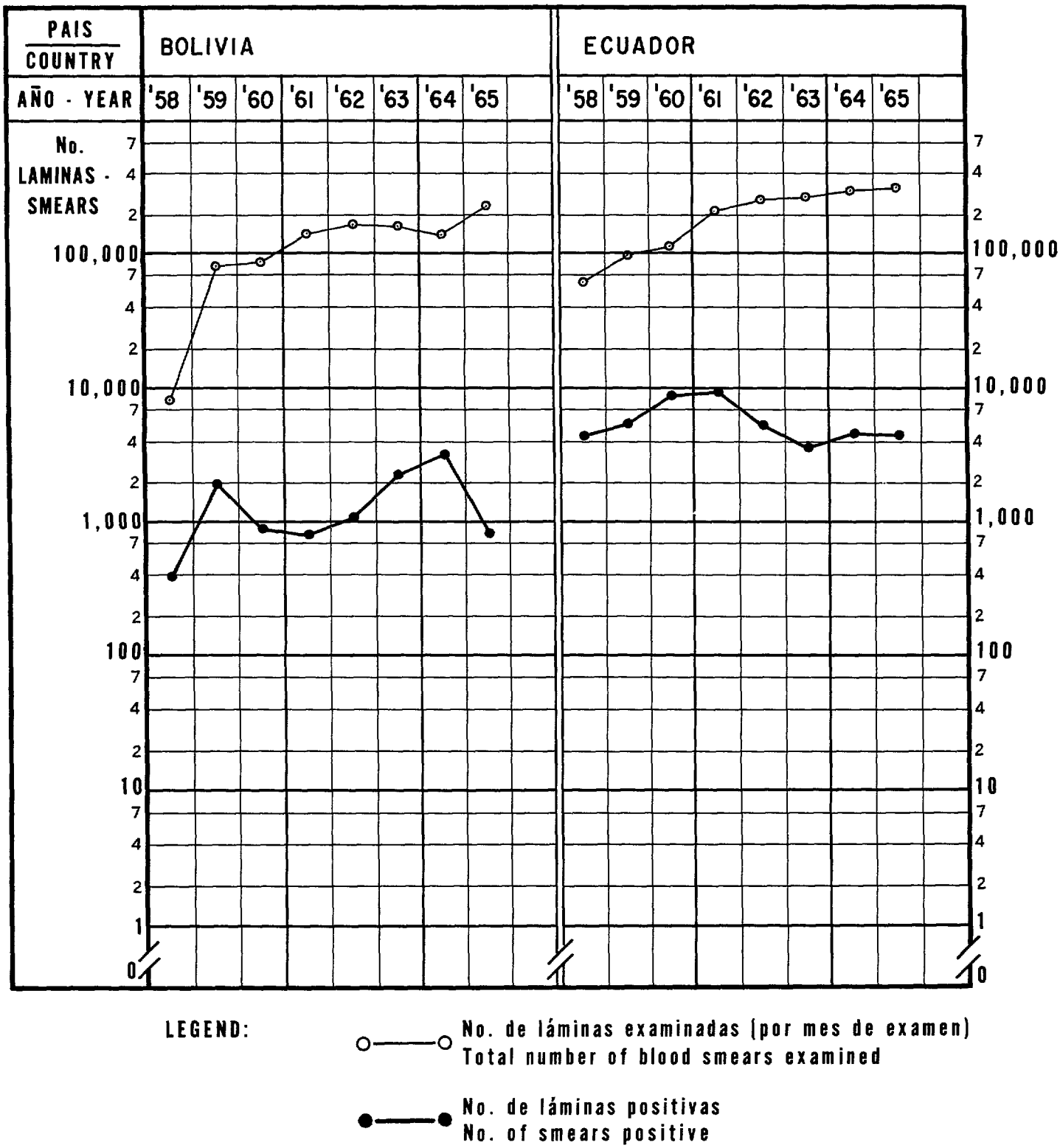
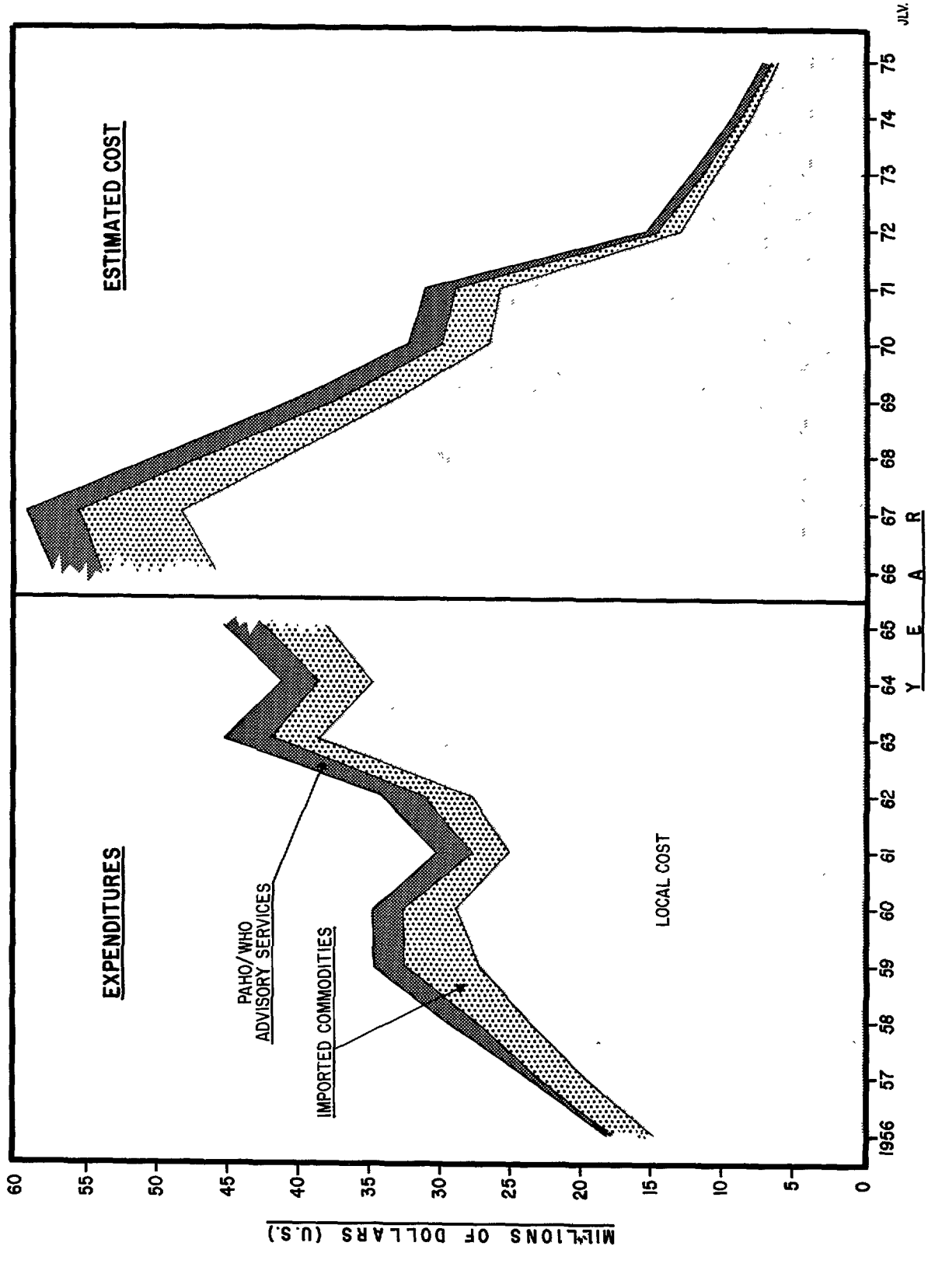


FIG.8

MALARIA ERADICATION IN THE AMERICAS

EXPENDITURES, 1956-1965, AND COST ESTIMATIONS, 1966-1975.



is very apparent. The actual source of the funds expended to date can be seen in Table 3. The increase of estimated costs in 1966, 1967 and 1968 over the present level reflects the improved position already nearly assured for Central American programs, and the increased level of expenditures that is necessary for a technically-adequate program in a number of other countries. The sharp decrease each year projected from 1967 onward depends, of course, upon provision of adequate funds in prior years –the level could be much more nearly horizontal and the total cost until eventual eradication much greater if timely provision of funds is not adhered to.

Table 3

SUMMARY OF MALARIA ERADICATION EXPENDITURES IN THE AMERICAS, BY SOURCE, 1956-1965

(thousands of U. S. dollars)

Year	Government	PAHO	WHO	UNICEF	AID	Total
1956	14 889.4	97.4	193.8	3 026.7	-	18 207.3
1957	19 828.3	510.6	169.9	3 307.3	-	23 816.1
1958	21 171.0	1 878.4	220.8	3 794.1	2 512.0	29 576.3
1959	22 947.0	2 041.8	214.4	5 269.8	4 233.0	34 706.0
1960	23 071.0	2 042.4	110.3	3 712.2	5 855.0	34 790.9
1961	22 256.0	2 312.5	120.0	2 675.6	2 853.0	30 217.1
1962	22 993.0	2 843.6	172.2	3 449.9	4 784.0	34 242.7
1963	31 248.0	2 910.4	185.1	3 409.4	7 419.0	45 171.9
1964	31 749.7	2 155.1	425.4	3 837.1	3 121.0	41 288.3
1965	36 878.0	1 897.2[a]	915.7[a]	3 013.0[a]	2 575.0[a]	45 278.9[a]
Total	247 031.4	18 689.4	2 727.6	35 495.1	33 352.0	337 295.5

(a) Estimated.

II. STATUS OF THE MALARIA ERADICATION PROGRAMS

A. General Picture

The advances made during 1965 were primarily in the administrative and financial sector –long the most troublesome "problem area". In the region comprised by Central America, Mexico and Panama the stubborn fight to prevent deterioration in the malaria situation while budget limitations blocked positive action finally has an end in sight, and funds are assured for some of these programs, in final stages of negotiation for others, and promised for the remainder. The coming triennium (funds are expected to become available at various dates in 1966) will see adequate attack measures put into operation in this area so beleaguered by technical problems. The long effort to provide coordination machinery in the region also bore fruit, and such machinery was established during 1965 and is already functioning, to ensure that the effects of the importation of malaria from one program to another are minimized and attack supports attack inside the group.

In Brazil, the federal program moved ahead with new impetus. A new loan agreement with USAID to cover necessities for imported materials was signed, covering two years. A Training Section was established and is being equipped and staffed, to train the personnel which will be needed for the expansion of operations taking place in the program. The first areas to be placed in consolidation phase were reclassified from attack phase, after surveillance operations had been reviewed to ensure that they met minimum requirements. Although budget is not quite adequate in this program and some re-scheduling has had to be done for this reason which will extend the attack phase an additional year (the last area is now scheduled to begin attack in 1968), the campaign is progressing more satisfactorily than ever before.

In some programs, in which financial and administrative problems were missing or not serious, solid advances were made toward the goal of eradication. This was the case in Cuba where the number of cases fell from 624 found during 1964 to 127 discovered during 1965, while the number of blood-smears examined rose from 276,500 to 424,000. The Dominican Republic likewise showed excellent progress, cases falling from 321 found among 121,000 smears in 1964 to 84 cases among 206,000 smears in 1965. Bolivia achieved a greatly lowered slide-positivity rate relative to 1964, with an increasing number of smears examined. British Guiana improved its position very considerably.

A number of other programs also show decreasing rates of positivity compared with 1964 but this results primarily from the fact that collective treatment programs are in progress, and such programs produce a large number of blood-smears with low average positivity, generally quite out-balancing the coverage of the rest of the malarious area. Collective treatment programs were underway during 1965 in Guatemala, El Salvador, Haiti, Honduras and Nicaragua, although only in Haiti was the program fully developed to cover the entire programmed area.

The general situation of the various programs according to phase can be compared in Map 1 and Map 2 and figures of population and areas by phase are summarized in Tables 4 and 5. Detailed population figures by country (Table 2) are repeated for ease of reference, and details of areas in each phase, by country, are shown in Table 6.

Notable changes have occurred. During the year, maintenance phase was increased by the addition of Jamaica and Trinidad and Tobago, as well as by additional areas in Argentina and Venezuela. Consolidation phase was swelled by the entry of areas with almost a million and a half population in the Brazilian federal program, a population of a million in Colombia, the first areas to reach this phase in the Dominican Republic, and various other small increases. In attack phase, population of attack areas in the Brazilian federal program increased by 4.4 million as new areas were brought under complete coverage, while the total net change in attack in the remaining programs was negative, as expected in more advanced programs. Preparatory-phase populations were drastically reduced as the Brazilian program reclassified large areas which have been "under observation" for several years – some were definitely classified for future attack and some were found to be non-malarious, the latter including a population of some 16 million persons.

This general review would not be complete, however, without pointing out that while satisfactory administrative and financial arrangements were being built for the problem areas of the Central American region actual operations on the ground were minimal and malaria barely held in check; that lack of funds in Ecuador paralyzed operations in the latter part of the year; that Paraguay has still not been able to resume attack; that Argentina and Colombia were forced to restrict operations because of insufficient budget.

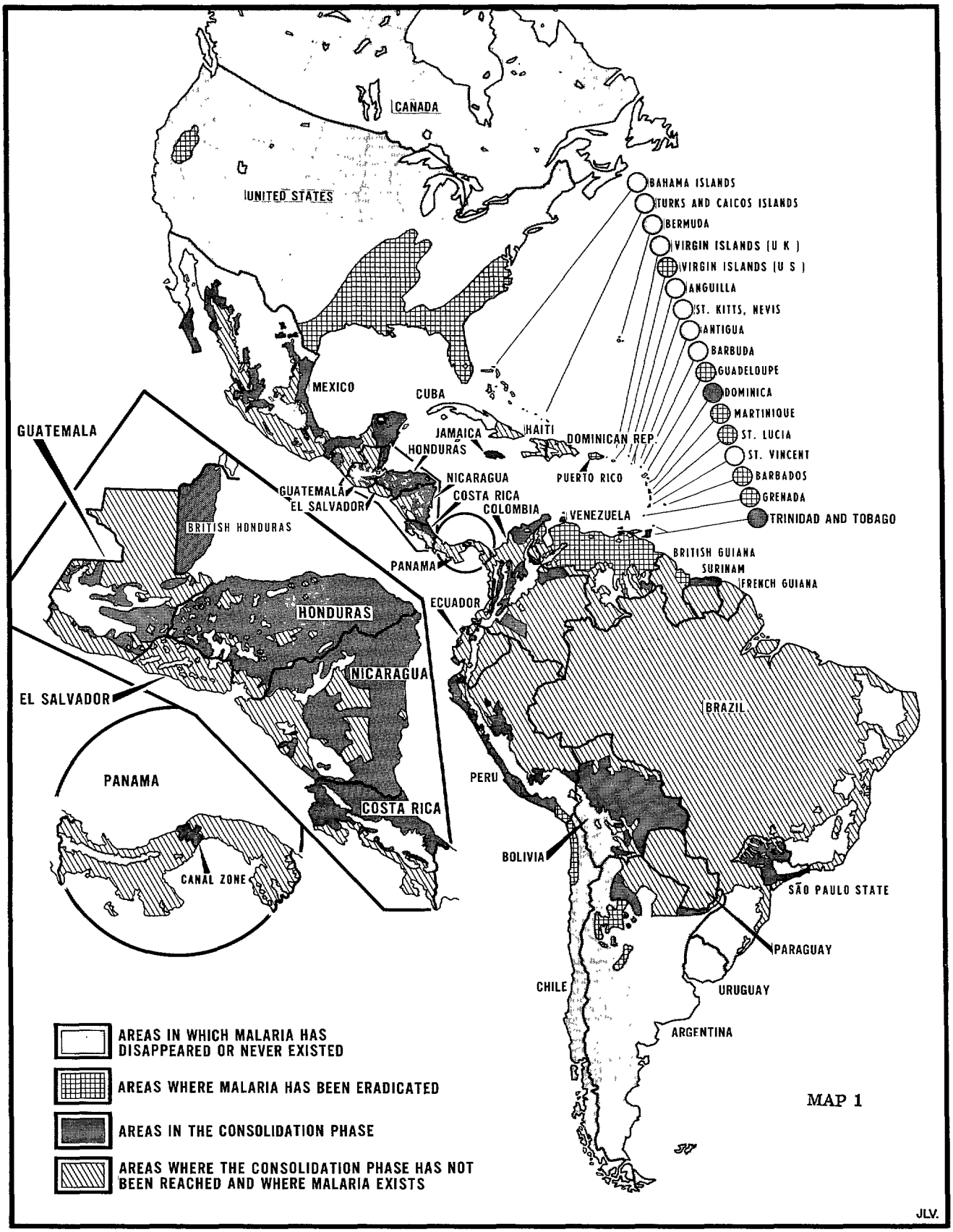
Table 4

COMPARISON OF 1964 AND 1965 POPULATION AND AREA IN VARIOUS PHASES OF THE MALARIA ERADICATION PROGRAMS IN THE AMERICAS, AND PERCENTAGES OF CHANGE BY PHASE

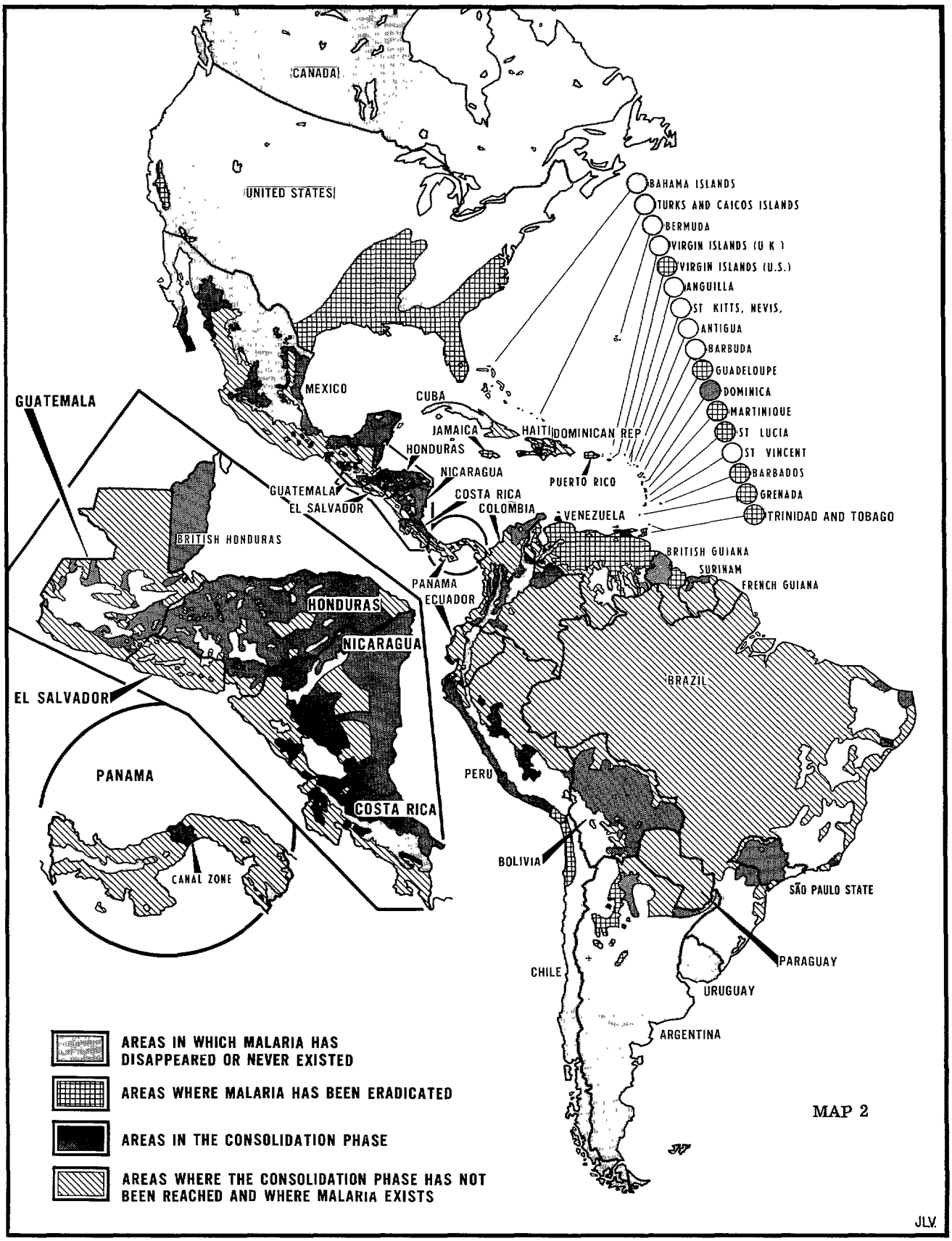
Phase	1964	1965	Percentage change
A. Population in thousands:			
1. Malaria eradication claimed or registered ...	57 414	60 975	+ 6.2
2. Consolidation phase	32 277	34 731	+ 7.6
3. Attack phase.....	34 426	38 575	+ 12.1
4. Preparatory phase or not yet started	34 525	12 108	- 64.9
B. Area in Km^2:			
1. Malaria eradication claimed or registered ...	2 874 313	2 931 204	+ 2.0
2. Consolidation phase	2 109 589	2 443 811	+ 15.8
3. Attack phase.....	3 219 017	4 490 867	+ 39.5
4. Preparatory phase or not yet started	7 852 697	5 757 061	- 26.7

Table 5

Year	Population in thousands			
	Malaria eradication claimed or achieved	Consolidation phase	Annual % of increase	
			Malaria eradication claimed	Consolidation phase
1960	50 741	1 991	-	-
1961	53 357	13 879	5.2	597.1
1962	55 397	25 914	3.8	86.7
1963	56 546	33 901	2.1	30.8
1964	57 414	32 277	1.5	-4.8
1965	60 975	34 731	6.2	7.6



STATUS OF THE MALARIA ERADICATION PROGRAM IN THE AMERICAS, 31 DECEMBER 1964.



STATUS OF THE MALARIA ERADICATION PROGRAM IN THE AMERICAS, 31 DECEMBER 1965.

Table 2

STATUS OF MALARIA ERADICATION IN THE AMERICAS, BY POPULATION, 1965

(Population in thousands)

Country or other political unit	Total population	Population of originally malarious areas				
		Total	Malaria eradication claimed (maintenance phase)	Consolidation phase	Attack phase	Prep. phase or program not yet started
Argentina	21 860	2 788	1 356	449	783	200
Bolivia	4 373	1 387	-	1 173	214	-
Brazil	80 932	25 397	-	5 205	10 270	9 922
Canada	19 571	-	-	-	-	-
Chile	8 656	101	101	-	-	-
Colombia	17 872	9 293	-	7 071	2 017	205 a)
Costa Rica	1 438	441	-	263	178	-
Cuba	7 390	2 296	-	-	2 296	-
Dominican Republic	3 573	2 930	-	346	2 584	-
Ecuador	4 957	2 692	-	1 288	1 404	-
El Salvador	2 918	2 451	-	-	2 451 b)	-
Guatemala	4 411	1 944	-	887	1 057	-
Haiti	4 500	3 500	-	-	3 500	-
Honduras	2 122	1 851	-	1 518	333	-
Jamaica	1 791	1 432	1 432	-	-	-
Mexico	40 707	20 485	-	12 995	7 490	-
Nicaragua	1 783	1 713	-	730	983 c)	-
Panama	1 244	1 194	-	-	1 194	-
Paraguay	2 144	1 781	-	-	-	1 781
Peru	11 107	3 879	46	2 334	1 499	-
Trinidad and Tobago	990	846	846	-	-	-
United States of America	194 300	47 100	47 100	-	-	-
Uruguay	2 715	-	-	-	-	-
Venezuela	8 579	6 402	6 028	132	242	-
Antigua	63	-	-	-	-	-
Bahamas	140	-	-	-	-	-
Barbados	245	241	241	-	-	-
Bermuda	49	-	-	-	-	-
British Guiana	638	638	602	26	10	-
British Honduras	105	105	-	105	-	-
Dominica	64	15	-	15	-	-
Falkland Islands	2	-	-	-	-	-
French Guiana	38	38	24	11	3	-
Grenada and Carriacou	95	32	32	-	-	-
Guadeloupe	300	267	267	-	-	-
Martinique	319	198	198	-	-	-
Montserrat	13	-	-	-	-	-
Netherland Antilles	210	-	-	-	-	-
Panama Canal Zone	50	50	-	49	1	-
Puerto Rico	2 626	2 572	2 572	-	-	-
St. Kitts-Nevis-Anguilla	63	-	-	-	-	-
St. Lucia	102	87	87	-	-	-
St. Pierre and Miquelon	5	-	-	-	-	-
St. Vincent	88	-	-	-	-	-
Surinam	328	200	-	134	66	-
Virgin Islands (U. K.)	8	-	-	-	-	-
Virgin Islands (U. S.)	43	43	43	-	-	-
Total	455 527	146 389	60 975	34 731	38 575	12 108

- None.

(a) Area in which the program is not yet started. (b) 199,500 inhabitants covered by mass drug program; 2,251,793 were living in areas in which spraying has been suspended due to financial difficulties, and from these, 1,545,258 are under epidemiological vigilance. (c) Includes inhabitants in areas in which spraying was suspended.

Table 6

STATUS OF MALARIA ERADICATION IN THE AMERICAS, BY AREA, 1965

(Area in km^2)

Country or other political unit	Total area	Originally malarious areas				
		Total	Malaria eradication claimed (maintenance phase)	Consolidation phase	Attack phase	Prep. phase or program not yet started
Argentina	4 024 458	349 051	63 280	73 630	140 075	72 066
Bolivia	1 098 581	824 260	-	619 540	204 720	-
Brazil	8 513 861	7 047 154	-	226 102	1 922 543	4 898 509
Canada	9 974 375	-	-	-	-	-
Chile	741 767	55 287	55 287	-	-	-
Colombia	1 138 338	946 222	-	276 294	290 032	379 896
Costa Rica	51 011	31 526	-	19 996	11 530	-
Cuba	114 524	37 502	-	-	37 502	-
Dominican Republic	48 442	39 000	-	7 780	31 220	-
Ecuador	291 906	175 462	-	29 479	145 983	-
El Salvador	21 146	19 300	-	-	19 300	-
Guatemala	108 889	80 350	-	16 546	63 804	-
Haiti	27 750	19 100	-	-	19 100	-
Honduras	112 088	101 367	-	79 217	22 150	-
Jamaica	11 428	10 028	10 028	-	-	-
Mexico	1 969 367	1 054 775	-	595 500	459 275	-
Nicaragua	139 000	132 385	-	91 888	40 497[a]	-
Panama	75 650	69 840	-	-	69 840	-
Paraguay	406 752	406 590	-	-	-	406 590
Peru	1 381 800	943 200	31 000	268 200	644 000	-
Trinidad and Tobago	5 605	5 444	5 444	-	-	-
United States of America	9 339 900	2 255 890	2 255 890	-	-	-
Uruguay	186 926	-	-	-	-	-
Venezuela	912 050	600 000	469 714	7 896	122 390	-
Antigua	280	-	-	-	-	-
Bahamas	11 396	-	-	-	-	-
Barbados	431	430	430	-	-	-
Bermuda	53	-	-	-	-	-
British Guiana	214 970	187 334	28 515	77 467	81 352	-
British Honduras	22 696	22 696	-	22 696	-	-
Dominica	790	152	-	152	-	-
Falkland Islands	11 961	-	-	-	-	-
French Guiana	86 000	32 000	200	24 396	7 404	-
Grenada and Carriacou	344	230	230	-	-	-
Guadeloupe	1 779	1 136	1 136	-	-	-
Martinique	1 102	300	300	-	-	-
Montserrat	84	-	-	-	-	-
Netherlands Antilles	961	-	-	-	-	-
Panama Canal Zone	1 432	1 432	-	1 432	-	-
Puerto Rico	8 896	8 896	8 896	-	-	-
St. Kitts-Nevis-Anguilla	396	-	-	-	-	-
St. Lucia	603	510	510	-	-	-
St. Pierre-Miquelon	240	-	-	-	-	-
St. Vincent	389	-	-	-	-	-
Surinam	163 820	163 750	-	5 600	158 150	-
Virgin Islands (U. K.)	174	-	-	-	-	-
Virgin Islands (U. S.)	344	344	344	-	-	-
Total	41 224 755	15 622 943	2 931 204	2 443 811	4 490 867	5 757 061

- None

(a) Includes an area of 11,560 Km^2 in which the spraying is temporarily suspended.

B. Current Extent of the Problem

In Mexico, the situation apparently remains essentially the same as it was at the end of 1964 although evaluation operations were insufficient to give a complete picture. Plans have been made for a greatly intensified attack on the areas of persistent transmission but funds have not yet become available although they have been agreed to in principle by the Government, which is endeavoring to provide a greatly increased budget for the next six years. Several pilot projects of various combinations of supplementary attack methods are in progress in the program (see Chapter IV, Research, AMRO-0210).

In Central America, funds at higher levels for the new three-year attack programs will be actually available at varying times in 1966 in the different programs. The three-year attack originally planned for 1965-1967 is expected to be mounted from mid-1966 to mid-1969, with adjustments for seasonal factors, as a result of the delays inherent in the process of approval of external financial aid. During 1965, in the meanwhile, El Salvador extended its collective treatment program to an additional 64,000 persons, although the operation suffered from insufficient preparation; Guatemala had a drug program for a population reaching 114,000 at its maximum, but not well administered; Honduras was able to initiate the scheduled collective treatment program for its problem area only on a pilot scale, in a population of 16,250 in the highest-incidence area, a program which was carefully planned and executed and which obtained excellent results. Collective treatment could be used in Nicaragua only in a few small localities of the problem area because of lack of money; malathion is also still being sprayed and will continue in use in the expanded program in those areas in which drugs alone cannot halt transmission completely.

The measures recommended for use in Costa Rica to eliminate its areas of persistent transmission were not adopted during 1965, but action was taken to improve the direction and administration of this program in expectation of improved financial prospects.

In April 1965, a meeting of the Ministers of Health of Central America and Panama was sponsored by PAHO in Washington, D. C., at which the need for efficient coordination among the six programs was recognized and a Coordination Working Group was established to perform this function. The Group is composed of the directors of the malaria services of the six programs, with PAHO's chief malaria adviser for Zone III as secretary, and will meet at least twice a year. The secretary also receives and distributes statistical and other data concerning the operation of the various programs on a monthly and quarterly basis. The Working Group is subsidiary to the High Council on Health of Central America and Panama.

British Honduras, which fortunately has escaped technical problems and has been entirely in consolidation phase since mid-1962, nevertheless fell victim to the deterioration which has occurred in the region since 1963 and experienced a sizeable outbreak of P. falciparum malaria in its southernmost district, Toledo, evidently set off by imported cases. Spraying and collective treatment of the population involved brought it under apparent control by September, but the consolidation phase will be prolonged.

In the Caribbean, progress has been excellent. In addition to the programs achieving maintenance mentioned above, and those of Cuba and the Dominican Republic which have advanced steadily in recent years and are nearing consolidation phase (the Dominican Republic placed its first areas in consolidation in December), the remaining program, that of Haiti, launched a full-scale attack using collective treatment. DDT had proved insufficient to interrupt transmission of malaria, in large and wide-spread areas of the country, and on the basis of a pilot drug project in Petit Goâve begun in 1964, a large drug program was initiated in the first half of 1965. As funds were not adequate to cover drug administration to the over-half-million persons scheduled and at the same time to provide the routine semi-annual DDT cycles in the whole attack area, spraying was suspended in about half the houses. Vigilance activities were tempered to the potentialities of transmission in the various areas, some receiving only passive case-detection and others active as well. Acceptance was excellent in the drug program and results good, but the rise in incidence in the remaining portions of the malarious area was more than had been anticipated and new areas were progressively incorporated in the drug program. At the end of the year, 1.25 million persons were being treated, in three-week cycles of chloroquine-pyrimethamine. It is expected that the program can be terminated in these areas at varying times during 1966, and some additional areas will undoubtedly need to be added. An annual cycle of DDT-spraying will also be made in all localities below 200 meters in altitude and in higher ones with recent transmission.

In the Guianas different conditions prevailed in the different programs. In British Guiana excellent results continued to be achieved in the interior regions, and in two of the three districts the medicated salt program was terminated and the districts were placed in consolidation phase. In the third, the Rupununi area in which chloroquine-resistant falciparum had motivated a DDT campaign to supplement medicated salt, salt distribution and spraying continued and only 17 cases were found, of which 16 were falciparum and none were chloroquine-resistant. Efforts are being made to improve evaluation in all districts.

Surinam experienced a considerable increase in the number of cases found, in a decreased number of blood-smears. This was related to doubling of the number of smears collected in the highly malarious portions of the interior (of which 85 per cent were taken by passive case-detection) and a decrease to half the previous number of smears taken in the rest of the country. As years of effort have been fruitless in obtaining the cooperation of the population for spraying along the upper Surinam and Tapanahony/Lawa river systems, a trial was begun of the use of chloroquinated salt, after study of the supply channels for salt in the interior. First distribution of the medicated salt was made by missionary doctors on the upper Surinam, and the salt was well received by the population. Expansion of the program on this river is under way.

French Guiana reported the re-classification of part of its attack area to consolidation phase. Venezuela continued attack through collective treatment, spraying and peri-domiciliary fogging in its areas of persistent transmission.

Financial difficulties were wide-spread in South American programs. The campaigns in Ecuador and Colombia both suffered, particularly the former. Efforts to eliminate two areas of continuing transmission in Ecuador were nevertheless successful in one of the areas. In Colombia supplementary attack was initiated through radical-cure treatment on a presumptive basis, administered to all fever cases found at the time of the semi-annual spraying cycles in the most difficult areas of the country. The treatment used was an experimental regimen of chloroquine-pyrimethamine-primaquine given for three successive days; details of a controlled test of this treatment as used for P. vivax will be found in Chapter IV, Research.

Argentina expanded its spraying program somewhat during 1965, and continued geographical reconnaissance in Formosa. Paraguay pushed forward with geographical reconnaissance during the year and is trying to arrange financing to permit a resumption of spraying operations in the latter part of 1966.

Bolivia recovered from the blow to the program which had resulted from insufficient budget in 1964, reorganized some of its zones, and made good progress toward eradication. Small collective treatment programs were employed in some of the persistent foci in river basins, and one of the three such sectors was cleaned up and passed to consolidation phase. The northern attack area, including the Bolivian Amazon region, showed very reduced positivity. If funds are provided to permit a higher level of evaluation this program should continue to make rapid progress. An Institute for Infectious Diseases was established during 1965 which will aid in setting up local health unit coverage in areas approaching maintenance and will take over malaria service staff and functions when this phase is achieved.

Peru had outbreaks in the consolidation area of the northwest part of the country, partly as a result of unusual rains which altered migration routes by opening new areas to cultivation, but also partly the result of deficient and slow case-detection and anti-focal action. For this reason the consignment of some consolidation areas in this zone to the responsibility of the general health services has been postponed.

The Brazilian federal program has been discussed above. In São Paulo, the level of cases, primarily imported from other states of Brazil, increased during the year and were found scattered widely through the state. The danger this represents to the program, which is almost entirely in consolidation phase, is considerable, although partly counterbalanced by spraying which is being carried out in connection with the control of Chagas disease.

Details for problem areas are set forth in Table 7. Table 8 lists the collective treatment programs under way in the Hemisphere and provides information concerning the population under treatment, drugs used, etc. The total under collective treatment is greatly increased by the expansion of the Haitian program; considerable expansion can be anticipated in the Central American campaigns during 1966.

Table 7

THE EXTENT AND NATURE OF PROBLEM AREAS AND REMEDIAL MEASURES TAKEN AND PLANNED, AS OF DECEMBER 1965

Country and name of area	Population	Area (km^2)	Insecticide		Vector	Causes of Problem	Remedial Measures		
			Kind	Years of coverage			In operation in 1965	Planned for 1966	Results
Costa Rica									
Jicaral-Puntarenas Matapalo-Aguirre Sámara-Nicoya	2 333 2 794 943	223 265 89	DDT and DLN	8	Known: A. albimanus A. punctimacula A. pseudopunct.	Excito-repellency to DDT; peri-domiciliary biting; open construction of houses; internal migration of population	None	Mass treatment	None
	6 070	577							
El Salvador									
Coastal strip 0 to 100 m. altitude	374 000	6 600	DLN DDT	2 8	Known: A. albimanus Suspected: A. pseudopunct.	Resistance and Excito-repellency to DDT; migration of population	Mass treatment and small-scale larviciding	Spraying	Good where acceptance by population good
French Guiana									
Alto Maroni	1 500	3 500	DDT	...	A. darlingi	Difficult spraying in border zones with Brazil and Surinam	DDT spraying and mass drug treatment	Improve DDT spraying and mass drug treatment	Insufficient
Oyapock	1 100	3 900	DDT Mal	...	"	"	"	"	"
Chantiers Fourgassié-Cacao	109	2	DDT	...	A. aquasalis	Nomadic habits of the population	...	...	...
Guatemala									
Pacific coast (western 2/3)	344 347	6 109	DLN DDT	2 8	A. albimanus A. pseudopunct.	Resistance to DDT and DLN; excito-repellency; migration; new houses	Mass drug treatment	Continue	Satisfactory where used, but coverage incomplete
Moyuta-Jutiapa	20 918	310	"	"	"	Excito-repellency; high migration; new houses	DDT; radical treatment; mass drug treatment	"	Good progress

General note: Unless otherwise noted, DDT and DLN sprayings are at standard doses and intervals.

Table 7 (Cont.)

THE EXTENT AND NATURE OF PROBLEM AREAS AND REMEDIAL MEASURES TAKEN AND PLANNED AS OF DECEMBER 1965

Country and name of area	Population	Area (km^2)	Insecticide		Vector	Causes of Problem	Remedial Measures		
			Kind	Years of coverage			In operation in 1965	Planned for 1966	Results
Guatemala (Cont.)									
Jalapa	71 069	1 324	DLN DDT	2 8	A. albimanus A. pseudopunct.	Resistance to DDT and DLN; internal migration	Larviciding in Capital District	Larvicides	In evaluation
Baja Verapaz	13 714	675	"	"	"	"	Larvicides	"	"
Alta Verapaz	20 410	410	"	"	"	Internal migration; open construction of houses; resistance to DDT	"	"	"
	470 458	8 828							
Haiti	1 850 000	...	DDT	3	A. albimanus	Aggresions to spraying; habits of population	Mass treatment, Chloro-Pyrimethamine, 3 week schedule	Continue	Good
Honduras									
Southern area	158 263	3 583	DLN DDT Mal.	1 4 1 1/2	A. albimanus A. pseudopunct.	Resistance to DDT and DLN; migration, construction of new houses; sleeping habits of pop.	Malathion for 2 months; mass treatment in one county	Mass treatment; malathion in limited foci	Insufficient
Mexico									
Tapachula-Suchiate	42 897	1 204	DDT	9	A. albimanus	Resistance to DDT	DDT spraying twice a year; search for cases; radical cure treatment	Continue	Transmission persists
Basin middle Grijalva River	41 814	3 078	"	"	A. pseudopunct. A. albimanus	Population movements; temporary shelters	DDT spraying twice a year	"	"
North Slope, Chiapas mountains	245 282	10 495	"	"	"	"	"	"	"
Ravine, Miguel Alemán Dam	121 268	13 467	"	"	A. albimanus	Population movements	Prompt spraying; increase of search for cases; radical treatment	"	"

Table 7 (Cont.)

THE EXTENT AND NATURE OF PROBLEM AREAS AND REMEDIAL MEASURES TAKEN AND PLANNED AS OF DECEMBER 1965

Country and name of area	Population	Area (km^2)	Insecticide		Vector	Causes of Problem	Remedial Measures		
			Kind	Years of coverage			In operation in 1965	Planned for 1966	Results
Mexico (Cont.)									
Upper basin of Papaloapan River	19 311	1 757	DDT	9	A. pseudopunct.	Excito-repellency; new houses	Antilarval measures; DDT spraying twice a year	Continue	Transmission persists
Huastecas	596 406	12 307	"	"	A. albimanus	Aggresions; new houses	Spraying twice a year; radical treatment	"	Tending to become negative
Upper basin of Sta. Maria River	23 848	1 608	"	"	A. pseudopunct.	Aggresions because of bed-bugs	DDT spraying twice a year	"	"
Southern Pacific Coast:									
a) Pilot Project of Integrated Attack (PPIA)	218 735	13 640	"	"	A. pseudopunct. A. albimanus	Vigor tolerance; Excito-repellency; new houses; aggresions	(a)	"	Transmission has been interrupted in some localities
b) Program of Intensified Spraying	89 000	4 766	"	"	"	"	(b)	"	Transmission persists
c) Rest of Area	671 509	54 351	"	"	"	"	"	"	"
Basin of the Balsas River and tributaries	1 390 225	68 894	"	14	A. pseudopunct.	Aggresions	DDT spraying twice a year	"	"
Morelos Valley	211 714	2 853	"	9	"	New houses	"	"	"
Coast of Colima and Pihuamo	60 179	4 723	"	"	"	Population movements; new houses	"	"	"
Coast of Nayarit	97 475	6 130	"	"	"	"	"	"	"
Basin of the Santiago River and tributaries	99 837	19 810	"	"	"	"	"	"	"

(a) DDT spraying three times a year; monthly search for cases in 100% of localities; radical treatment and special follow-up of positive localities.
(b) Spraying during the first two quarters and search for cases and radical treatment in the 3rd and 4th quarters.

Table 7 (Cont.)

THE EXTENT AND NATURE OF PROBLEM AREAS AND REMEDIAL MEASURES TAKEN AND PLANNED, AS OF DECEMBER 1965

Country and name of area	Population	Area (km^2)	Insecticide		Vector	Causes of Problem	Remedial Measures		
			Kind	Years of coverage			In operation in 1965	Planned for 1966	Results
Mexico (Cont.)									
River basins and the northwest coast of the Pacific	226 765	40 108	DDT	9	A. pseudopunct. A. albimanus	Exophagy; vigor tolerance; new houses	DDT spraying twice a year	Continue	Transmission persists
Basins of Fuerte and Mayo Rivers	136 895	27 693	"	"	A. pseudopunct.	People sleep outdoor	Antilarval measures and spraying twice a year	"	"
	5 272 404	359 641							
Nicaragua									
Managua-1	255 462	46	Mal.	8 months	A. albimanus	Resistance to DDT and DLN	Larvicides and Malathion	Continue	Good
Managua-2	20 998	1 008	DDT Mal.	3	"	"	Malathion and mass drug treatment	"	"
Leon	16 195	2 031	"	1	Known: A. albimanus Suspected: A. pseudopunct.	"	Malathion	"	In observation
Chinandega-1	9 387	116	"	3	A. albimanus	"	Mass drug treatment	"	Good
Chinandega-2	9 216	105	"	"	"	"	"	"	"
Madriz	45 218	1 218	"	"	"	"	"	"	"
Estelf-1	55 068	1 683	"	"	Known: A. albimanus Suspected: A. pseudopunct.	"	Mass drug treatment; malathion and larvicides	"	"
Estelf-2	2 703	3	"	"	"	"	"	"	"
	414 247	6 210							

Table 7 (Cont.)

THE EXTENT AND NATURE OF PROBLEM AREAS AND REMEDIAL MEASURES TAKEN AND PLANNED AS OF DECEMBER 1965

Country and name of area	Population	Area (km^2)	Insecticide		Vector	Causes of Problem	Remedial Measures		
			Kind	Years of coverage			In operation in 1965	Planned for 1966	Results
Surinam									
Upper Surinam	14 138 [a]	...	DLN	2 or 3	A. darlingi	Refusal to spraying	Health education; pilot project of medicated salt on Upper Surinam River (13 localities)	Expansion of medicated salt	Too soon
Marowijne	2 954	...	DDT	2					
Tapanahony	5 956	...							
Lawa	2 356	...							
	25 404								
Venezuela									
Western malarious area	232 158	17 654	DDT	18	A. nuñeztovari	Exophagy and exophily; importation of cases; intense population movements	DDT spraying quarterly; peridomiciliary fogging with lindane and DDT in limited sectors; mass drug treatment every two weeks, monthly or weekly in different areas	Extend the current methods to the entire area	Eradication where imported cases were few
Eastern malarious area	97 437	2 528	"	"	A. emilianus	Exophagy and exophily; intense population movements	DDT spraying 3 times a year; peridomiciliary fogging with DDT in limited sectors; mass drug treatment every week; clean-up of foci by 14-day primaquine treatments	Same measurements	Eradication obtained in 5,975 km^2; in the remaining area the annual rate of incidence per 1,000 inhabitants was (0) in 1965
	329 595	20 182							

(a) 1964 population

Table 8

MASS DRUG PROGRAMS IN THE AMERICAS, 1965

Country and name of area	Population	Area (km^2)	Drug used and additional measures	Drug cycle	No. of cycles to 31 Dec.	Summary of last four cycles available						Planned for 1966
						Population treated (percentage)	Slides examined	Positive cases				
								P. fal.	P. vivax	Number Invest.	Autochthonous	
British Guiana												
St. Victor and St. Vincent	1 185	...	Chloroquine-primaquine	14 days	15	85.0	475	0	1	1	1	Descontinuation probable
Bolivia												
Quebrada de Tomina	320	770	Chloroquine-primaquine DDT spraying	15 days	18	100.0	1 057	0	0	0	0	To be terminated
Costa Rica												
Colorado	1 281	360	Chloroquine-primaquine; DDT spraying	15 days	16	84.0	526	0	0	0	0	To be continued
El Salvador												
Area-1	53 500	...	Chloroquine-primaquine	14 days	16	87.2	10 316	3	182	185	99	To be continued
Area-2	71 200	...	"	14 days	17	76.6	11 811	19	117	122	59	"
Area-3	64 800	...	"	14 days	21	75.4	14 755	15	71	93	41	"
French Guiana	Short courses of collective treatment administered in some areas.											
Guatemala												
Pacific Coast	136 276	2 477	Chloroquine-primaquine; DDT spraying once a year	14 days	18	69.6 70.5 70.0 71.0	3 516 3 604 3 236 2 823	17 5 6 5	37 4 6 8	... ...	... ...	To be continued

Table 8 (Cont.)

MASS DRUG PROGRAMS IN THE AMERICAS, 1965

Country and name of area	Population	Area (km^2)	Drug used and additional measures	Drug cycle	No. of cycles to 31 Dec.	Summary of last four cycles available						Planned for 1966
						Population treated (percentage)	Slides examined	Positive cases				
								P. fal.	P. vivax	Number Invest.	Autochthonous	
Haiti	1 250 000	...	Chloroquine-primaquine	every three weeks	11	94.0	167 023	517	14	...	...	To be continued
Honduras												
Marcovia	15 627	364	Chloroquine-primaquine	15 days	14	95.2	4 423	1	4	5	1	To be continued
Nicaragua												
Mun. El Viejo	9 733	105	Chloroquine-primaquine	14 days	28	85.4	4 052	34	108	142	54	To be continued
Dept. Nueva Segovia, Matagalpa	38 374	1 979	Chloroquine (presumptive treatment)	2 months	12		2 599	2	42	44	9	In study
Dept. Estelí	55 654	2 000	Chloroquine-(presumptive treatment) larvicides	2 months 14 days	40		7 215	9	162	171	139	"
Dept. Madriz	45 218	1 218	"	"	"		10 351	16	228	244	190	"
Venezuela	Areas with 111 536 inhabitants under chemotherapy, but not as an attack measure											

C. Statistics of Field Operations

The details concerning the categories of personnel employed in malaria eradication campaigns in the Americas are presented in Table 9, by category, and in Tables 10 through 13 by program.

Total personnel remained very stable as compared with the December 1964 level, but its distribution in the various types of activities carried out in malaria eradication operations shifted noticeably. The increasing use of collective treatment programs in the problem areas shows clearly in the decreasing percentage of personnel employed in spraying operations and the increase in those classified as in epidemiological operations, a category which includes, under the title "evaluator", persons employed in administering collective treatment and simultaneously searching for cases. Slight decreases also occurred in the numbers employed in administration and in transport, but these changes are within the range of normal annual variation.

From Table 10 relating to personnel in spraying operations it can be seen, comparing against last year's equivalent table, that the decrease in this category occurred mainly in the Brazilian, Haitian and Ecuadorian programs. In Haiti, while a considerable decrease in spraying personnel was made in order to expand the drug program, the very low level shown is merely the result of a seasonal spraying pattern which does not program routine spraying in December. The lack of personnel in El Salvador is also a result of seasonally-timed spraying.

The country-by-country data for personnel in epidemiological operations, Table 11, shows that the increase occurred primarily in the category of "evaluators". About 60 per cent of the rise is accounted for by the Haitian program and again reflects the large scale of the program of collective treatment underway there. The other campaigns with drug programs also show increase in this category, but of lesser magnitude since their programs are not yet fully developed nor do they anticipate covering such a large population.

It is noticeable in this table that the sole category showing an actual decline since the end of 1964 is that of doctors. This occurred primarily in the Mexican and Peruvian programs, although the need has not decreased in either of these campaigns. The explanation for most of the decreases lies primarily in insufficient funds for paying competitive salaries, so that either posts are too few or many of those existing are vacant.

Table 12, personnel in administration and other activities, shows no striking changes. Jamaica, which has entered maintenance phase, reduced its staff to one man.

Transport personnel are detailed in Table 13. A slight decrease occurred in the total staff in this sector, occurring primarily in the federal Brazilian program and in Ecuador and somewhat offset by increases in Colombia and some other programs.

Table 14 gives details of the various types of transport available to the campaigns. Changes in the means of transport possessed are noticeable in the Brazilian program, which considerably increased the numbers of their bicycles, boats (particularly those without motors) and saddle and pack animals. The emphasis on these non-motorized elements stems from both the terrain to cover and the fact that the Brazilian program does not receive UNICEF aid and must provide imported items from its own resources; the USAID loan to Brazil is destined to cover purchase of such items. The Colombian program also increased the number of animals in use, reflecting the emphasis on spraying and the administration of presumptive radical-cure treatment in troublesome areas of difficult access. In Mexico, on the other hand, the shift has been in the other direction, with a decrease in the number of animals and some increase in motorized vehicles. UNICEF continues to give essential support in both transport and insecticide[1/], providing vehicles promptly in the amounts and types recommended by PAHO.

Information concerning national budgets in 1964 and 1965, and commitments for 1966, is presented in Table 15. Expenditures were at a somewhat higher level in 1965 than they had been in 1964. Commitments for 1966 show a much larger increase, with a total 25 per cent higher than the amount reported as spent in 1965. This is accounted for primarily by the inclusion of sums expected to be available as proceeds of long-term loans to governments from USAID for malaria eradication operations; eight programs are negotiating such loans. In addition, commitments are at significantly higher levels in the federal Brazilian program, the Mexican program, and the Colombian program.

1/ UNICEF also provides drugs for collective treatment programs to some campaigns.

Table 9

PERSONNEL EMPLOYED IN MALARIA ERADICATION PROGRAMS IN THE AMERICAS
31 DECEMBER 1964 AND 1965 BY CATEGORY

(Part-time personnel in parentheses)

	Title	1964	1965
SPRAYING OPERATIONS	Engineers	117 (1)	101 (1)
	Spraying Chiefs (non-professionals)	208 (2)	176 (2)
	Sector Chiefs	662 (2)	686 (2)
	Squad Chiefs	2 082 (2)	1 918 (2)
	Spraymen	10 036 (20)	8 558 (20)
	Draftsmen	141	126
	SUB-TOTAL	13 246 (27)	11 565 (27)
EPIDEMIOLOGICAL OPERATIONS	Physicians	271 (13)	252 (14)
	Entomologists	21 (1)	26 (3)
	Entomologist Assistants	247 (12)	260 (14)
	Statisticians and Statistician Assistants	139	158 (3)
	Evaluation Inspectors	770 (5) [a]	780 (3) [a]
	Evaluators	4 188 (9) [a]	6 034 (43) [a]
	Microscopists	747 (15)	809 (25)
	SUB-TOTAL	6 383 (55)	8 319 (105)
ADMINISTRATION AND OTHERS	Administrators	347 (1)	358
	Administrative Assistants	1 123	934
	Accountants	38	36
	Disbursing Officers	50	47
	Storekeepers	106	80
	Assistant Storekeepers	93 (1)	91
	Secretaries	351 (1)	348
	Others	1 645 (32)	1 605
	SUB-TOTAL	3 753 (35)	3 499
TRANSPORT	Transport Chiefs, Mechanics and Assistant Mechanics	579	622
	Drivers	1 557 (2)	1 424 (2)
	Motorboat Operators	229 (2)	222 (2)
	Boatmen	28	32
	SUB-TOTAL	2 393 (4)	2 300 (4)
	GRAND TOTAL	25 775 (121)	25 683 (136)

(a) Includes personnel engaged in mass drug treatment and larviciding.

Table 10

PERSONNEL EMPLOYED IN SPRAYING OPERATIONS IN MALARIA ERADICATION PROGRAMS IN THE AMERICAS - 31 DECEMBER 1965

(Part-time personnel in parentheses)

Country or other political unit	Total	Engineers	Sanitarians or Spraying Chiefs	Sector Chiefs	Squad Chiefs	Spraymen	Draftsmen
Argentina[a]	191	3	6	10	31	136	5
Bolivia[b]	60	-	7	4	26[c]	23	-
Brazil (Excl.São Paulo)	4 498	29	83[d]	219	697	3 433	37
Brazil (São Paulo)	641	9	-	33[e]	130	451	18
Colombia	842	6	-	120	220[f]	485	11
Costa Rica	77	1	1	7	20	47	1
Cuba[a]	548	1	4	15	78	448[g]	2
Dominican Republic	441	-	2	12	62	363	2
Ecuador	204	4	-	6	37	153	4
El Salvador	3	1	-	-	-	-	2
Guatemala[h]	296	1	5	11	39	236	4
Haiti	49	4	-	22	3	15	5
Honduras[a]	64	-	-	3	10	51	-
Mexico	2 431	35	58	130	382	1 803	23
Nicaragua	92	1	4	14	14	57	2
Panama	272	-	5	10	47	209	1
Paraguay	23	2	-	2	6	9	4
Peru[i]	214	3	-	31	43	134	3
Trinidad and Tobago	17	-	-	3	2	12	-
Venezuela[b]	444	1	-	25	41	377	-
British Guiana	26	-	-	1	5	20	-
French Guiana[a]	29	-	-	2	6	21	-
Guadeloupe[j]	51	-	-	1	8	42	-
Panama Canal Zone	(27)	(1)	(2)	(2)	(2)	(20)	-
Surinam	52	-	1	5	11	33	2
Total	11 565 (27)	101 (1)	176 (2)	686 (2)	1 918 (2)	8 558 (20)	126

- None
(a) October. (b) September. (c) Includes District Inspectors. (d) Statistical aides for spraying operations. (e) Includes 13 of Chagas disease control program. (f) Includes 184 squad chiefs/spraymen. (g) Includes Sector chiefs' auxiliaries. (h) July. (i) November. (j) Includes personnel of desinsectisation services.

Table 11

PERSONNEL EMPLOYED IN EPIDEMIOLOGICAL EVALUATION IN MALARIA ERADICATION PROGRAMS IN THE AMERICAS - 31 DECEMBER 1965

(Part-time personnel in parentheses)

Country or other political unit	Total	Physicians	Entomologists	Assistant Entomologists	Statisticians and Statisticians' Assistants	Evaluation Inspectors	Evaluators	Microscopists and Laboratory personnel
Argentina a)	183	8	1	3	1	24	118	28
Bolivia b)	107	7	1	4	8	-	71	16
Brazil (excl. São Paulo)	2 093	65	8	29	95	280	1 439	177
Brazil (São Paulo)	238	9	1	11	1	32	125	59
Colombia	461	22	-	4	3	35	355	42
Costa Rica	129	1	-	2	2	15	92 c)	17
Cuba a)	78	7	1	2	4	6	31	27
Dominican Republic	82	4	1	4	3	8	46	16
Ecuador	175	11	1	5	-	4	119	35
El Salvador	299	4	-	7	4	14	244 c)	26
Guatemala d)	307	3	1	12	3	48 c)	214 c)	26
Haiti	1 407	11	1	7	11	66 c)	1 237 c)	74
Honduras a)	168	2	-	-	2	17	118	29
Jamaica	88 (1)	1	(1)	12	-	14	49	12
Mexico	1 093	60	1	53	2	64	825 c)	88
Nicaragua	200	3	1	5	7	25	144 c)	15
Panama	45	2	1	3	5	-	24	10
Paraguay	57	5	-	4	...	9	29	10
Peru e)	148	6	3	-	5	-	108	26
Trinidad and Tobago	142	1	1	55	-	14	61	10
Venezuela b)	696 (8)	17	2	25	-	81 c)	522 c)	49 (8)
British Guiana	24 (4)	(1)	-	-	(3)	3	15	6
British Honduras	13	1	-	-	-	2	9	1
Dominica	6 (1)	(1)	-	-	-	1	4	1
French Guiana a)	4	1	-	1	-	-	-	2
Grenada	25 (2)	-	-	10	-	14	1	(2)
Guadeloupe	10 (44)	1 (1)	(1)	1	-	-	6 (40)	2 (2)
Panama Canal Zone	(42)	(10)	(1)	(14)	-	(2)	(3)	(12)
St. Lucia	3 (3)	(1)	-	-	-	(1)	3	(1)
Surinam	38	-	1	1	2	4	25	5
Total	8 319 (105)	252 (14)	26 (3)	260 (14)	158 (3)	780 (3)	6 034 (43)	809 (25)

- None
(a) October. (b) September. (c) Includes personnel with same category from the mass drug treatment and/or larviciding programs. (d) July. (e) November.

Table 12

PERSONNEL EMPLOYED IN ADMINISTRATIVE AND OTHER SERVICES IN MALARIA ERADICATION PROGRAMS IN THE AMERICAS - 31 DECEMBER 1965

(Part-time personnel in parentheses)

Country or other political unit	Total	Administrators	Administrative Assistants	Accountants	Disbursing Officers	Storekeepers	Storekeepers' Assistants	Secretaries	Others
Argentina [a]	128	4	64	-	-	3	8	3	46
Bolivia [b]	31	7	4	4	-	1	-	7	8
Brazil (excl. São Paulo)	1443	279	476	25	-	24	-	19	620
Brazil (São Paulo)	413	14	85	-	9	7	13	-	285 [c]
Colombia	231	11	7	-	14	13	6	55	125
Costa Rica	11	1	6	-	-	2	1	1	-
Cuba [a]	25	1	4	1	-	2	-	4	13
Dominican Republic	47	4	7	-	-	-	-	12	24
Ecuador	148	5	6	1	5	1	8	24	98
El Salvador	39	1	1	-	1	1	4	8	23
Guatemala [d]	17	-	-	-	-	2	2	7	6
Haiti	138	7	6	2	1	2	1	30	89
Honduras [a]	50	1	8	-	-	1	-	16	24
Jamaica	1	-	-	-	-	-	-	-	1
Mexico	511	16	215	-	16	13	25	137	89
Nicaragua	41	-	8	-	-	1	7	8	17
Panama	34	1	5	-	-	1	11	4	12
Paraguay	1	...	...	...	...	...	...	...	1
Peru [e]	118	3	30	3	-	3	2	5	72
Venezuela	...	...	...	...	...	...	...	...	...
British Guiana	29	-	-	-	-	1	1	1	26
British Honduras	5	1	-	-	-	-	-	2	2
Dominica	2	1	-	-	-	-	-	1	-
French Guiana [a]	3	-	-	-	-	-	-	1	2
Guadeloupe	3	-	-	-	-	-	-	-	3
Surinam	30	1	2	-	1	2	2	3	19
Total	3499	358	934	36	47	80	91	348	1605

- None
... No information
(a) October. (b)September. (c) Includes personnel of Chagas Disease Control program. (d) July. (e) November.

Table 13

PERSONNEL EMPLOYED IN TRANSPORT SERVICES IN MALARIA ERADICATION PROGRAMS IN THE AMERICAS - 31 DECEMBER 1965

(Part-time personnel in parentheses)

Country or other political unit	Total	Transport Chiefs, Mechanics and Assistant Mechanics	Drivers	Motorboat operators	Boatmen
Argentina[a]	62	26	36	-	-
Bolivia[b]	51	10	27	14	-
Brazil (excl. São Paulo)	918	228	652[c]	32	6
Brazil (São Paulo)	267	23	241	3	-
Colombia	272	68	82	99	23
Costa Rica	12	3	9	-	-
Cuba[a]	14	6	8	-	-
Dominican Republic	70	18	52	-	-
Ecuador	38	14	24	-	-
El Salvador	41	15	25	1	-
Guatemala[d]	27	2	25	-	-
Haiti	61	32	27	2	-
Honduras[a]	38	6	31	1	-
Mexico	169	130	27	12	-
Nicaragua	62	4	49	9	-
Panama	11	5	5	1	-
Paraguay	...	...	...	...	...
Peru[e]	49	13	13	23	-
Trinidad and Tobago	27	-	27	-	-
Venezuela	43	...	38[f]	5	-
British Guiana	12	-	6	3	3
British Honduras	2	2	-	-	-
Dominica	-	-	-	-	-
French Guiana[a]	6	2	4	-	-
Guadeloupe	7	2	5	-	-
Panama Canal Zone	(4)	-	(2)	(2)	-
Surinam	41	13	11	17	-
Total	2 300 (4)	622	1 424 (2)	222 (2)	32

- None
... No information.
(a) October. (b) September. (c) Includes 3 airplane pilots. (d) July. (e) November. (f) 28 fogging machine operators.

Table 14

MEANS OF TRANSPORT IN MALARIA ERADICATION PROGRAMS IN THE AMERICAS - 1965

Country or other political unit	Trucks (3 tons or more)	Trucks and "Pick-up" (less than 3 tons)	Jeeps	Automobiles and station wagons	Motorcycles	Bicycles	Motor boats	Boats without motor	Saddle and pack animals	Other
Argentina	11	119	25	12	1	77	1	-	2	-
Bolivia	-	21	47	-	30	56	37	-	100	-
Brazil (Excl. São Paulo)	53	335	806	34	-	600	163	115	1 130	2 a)
Brazil (São Paulo)	2	167	58	13	-	-	12	-	-	-
Colombia	16	148	121	41	2	67	162	30	1 018	-
Costa Rica	1	7	13	2	-	89	10	-	-	-
Cuba	-	20	73	-	-	-	-	-	222	-
Dominican Republic	1	72	2	3	4	13	-	-	6	-
Ecuador	4	50	58	12	30	9	47	19	381	-
El Salvador	2	53	14	8	48	1	1	-	-	-
Guatemala	1	25	8	8	35	38	10	-	(b)	-
Haiti	5	69	21	11	-	1	2	-	-	-
Honduras	2	35	30	9	20	50	3	-	157	-
Jamaica	2	13 c)	15	8	-	-	-	-	-	-
Mexico	19	460	397	22	-	-	12	-	1 993	-
Nicaragua	2	17	32	6	-	-	11	-	-	-
Panama	-	52	20	8	11	-	10	-	-	-
Paraguay	-	10	15	2	3	2	13	1	12	-
Peru	4	157	60	-	-	1	85	17	-	-
Trinidad and Tobago	9	9	9	2	-	-	1	-	-	-
Venezuela	3	133	81	31	12	319	124	-	563	43 d)
British Guiana	1	1	5	-	-	-	4	-	7	-
British Honduras	-	2	8	1	-	3	5	-	-	-
Dominica	-	-	1	1	4	-	-	-	-	-
French Guiana	-	2	2	3	2	-	1	7	-	-
Guadeloupe	5	-	6	-	-	-	-	-	-	-
Panama Canal Zone	-	2 e	-	-	-	-	2 e)	-	-	-
St. Lucia	-	-	-	-	3	-	-	-	-	-
Surinam	1	3	3	4	5	5	22	1	-	-

- None.
(a) Airplanes. (b) Rented as needed. (c) Two of them are used for the Aëdes aegypti program. (d) Fogging machines. (e) Part-time

Table 15

NATIONAL BUDGETS FOR MALARIA ERADICATION IN THE AMERICAS, 1964-1966

(in thousands of U. S. dollars)

Country or other political unit	National Budget 1964	National Budget 1965	National Commitments 1966
Argentina	788	905	1 057
Bolivia	83	133	236
Brazil (Excl. São Paulo)	8 280	10 266 a)	11 906
Brazil (São Paulo)	1 242	2 777	3 146
Colombia	2 333	2 778	2 056 b)
Costa Rica	274	287	538 c)
Cuba	1 565	1 861	1 867
Dominican Republic	1 135	1 204	1 284
Ecuador	777	935	1 595 c)
El Salvador	366	371	1 265 c)
Guatemala	738	946	1 696 c)
Haiti	50	50	50
Honduras	300	300	975 c)
Jamaica	259	280 d)	556 d)
Mexico	6 322	5 962	6 539
Nicaragua	453	432	1 509 c)
Panama	487	606	1 278 c)
Paraguay	258	255	556 c)
Peru	949	1 060	1 119
Trinidad and Tobago	470	468	535
Venezuela	3 947	4 296	5 199
British Guiana	58	61	...
British Honduras	17	24	44
Dominica	9	8	5
French Guiana	114	127	127
Grenada	1	1	1
Guadeloupe	186	132	102
Panama Canal Zone	50	50	50
St. Lucia	3	3	3
Surinam	235	298	260
Total	31 749	36 876	45 554

... No information

(a) Includes proceeds of a loan of $1,356,757, expended during 1964-1965. (b) Includes $666,667 requested as a supplementary budget but not as yet authorized. (c) Including loans which are under negotiation, as follows: Costa Rica, $225,258; Ecuador, $770,077; El Salvador, $664,729; Guatemala, $750,000; Honduras, $675,000; Nicaragua, $874,286; Panama, $584,350; Paraguay, $270,000. (d) Malaria and mosquito control.

In Table 16 a summary is given of the gross number of smears examined and cases found annually since 1958. An increase occurred in the number of blood-smears taken, principally as a result of the high blood-smear production which always accompanies collective treatment programs (in which blood-samples are generally taken from all persons newly arriving in the treatment area, persons refusing treatment, persons who have missed one or two treatments, and babies reaching six months of age, in addition to all fever cases). An increase of significant proportions also took place in Brazil.

Table 16

SUMMARY OF CASE DETECTION IN THE AMERICAS, 1958-1965

Year	Number of slides examined	Number of slides found positive	Per cent positive
1958	1 716 103	56 705	3.3
1959	2 749 117	75 612	2.8
1960	3 955 149	79 998	2.0
1961	5 341 004	99 539	1.9
1962	7 221 367	177 089	2.4
1963	7 903 156	227 026	2.9
1964	8 156 290	254 572	3.1
1965	9 069 950	241 462	2.7

Table 17 presents a summary of the blood-smears examined and positives found in 1965, by type of case-detection, for the individual programs. The greater efficiency of the passive case-detection network continues to be very apparent.

The over-all slide positivity rate (per cent of blood-smears which were positive for malaria) fell in 1965 relative to 1964. Aggregate figures of this kind have no epidemiological significance, since the percentage of the population for which blood is examined differs greatly from area to area, and changes from one period to another in the intensity of sampling as between highly malarious areas and less malarious areas will have a strong effect on the general rate of positivity. The increased sampling in areas under collective treatment programs, which produced most of the increase in smears examined during the year, also accounts in the main for the reduction in the percentage of slides found positive. Reductions also occurred, however, in many other programs, and indeed only two show a higher positivity rate, namely Colombia and Surinam. In both, the increase is likely to be an artifact resulting from intensified operations in the more malarious areas.

Table 17

COMPARATIVE RESULTS OF ACTIVE AND PASSIVE CASE DETECTION IN MALARIA ERADICATION PROGRAMS IN THE AMERICAS, 1965

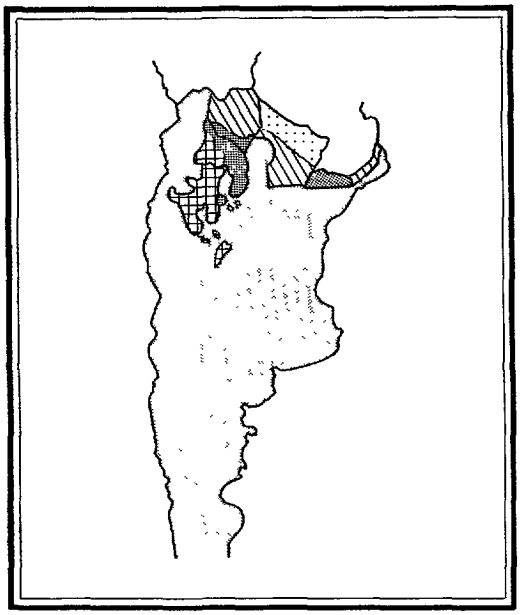
Country or other political unit	Active case detection					Passive case detection					
	Average number of evaluators	Blood slides			Average production per evaluator per month	Average number of notification posts	Average of notification post producing slides per month	Blood slides			Average of slides per month per productive notification post
		Number examined	Positive	Per cent				Number examined	Positive	Per cent	
Argentina	98	149 363	73	0.05	127.0	1 185	250	33 518	181	0.5	11.2
Bolivia[a]	85	149 508	491	0.3	158.0	2 586	524	37 787	239	0.6	6.5
Brazil (excl. São Paulo)	1 450	951 857	32 170	3.4	54.7	20 056	7 875	730 053	76 587	10.5	7.7
Brazil (São Paulo)	149	120 807	158	0.1	67.6	4 919	1 521	72 238	1 391	1.9	3.9
Colombia	357	259 549	6 474	2.5	60.6	8 548	4 586	231 459[b]	11 803[b]	5.1	4.2
Costa Rica	69	186 236	1 523	0.8	224.9	1 033	118	11 515	1 040	9.1	8.2
Cuba	20	80 968	23	0.03	337.3	565	358	342 822	108	0.03	79.8
Dominican Republic	36	146 541	35	0.02	370.0	2 198	608	59 295	49	0.08	8.2
Ecuador	107	87 306	305	0.3	68.0	5 079	2 617	252 821	3 874	1.5	8.1
El Salvador	60	191 338	3 596	1.9	265.8	2 200	1 902	315 104	30 474	9.7	13.8
Guatemala	223	226 662	6 379	2.8	84.7	2 415	1 265	153 900	8 093	5.3	10.2
Haiti	82	419 900	5 278	1.3	426.7	4 585	1 132	332 384	5 026	1.5	24.5
Honduras	69	121 507	1 324	1.1	146.8	2 390	1 469	188 794	5 628	3.0	10.7
Jamaica	49	24 596	1	0.004	41.8	711	102	53 701	2	0.003	43.9
Mexico	634	1 251 856	6 033	0.5	164.6	25 031	3 717	343 647	4 080	1.2	7.7
Nicaragua	65	148 804	4 793	3.2	190.8	1 767	856	87 727	5 482	6.2	8.5
Panama	19	45 398	400	0.9	199.1	1 547	291	57 571	1 529	2.7	16.5
Paraguay[c]	29	22 087	312	1.4	69.3	2 628	719	55 846	5 877	10.5	7.1
Peru	106	371 892	1 443	0.4	292.3	8 494	1 254	80 205	434	0.5	5.3
United States	...	...	...	...	...	...	...	...	106	...	...
Trinidad and Tobago[c]	75	58 808	0	0	71.3	82	82	114	2	1.8	0.13
Venezuela[c]	260	268 277	2 451	0.9	115.0	2 396	425	138 809	1 501	1.1	36.3
British Guiana	15	57 299	24	0.04	318.3	80	19	4 208	4	0.009	18.4
British Honduras	8	3 302	166	5.0	34.4	127	60	7 485	40	0.5	10.4
Dominica	5	5 644	0	0	94.0	26	14	4 250	0	0	25.3
French Guiana	2	4 662	5	0.1	194.3	18	10	762	17	2.2	6.3
Grenada	1	-	-	-	-	...	...	1 085	0	0	...
Guadeloupe	10	33 480	0	0	279.0	...	...	32	0	0	...
Panama Canal Zone	2	1 681	2	0.1	70.0	...	...	22 343	36	0.2	...
Puerto Rico	-	-	-	-	-	...	...	2	0	0	...
St. Lucia	3	11 201	0	0	311.2	-	-	-	-	-	-
Surinam	23	19 785	256	1.3	71.7	60	21	27 959	4 055	14.5	110.9

... No information.
- None.
(a) January-September. (b) 2,500 blood-smears and 89 positive from non-malarious areas are not included. (c) January-November.

Country: ARGENTINA

Date attack phase began: 1 August 1959

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	21 860	4 024 458
Non malarious areas	19 072	3 675 407
Originally malarious areas		
Maintenance phase	1 356	63 280
Consolidation phase	449	73 630
Attack phase	783	140 075
Preparatory phase	200	72 066
Total originally malarious areas	2 788	349 051

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	3	188	191
Evaluation operations	9	174	183
Administrative and other	1	127	128
Transport	-	62	62
Total	13	551	564

TRANSPORT FACILITIES

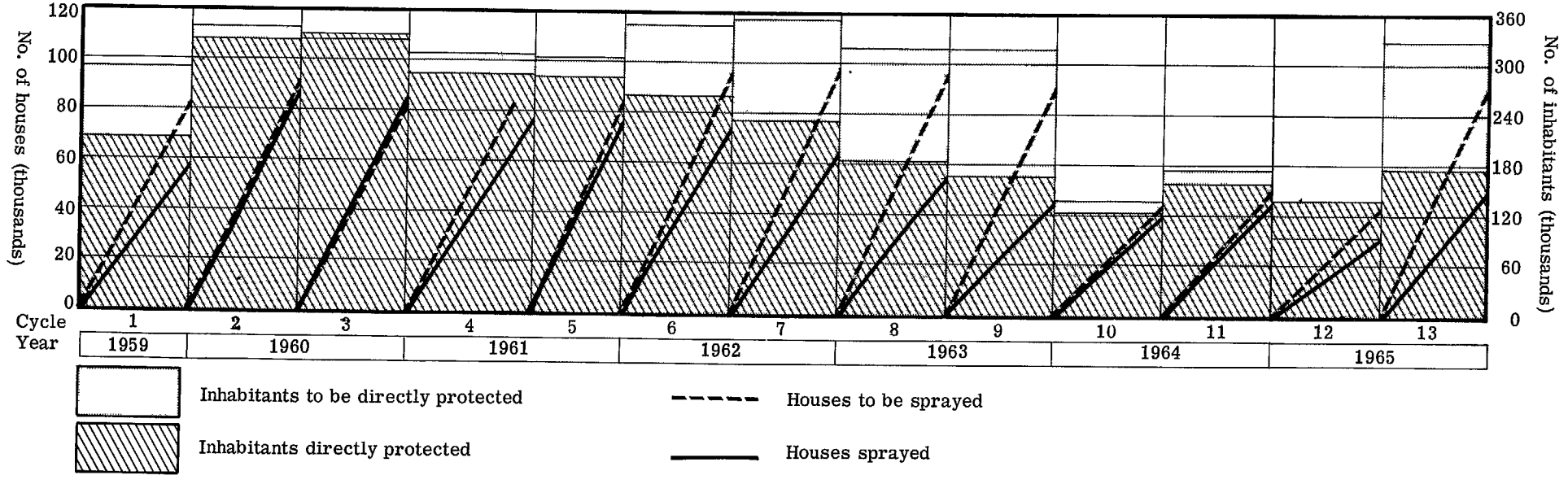
Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	45	75	47	167
Two-wheel vehicles	2	67	9	78
Boats	1	-	-	1
Animals	-	-	2	2
Other	-	-	-	-
Total	48	142	58	248

ARGENTINA (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Aug. 59-Jun. 60	1st 2nd	81 619 92 438	57 995 a) 88 079 a)	288 768 347 012	205 189 330 733	263 255	...
2nd	Jul. 60-Jul. 61	3rd 4th	84 011 84 077	84 929 a) 76 991 a)	323 610 308 142	327 209 282 178	305 334	...
3rd	Aug. 61-Jun. 62	5th 6th	81 906 96 249	75 734 a) 73 027	303 290 341 780	280 425 259 379	383 349	...
4th	Jul. 62-Jun. 63	7th 8th	97 908 95 552	63 967 54 742 a)	351 098 318 288	229 432 182 273	353 329	...
5th	Jul. 63-Jun. 64	9th 10th	90 333 43 572	46 627 39 430	317 972 135 574	164 420 122 685	320 324	...
6th	Jul. 64-Jun. 65	11th 12th	50 322 43 927	44 972 30 236	172 313 138 809	153 995 95 417	302 302	...
7th	Jul. 65-Dec. 65	13th	90 224	48 428	327 495	175 788	416	...

(a) Some houses were sprayed once a year.



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1959[a]	12 377	1 043	8.4	-	1 043	-
1960	82 191	2 013	2.4	7	2 006	-
1961	93 464	4 524	4.8	4	4 520	-
1962	112 477	4 685	4.2	-	4 685	-
1963	96 668	834	0.9	-	834	-
1964	102 683	543	0.5	-	543	-
1965	57 872	213	0.4	-	211	2

CONSOLIDATION AND MAINTENANCE PHASE AREAS

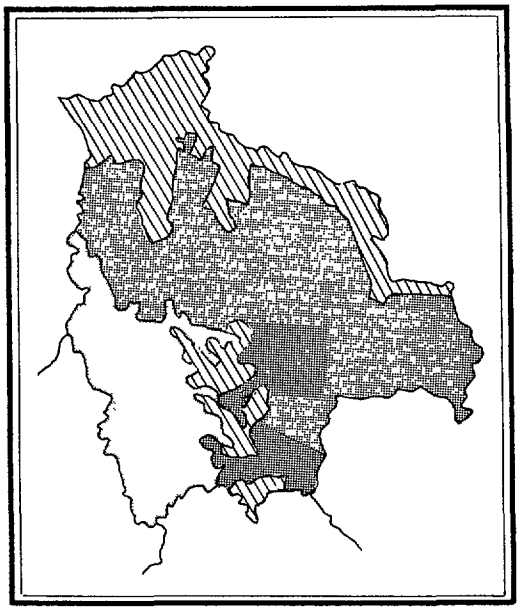
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1959[a]	1-4	911	9 491	1.0	51	-	-	-	32	-	19	-	-	51	-
1960	1-4	929	14 438	1.5	26	-	-	-	14	-	12	-	-	26	-
1961	1-4	1 278	44 395	3.5	17	-	2	-	5	-	10	-	-	17	-
1962	1-4	1 542	39 675	2.6	23	-	10	-	5	1	7	-	-	20	3
1963	1st	1 584	13 371	3.4	7	2	-	-	4	1	-	-	-	6	1
	2nd		17 759	4.5	2	-	-	-	1	1	-	-	-	1	1
	3rd		12 367	3.1	2	-	-	-	1	-	-	1	-	2	-
	4th		17 245	4.3	-	-	-	-	-	-	-	-	-	-	-
1964	1st	1 648	20 144	4.9	5	-	-	-	5	-	-	-	-	5	-
	2nd		21 782	5.3	5	1	-	-	2	-	2	-	-	5	-
	3rd		14 703	3.6	-	-	-	-	-	-	-	-	-	-	-
	4th		22 410	5.4	1	1	-	-	-	-	-	-	-	1	-
1965	1st	1 805	23 847	5.3	8	6	-	-	2	-	-	-	-	8	-
	2nd		34 557	7.7	10	3	-	-	1	1	5	-	-	9	1
	3rd		29 285	6.5	11	5	-	-	2	2	2	-	-	9	2
	4th		37 320	8.3	12	6	-	1	3	-	-	2	-	12	-

(a) August-December.

Country: BOLIVIA

Date attack phase began: 1 September 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	4 373	1 098 581
Non malarious areas	2 986	274 321
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	1 173	619 540
Attack phase	214	204 720
Preparatory phase	0	0
Total originally malarious areas	1 387	824 260

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	60	60
Evaluation operations	12	95	107
Administrative and other	2	29	31
Transport	-	51	51
Total	14	235	249

TRANSPORT FACILITIES

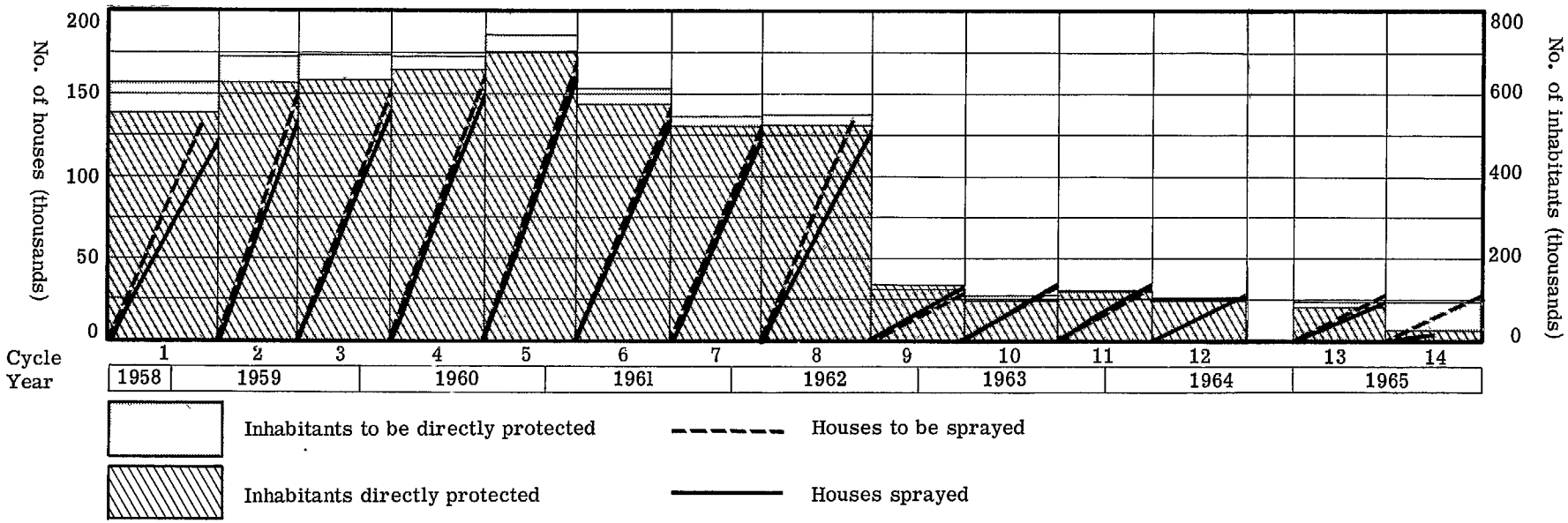
Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	14	41	13	68
Two-wheel vehicles	-	54	32	86
Boats	12	22	3	37
Animals	48	52	-	100
Other	-	-	-	-
Total	74	169	48	291

BOLIVIA (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin							
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	Dieldrin	
1st	Sep. 58-Aug. 59	1st 2nd	131 444 148 200	116 572 129 119	1st	6 365	10 910	627 362 691 820	556 190 627 210	362 331	115	8.3 7.0
2nd	Sep. 59-Aug. 60	3rd 4th	147 263 153 514	136 601 142 536	2nd	11 331	12 268	695 521 692 274	634 859 660 185	319 309	118	7.6 7.2
3rd	Sep. 60-Aug. 61	5th 6th	169 690 142 210	159 952 134 173	-	-	-	742 902 612 356	700 295 577 743	331 329	-	7.6 7.5
4th	Sep. 61-Sep. 62	7th 8th	129 600 135 474	124 623 128 898	-	-	-	546 005 551 785	524 986 525 005	353 359	-	7.9 8.6
5th	Oct. 62-Sep. 63	9th 10th	32 561 32 361	34 469 28 893	-	-	-	124 643 110 578	131 962 98 727	408 428	-	6.0 5.9
6th a)	Oct. 63-Sep. 64	11th 12th	32 361 28 536	32 160 27 509	-	-	-	123 923 101 503	123 152 97 855	533 547	-	5.3 5.6
7th	Jan. 65-Sep. 65	13th 14th b)	26 941 26 941	24 634 6 379	-	-	-	96 020 91 489	87 799 21 663	557 605	-	5.3 3.9

(a) Includes emergency spraying. (b) Cycle not yet finished.



BOLIVIA (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1958 a)	3426	257	7.5	53	143	61
1959	83762	1970	2.4	243	1419	308
1960	87775	893	1.0	143	621	129
1961	141033	782	0.6	58	711	13
1962	159397	1089	0.7	378	700	11
1963	117432	2241	1.9	906	1335	-
1964	89333	3002	3.4	477	2525	-
1965 b)	110207	674	0.6	111	563	-

CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1961	1-4	461	11975	2.6	14	1	1	5	7	-	-	-	-	14	-
1962	1-3	759	18131	3.2	21	-	-	2	19	-	-	-	-	21	-
1963	1-3	1179	58587	7.4	104	18	1	-	73	-	2	10	4	100	-
1964	1st	1141	18702	6.6	64	36	5	3	10	-	-	10	1	63	-
	2nd		11910	4.2	207	49	-	1	4	-	-	153	6	201	-
	3rd		16509	5.9	140	40	-	-	5	-	-	95	11	129	-
	4th		19086	6.7	41	29	2	1	2	-	-	7	2	37	2
1965	1st	1173	20529	7.0	14	5	-	3	6	-	-	-	-	13	1
	2nd		23704	8.1	18	11	-	-	5	-	-	2	-	18	-
	3rd		32855	11.2	24	15	-	5	-	-	-	4	1	22	1
	4th		42866	14.6	40	19	-	-	11	-	-	10	1	39	-

(a) September-December. (b) January-September.

Country: BRAZIL (Excl. São Paulo) Date attack phase began: August 1959

STATUS OF MALARIA PROGRAM AT DECEMBER 1965

	Population (thousands)	Area km^2
TOTAL COUNTRY	65 332	8 266 622
Non malarious areas	43 871	1 447 483
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	1 439	26 087
Attack phase	10 100	1 894 543
Preparatory phase	9 922	4 898 509
Total originally malarious areas	21 461	6 819 139

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	29	4 469	4 498
Evaluation operations	74	2 019	2 093
Administrative and other	25	1 418	1 443
Transport	-	918	918
Total	128	8 824	8 952

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	727	366	135	1 228
Two-wheel vehicles	-	600	-	600
Boats	201	77	-	278
Animals	781	349	-	1 130
Other	-	-	2[a)]	2
Total	1 709	1 392	137	3 238

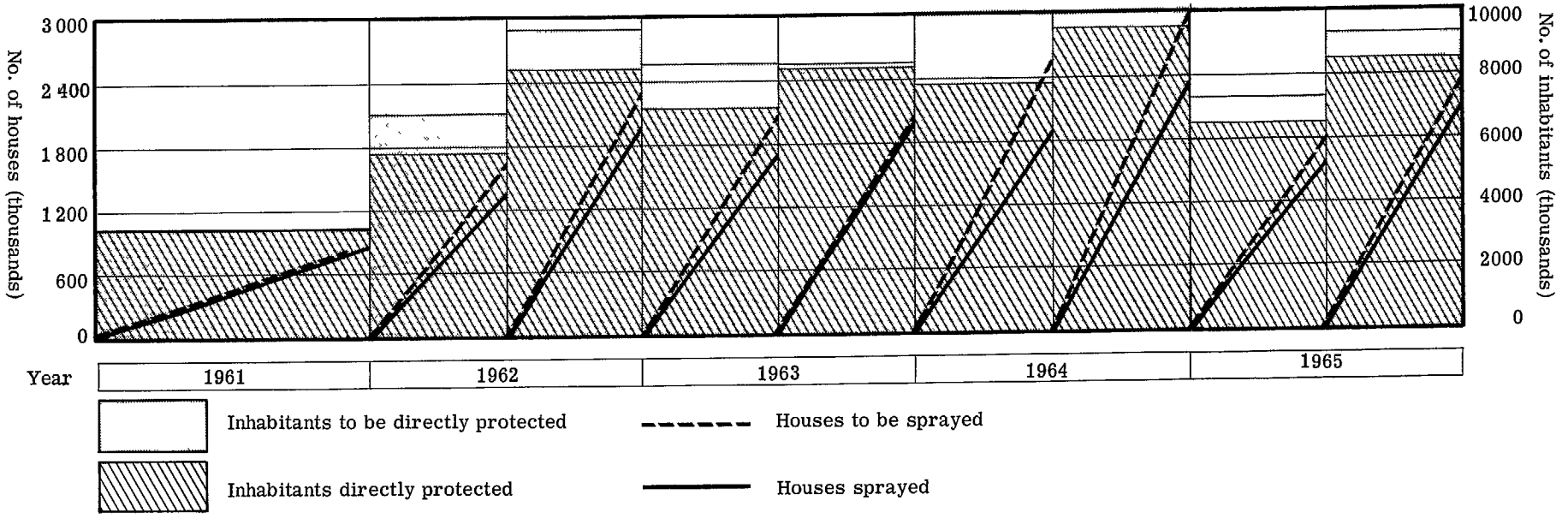
(a) Airplanes

BRAZIL (Excl. São Paulo) (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
(a)	Jan. 61-Nov. 61	(a)	820 095	814 475 b)	3 399 300 c)	3 380 000 c)	...	...
(a)	Jan. 62-Jun. 62	...	1 622 052	1 350 566	7 016 997	5 843 075	424	...
	Jul. 62-Dec. 62	...	2 292 000	1 960 358	9 724 956	8 317 433	420	...
(a)	Jan. 63-Jun. 63	...	2 062 265	1 726 289	8 574 898	7 178 751	407	...
	Jul. 63-Dec. 63	...	2 045 534	2 010 035	8 524 558	8 376 676	414	7.5
(a)	Jan. 64-Jun. 64	...	2 532 153	1 899 065	10 502 357	7 876 719	412	7.9
	Jul. 64-Dec. 64	...	2 993 954	2 350 055	12 310 241	9 662 834	419	7.7
(a)	Jan. 65-Jun. 65	...	1 799 354	1 588 479	7 361 157	6 498 567	414	7.7
	Jul. 65-Dec. 65	...	2 388 893	2 134 604	9 388 350	8 389 182	413	7.6

(a) Owing to different spray cycle timing in different regions, these data refer to the calendar year. (b) Sprayings. (c) Estimated.



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK AND PREPARATORY PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1961	230 205	36 912[a]	16.03	3 620	32 285	2
1962	513 767	68 371	13.31	22 683	45 683	5
1963	860 681	109 210	12.69	37 502	71 610	98
1964	1 241 242	109 507	8.82	41 737	67 713	57
1965[b]	1 584 730	108 713	6.86	51 012	57 594	107

CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1965	1-3	1 439	97 180	9.0	44	-	-	-	37	-	-	7	9	35	-

(a) Includes 1,005 undifferentiated mixed infections from Espiritu Santo Sector. (b) Includes 4th quarterly from areas in consolidation phase.

Country: BRAZIL (São Paulo)

Date attack phase began: 4 January 1960

STATUS OF MALARIA PROGRAM AT DECEMBER 1965

	Population (thousands)	Area km^2
TOTAL COUNTRY	15 600	247 239
Non malarious areas	11 664	19 224
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	3 766	200 015
Attack phase	170	28 000
Preparatory phase	0	0
Total originally malarious areas	3 936	228 015

PERSONNEL

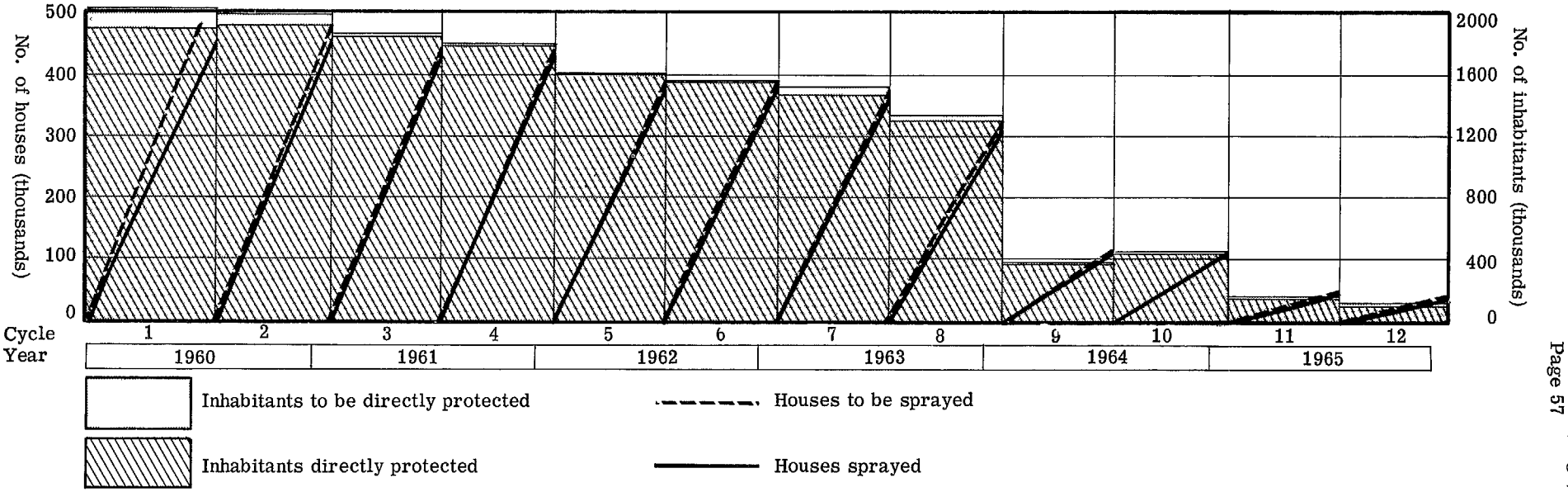
Activity	Professional	Non professional	Total
Spraying operations	9	632	641
Evaluation operations	11	227	238
Administrative and other	-	413	413
Transport	-	267	267
Total	20	1 539	1 559

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	208	32	-	240
Two-wheel vehicles	-	-	-	-
Boats	4	8	-	12
Animals	-	-	-	-
Other	-	-	-	-
Total	212	40	-	252

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Jan. 60-Jan. 61	1st 2nd	481 533 475 121	455 219 458 926	2 002 214 1 992 182	1 892 679 1 924 405	433 404	8.4 9.8
2nd	Feb. 61-Jan. 62	3rd 4th	441 104 436 057	436 048 431 473	1 870 722 1 807 892	1 849 398 1 789 051	416 412	9.4 9.7
3rd	Feb. 62-Jan. 63	5th 6th	381 254 385 555	380 623 383 717	1 605 079 1 558 413	1 602 444 1 550 975	419 420	9.7 9.8
4th	Feb. 63-Jan. 64	7th 8th	378 922 324 556	366 817 316 221	1 525 540 1 346 907	1 477 021 1 312 405	424 433	9.7 9.5
5th	Feb. 64-Jan. 65	9th 10th	113 293 113 257	110 114 109 480	379 362 449 981	368 721 434 974	444 440	8.1 8.3
6th	Feb. 65-Feb. 66	11th 12th	43 711 36 050	43 313 33 884	171 413 129 816	169 855 122 021	436 415	8.3 8.3



BRAZIL (São Paulo) (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1960	114 622	8 297	7.2	66	8 230	1
1961	208 502	7 276	3.5	258	7 015	3
1962 a)	370 667	3 689	1.0	227	3 459	3
1963 a)	384 993	2 207	0.6	427	1 778	2
1964	227 608	1 295	0.6	235	1 060	-
1965	52 554	858	1.6	140	717	1

CONSOLIDATION PHASE AREAS

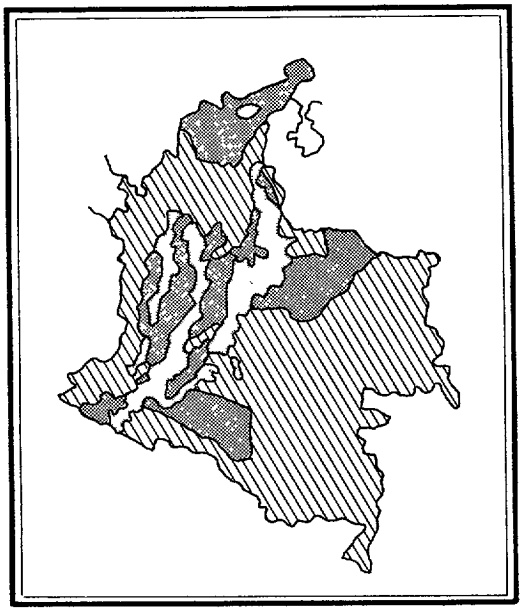
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1964	1st	2 183	64 686	11.9	115	-	5	-	101	-	5	4	17	98	-
	2nd		107 483	19.7	146	18	6	-	107	-	1	14	12	134	-
	3rd		75 501	13.8	95	2	4	-	79	-	2	8	23	72	-
	4th		59 344	10.9	120	1	-	-	115	-	1	3	17	103	-
1965	1st	3 766	32 433	3.4	187	15	-	-	163	6	-	3	30	157	-
	2nd		29 107	3.1	186	4	1	-	163	-	2	16	37	149	-
	3rd		24 721	2.6	156	8	-	-	128	-	-	20	25	131	-
	4th		54 230	5.8	162	2	2	-	145	-	8	5	20	142	-

(a) Data for entire State, not separated by attack or consolidation phase.

Country: COLOMBIA

Date attack phase began: 20 September 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	17 872	1 138 338
Non malarious areas	8 579	192 116
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	7 071	276 294
Attack phase	2 017	290 032
Preparatory phase	205	379 896
Total originally malarious areas	9 293	946 222

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	6	836	842
Evaluation operations	25	436	461
Administrative and other	2	229	231
Transport	-	272	272
Total	33	1 773	1 806

TRANSPORT FACILITIES

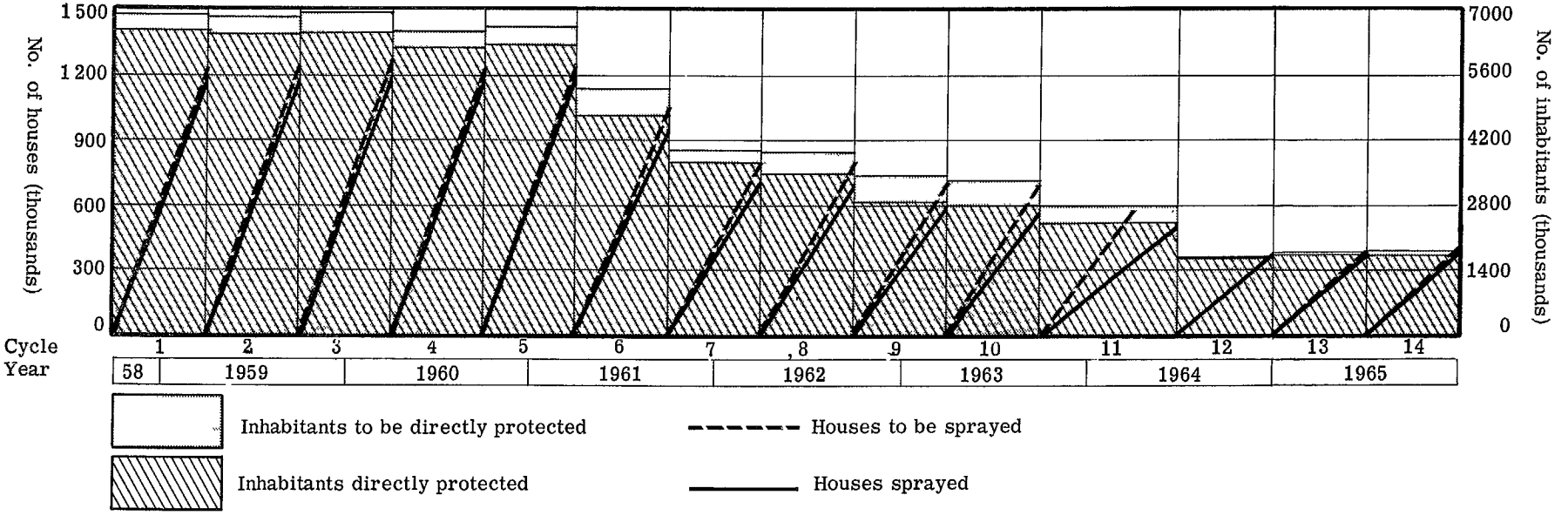
Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	94	73	159	326
Two-wheel vehicles	-	68	1	69
Boats	121	63	8	192
Animals	594	424	-	1 018
Other	-	-	-	-
Total	809	628	168	1 605

COLOMBIA (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Oct. 58-Sep. 59	1st 2nd	1 235 473 1 240 810	1 181 235 1 176 392	6 900 118 6 848 030	6 597 002 6 492 119	466 425	6.6 8.9
2nd	Oct. 59-Sep. 60	3rd 4th	1 273 295 1 228 550	1 196 930 1 162 059	6 915 265 6 556 771	6 500 325 6 201 358	409 309	9.4 8 7
3rd	Oct. 60-Sep. 61	5th 6th	1 253 594 1 050 556	1 181 557 945 501 a)	6 642 794 5 320 016	6 261 680 4 788 305	394 402	9.7 9.3
4th	Oct. 61-Sep. 62	7th 8th	796 056 789 399	738 459 a) 693 315 a)	3 997 793 3 928 049	3 708 400 3 449 630	408 421	8.9 8.8
5th	Oct. 62-Sep. 63	9th 10th	701 762 690 726	586 740 b) 576 540 b)	3 440 739 3 363 145	2 876 514 2 806 950	435 459	8.4 7.9
6th	Oct. 63-Dec. 64	11th 12th	582 580 365 843	508 501 b) 362 793	2 801 627 1 710 645	2 445 856 1 696 396	437 602	7.9 6.0
7th	Jan. 65-Dec. 65	13th 14th	376 662 378 869	373 763 370 239	1 746 130 1 762 953	1 732 717 1 722 802	630 589	5.8 5.8

(a) Some houses were sprayed in annual cycles. (b) Some houses were sprayed in cycles of one, three and four times a year.



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1959	329 288	4 172	1.3	1 195	2 942	35
1960	509 920	8 426	1.6	3 758	4 642	26
1961	570 160	16 974	3.0	10 235	6 694	45
1962	626 995	17 350	2.8	9 619	7 697	34
1963	456 592	17 448	3.8	9 113	8 311	24
1964	321 115	13 515	4.2	8 070	5 423	22
1965a)	251 551	15 651	6.2	10 089	5 549	13

CONSOLIDATION PHASE AREAS

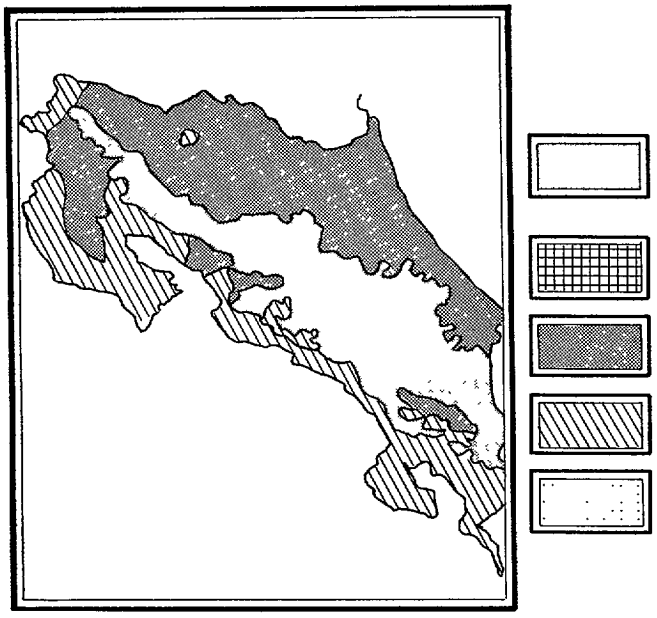
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1962	2nd	3 027	16 345	2.2	14	1	-	-	10	1	-	2	3	11	-
	3rd		17 636	2.3	36	1	2	-	29	-	-	4	21	15	-
	4th		36 269	4.8	97	46	2	-	33	4	-	12	75	22	-
1963	1st	3 874	28 193	2.9	129	26	-	-	61	1	6	35	82	47	-
	2nd		26 694	2.8	85	6	-	-	52	5	-	22	46	39	-
	3rd		24 844	2.6	89	4	-	-	78	-	-	7	46	43	-
	4th	5 305	41 083	3.1	147	47	1	-	88	1	1	9	88	59	-
1964	1st	6 053	41 501	2.7	257	30	-	1	197	-	5	24	111	146	-
	2nd		40 571	2.7	226	25	-	-	165	-	5	31	132	94	-
	3rd		50 135	3.3	356	39	-	-	240	-	9	68	170	186	-
	4th		46 201	3.0	375	130	-	-	172	-	8	65	165	209	1
1965	1st	7 071	76 300	4.3	641	149	1	-	301	1	1	188	323	315	3
	2nd		78 947	4.5	748	79	-	6	464	3	-	196	406	342	-
	3rd		83 910	4.7	1 237	159	1	-	783	2	-	292	775	462	-

(a) Data for last quarter, not separated by attack or consolidation phase.

Country: COSTA RICA

Date attack phase began: 15 July 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	1 438	51 011
Non malarious areas	997	19 485
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	263	19 996
Attack phase	178	11 530
Preparatory phase	0	0
Total originally malarious areas	441	31 526

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	1	76	77
Evaluation operations	1	128	129
Administrative and other	-	11	11
Transport	-	12	12
Total	2	227	229

TRANSPORT FACILITIES

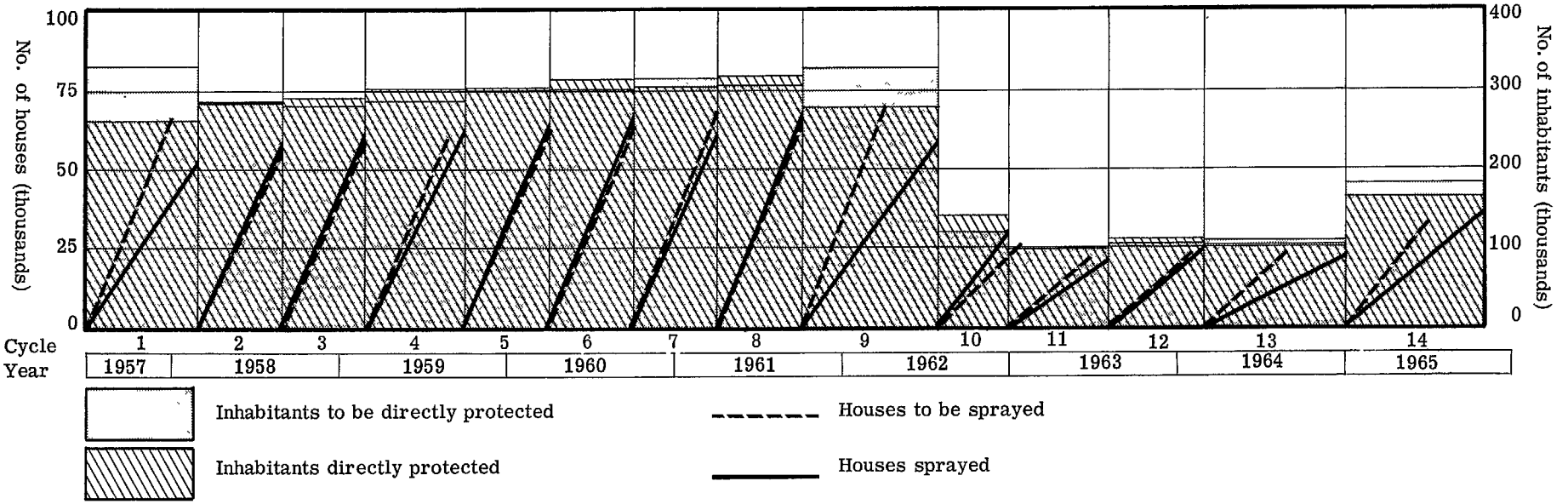
Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	11	10	2	23
Two-wheel vehicles	-	89	-	89
Boats	4	6	-	10
Animals	-	-	-	-
Other	-	-	-	-
Total	15	105	2	122

COSTA RICA (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Jul. 57-Aug. 58	1st 2nd	67 059 58 641	53 297 58 624	331 070 287 634	263 123 287 537	464 419	5.1 7.4
2nd	Sep. 58-Sep. 59	3rd 4th	58 858 60 413	60 800 63 063	282 930 290 405	292 856 303 151	465 531	6.9 7.1
3rd	Oct. 59-Sep. 60	5th 6th	63 259 64 057	63 884 66 961	302 568 302 926	305 586 316 629	512 475	8.6 9.3
4th	Oct. 60-Sep. 61	7th 8th	68 300 65 567	66 242 68 277	317 185 307 903	307 601 320 603	473 485	9.4 9.2
5th	Oct. 61-Dec. 62	9th 10th	69 643 26 075	58 910 30 684	332 545 120 753	281 295 142 102	492 508	8.8 9.6
6th	Jan. 63-Feb. 64	11th 12th	21 582 22 764	21 443 24 003	99 300 105 260	99 083 110 988	509 526	8.6 8.2
7th	Mar. 64-Oct. 65	13th 14th	23 046 32 623	22 098 29 827 a)	107 413 186 395	102 996 170 422	610 727	8.0 6.1

(a) In addition, 3,573 houses were sprayed with dieldrin.



COSTA RICA (Cont)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1957	18 136	1 153	6.4	98	1 037	18
1958	36 801	2 139	5.8	151	1 981	7
1959	52 536	1 899	3.6	121	1 775	3
1960	67 643	2 000	3.0	64	1 936	-
1961	87 893	1 673	1.9	18	1 655	-
1962	131 058	1 482	1.1	5	1 476	1
1963	124 475	857	0.7	7	850	-
1964	47 940	566	1.2	-	566	-
1965	95 027	1 846	1.9	1	1 845	-

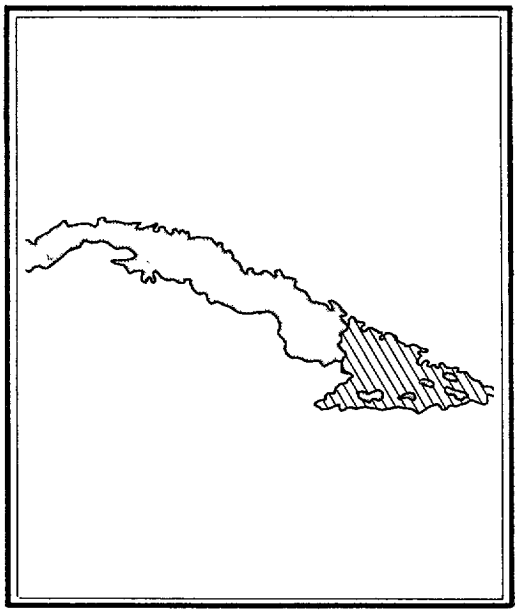
CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1962	3rd	230	22 765	39.6	37	-	6	2	9	-	17	3	-	37	-
	4th	230	29 829	51.9	64	-	9	2	3	-	34	16	-	64	-
1963	1st	255	35 311	55.4	62	33	13	-	-	-	8	8	-	62	-
	2nd	255	35 946	56.4	59	40	11	-	4	-	-	4	-	59	-
	3rd	255	26 885	42.1	135	101	11	-	3	-	-	20	-	135	-
	4th	262	35 233	53.8	115	70	10	-	-	-	2	33	-	115	-
1964	1st	263	23 761	36.1	93	41	7	-	4	-	-	41	-	93	-
	2nd	263	15 471	23.5	34	30	2	-	-	-	-	2	-	34	-
	3rd	283	19 262	27.2	192	116	10	2	12	-	1	51	4	188	-
	4th	294	16 851	22.9	327	164	-	-	-	-	-	163	6	321	-
1965	1st	263	17 378	26.4	71	33	-	-	-	-	2	36	-	71	-
	2nd		21 769	33.1	18	13	2	-	1	-	-	2	-	18	-
	3rd		31 468	47.9	284	111	-	-	-	-	-	173	3	281	-
	4th		32 109	48.8	344	39	1	-	3	-	-	301	-	344	-

Country: CUBA

Date attack phase began: 1 January 1962

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	7 390	114 524
Non malarious areas	5 094	77 022
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	0	0
Attack phase	2 296	37 502
Preparatory phase	0	0
Total originally malarious areas	2 296	37 502

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	1	547	548
Evaluation operations	9	69	78
Administrative and other	1	24	25
Transport	-	14	14
Total	11	654	665

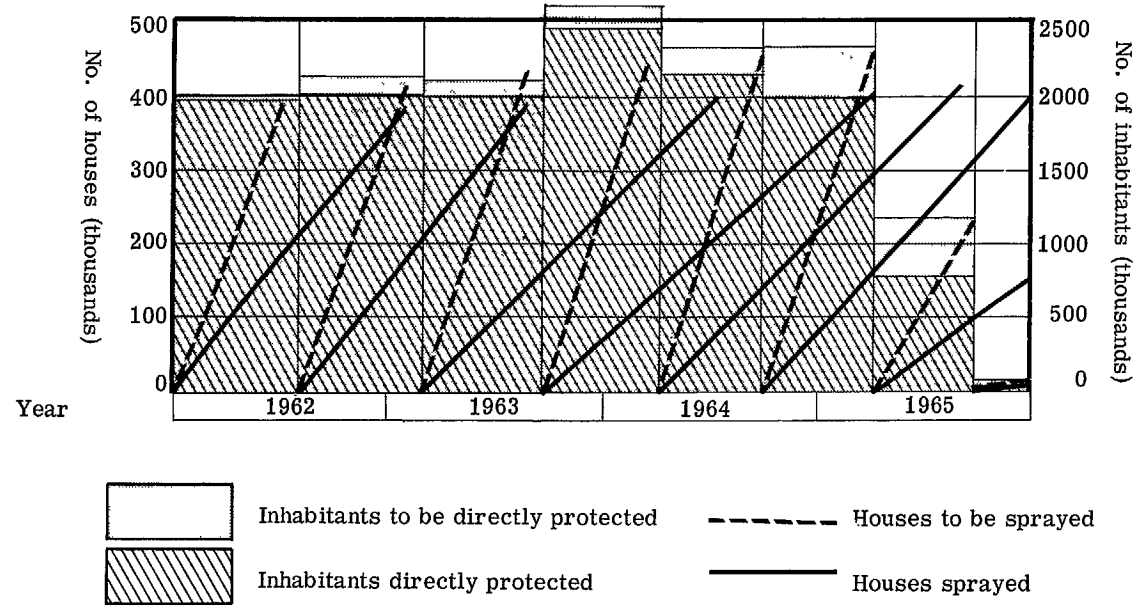
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	65	20	8	93
Two-wheel vehicles	-	-	-	-
Boats	-	-	-	-
Animals	201	21	-	222
Other	-	-	-	-
Total	266	41	8	315

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Jan. 62-Jan. 63	1st	391 155	385 020	2 007 000	1 975 528	210	9.7
	Jul. 62-Aug. 63	2nd	411 773	389 914	2 125 572	2 012 831	209	10.0
2nd	Mar. 63-Jul. 64	3rd	432 891	398 940	2 110 456	1 944 936	222	9.1
	Oct. 63-Mar. 65	4th	440 285	407 546	2 641 710	2 445 886	271	8.5
3rd	Apr. 64-Sep. 65	5th	454 923	423 361	2 283 531	2 125 145	248	9.1
	Oct. 64-Dec. 65	6th a)	460 484	389 001	2 289 065	1 933 561	238	9.2
4th	Apr. 65-Dec. 65	7th a)	233 435	149 685	1 197 223	767 693	224	8.8
	Oct. 65-Dec. 65	8th a)	19 631	8 756	85 361	38 074	256	9.0

(a) Cycle not yet finished.



CUBA (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

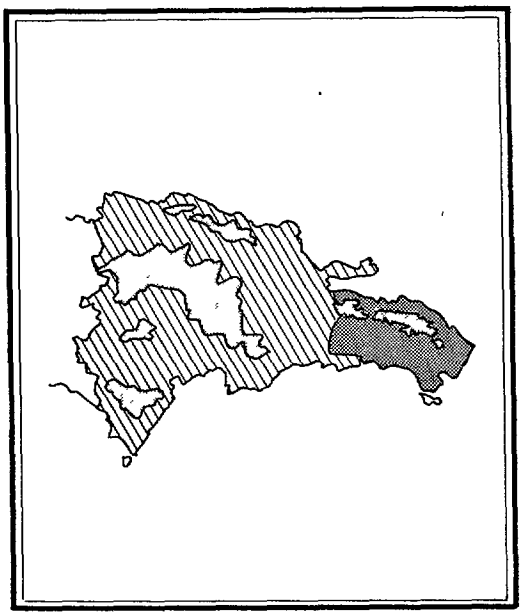
Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1960 a)	28 791	1 325	4.6	197	1 128	-
1961 a)	91 181	3 230	3.5	128	3 102	-
1962	100 247	3 515	3.5	31	3 484	-
1963	126 334	833	0.7	6	827	-
1964	276 470	624	0.2	-	623	1
1965	423 790	131	0.03	-	131	-

(a) Pre-eradication survey.

Country: DOMINICAN REPUBLIC

Date attack phase began: 16 June 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	3 573	48 442
Non malarious areas	643	9 442
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	346	7 780
Attack phase	2 584	31 220
Preparatory phase	0	0
Total originally malarious areas	2 930	39 000

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	441	441
Evaluation operations	5	77	82
Administrative and other	1	46	47
Transport	-	70	70
Total	6	634	640

TRANSPORT FACILITIES

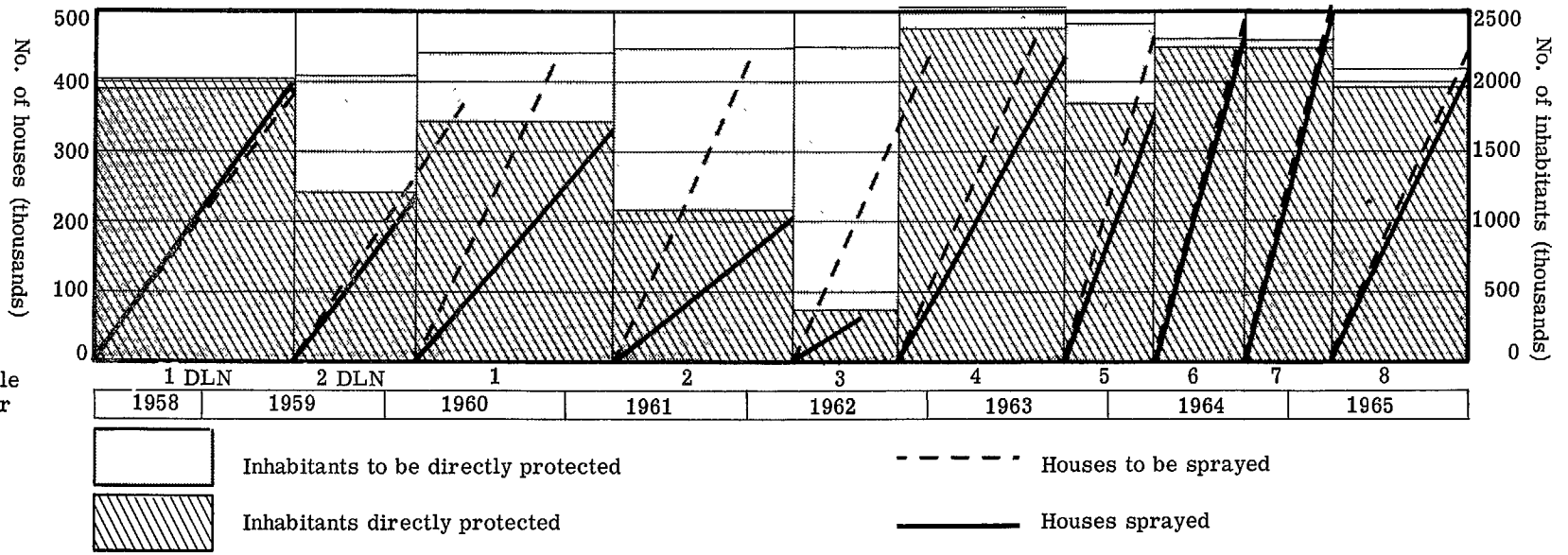
Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	62	12	4	78
Two-wheel vehicles	-	17	-	17
Boats	-	-	-	-
Animals	-	6	-	6
Other	-	-	-	-
Total	62	35	4	101

DOMINICAN REPUBLIC (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin							
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	Dieldrin	
1st	Jun. 58-Jun. 59	-	-	-	1st	386 120	395 597	1 966 895	2 015 214	-	102	11.4
2nd	Jul. 59-Feb. 60	-	-	-	2nd[a]	400 000	236 597	2 032 800	1 202 301	-	119	10.5
3rd	Mar. 60-Mar. 62	1st 2nd	428 615 428 615	332 944 204 531	-	-	-	2 206 080 2 241 656	1 713 612 1 083 459	495 472	-	9.0 8.4
(b)	Apr. 62-Oct. 62	3rd	428 615	72 499	-	-	-	2 241 656	368 201	424	-	8.4
4th	Nov. 62-Mar. 64	4th 5th	462 900 472 000	438 706 359 653	-	-	-	2 530 674 2 428 110	2 398 328 1 850 166	468 475	-	8.2 8.4
5th	Apr. 64-Mar. 65	6th 7th	490 000 510 575	480 537 500 343	-	-	-	2 316 181 2 315 764	2 271 494 2 269 357	449 355	-	9.8 10.5
6th	Apr. 65-Dec. 65	8th	450 215	411 193	-	-	-	2 104 080	1 921 727	357	-	10.0

(a) Cycle suspended due to shift of insecticide. (b) Cycle suspended.



DOMINICAN REPUBLIC (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

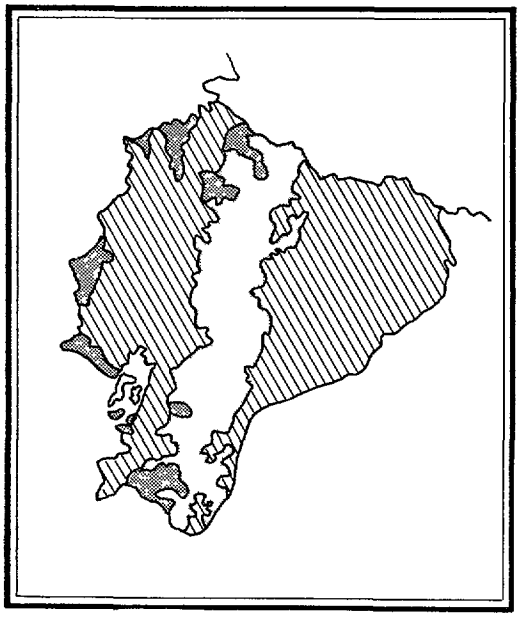
Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1958 a)	17 784	2 676	15.0	...	...	...
1959	28 721	3 743	13.0	1 968	1 767	8
1960	20 337	5 540	27.2	3 583	1 949	8
1961	21 946	2 523	11.5	1 164	1 358	1
1962	19 742	548	2.8	275	271	2
1963	73 352	386	0.5	129	256	1
1964	121 211	321	0.3	103	201	17
1965	205 836	84	0.04	38	41	5

(a) June-December.

Country: ECUADOR

Date attack phase began: 27 March 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	4 957	291 906
Non malarious areas	2 265	116 444
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	1 288	29 479
Attack phase	1 404	145 983
Preparatory phase	0	0
Total originally malarious areas	2 692	175 462

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	4	200	204
Evaluation operations	12	163	175
Administrative and other	4	144	148
Transport	-	38	38
Total	20	445	565

TRANSPORT FACILITIES

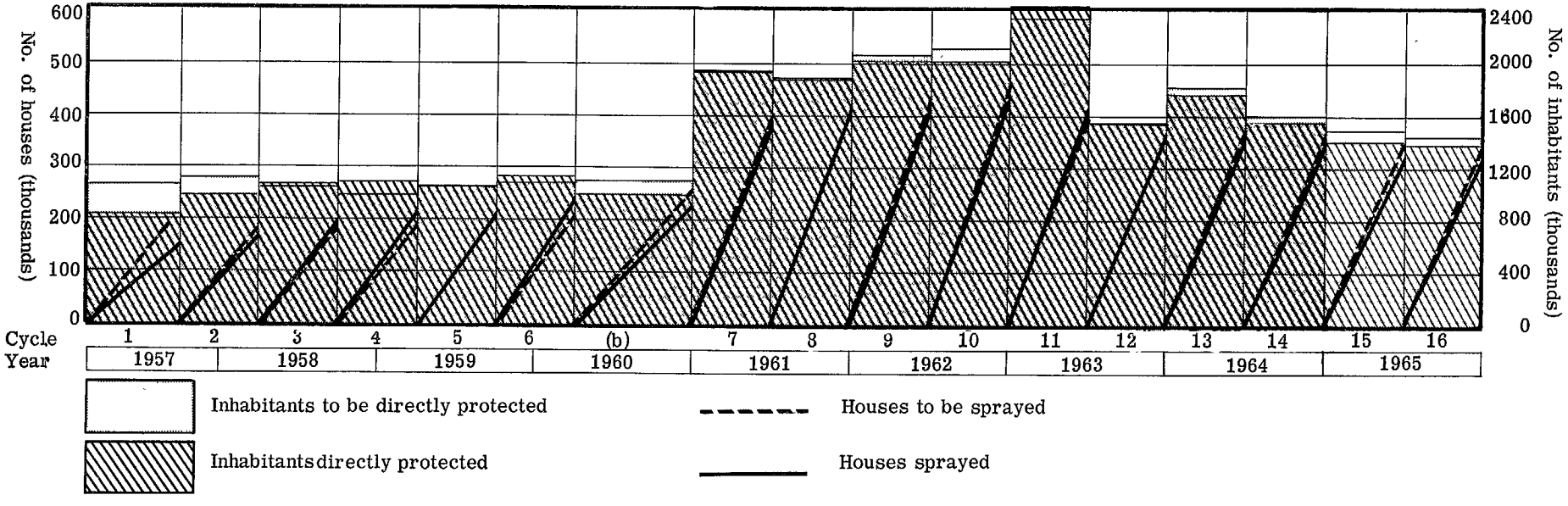
Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	104	6	14	124
Two-wheel vehicles	-	39	-	39
Boats	66	-	-	66
Animals	381	-	-	381
Other	-	-	-	-
Total	551	45	14	610

ECUADOR (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin							
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	Dieldrin	
1st	Mar. 57-Mar. 58	1st + 2nd	42 418	63 284	1st	244 304	257 697	1 587 866	1 777 566	590	114	8.0
2nd	Apr. 58-Mar. 59	3rd	48 104	50 089	2nd	280 832	144 069	1 047 229	1 078 629	490	123	6.9
		4th	48 391	83 018			127 348	980 474	1 092 450	436	169	8.5
3rd	Apr. 59-Mar. 60	5th	76 577	72 370	3rd[a]	260 539	135 187	949 386	952 664	399	119	9.3
		6th	76 577	97 790[a]			136 542[a]	995 761	1 128 111	403	122	8.8
(b)	Apr. 60-Dec. 60	(b)	251 768	227 411	-	-	-	1 016 387	918 151	424	-	8.9
4th	Jan. 61-Dec. 61	7th	403 989	394 246	-	-	-	1 954 095	1 907 065	446	-	8.4
		8th	413 951	412 008				1 897 137	1 888 183	502		8.5
5th	Jan. 62-Dec. 62	9th	438 027	428 269	-	-	-	2 069 240	2 023 097	529	-	8.4
		10th	448 716	428 329				2 119 734	2 023 430[c]	557		8.2
6th	Jan. 63-Dec. 63	11th	400 362	409 722	-	-	-	2 360 935	2 416 436	581	-	8.2
		12th	363 437	363 304				1 553 330	1 552 883	602		8.2
7th	Jan. 64-Dec. 64	13th	374 284	362 930	-	-	-	1 829 500	1 774 020	620	-	7.8
		14th	367 377	357 206				1 606 760	1 562 305	630		7.9
8th	Jan. 65-Dec. 65	15th	343 390	328 679	-	-	-	1 494 330	1 430 345	627	-	7.5
		16th	330 691	316 519				1 453 023	1 390 756	570		7.7

(a) Cycle suspended. (b) Emergency spraying. (c) Estimated.



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1957	38 631	1 675	4.3	864	808	3
1958	65 521	4 421	6.7	2 411	2 006	4
1959	98 977	5 887	5.9	2 313	3 571	3
1960	119 562	9 084	7.6	3 158	5 906	20
1961	213 169	9 733	4.6	1 489	8 243	1
1962	269 004	5 531	2.1	658	4 868	5
1963	199 675	3 760	1.9	231	3 509	20
1964	174 203	4 246	2.4	251	3 994	1
1965 a)	180 374 a)	3 777 a)	2.1	181	3 596	-

CONSOLIDATION PHASE AREAS

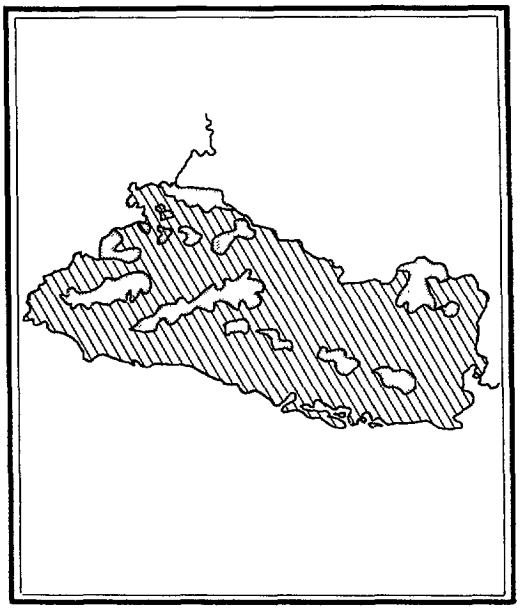
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1963	1st	625	17 734	11.3	6	-	-	-	6	-	-	-	-	5	1
	2nd	625	19 286	12.3	15	-	-	-	15	-	-	-	1	14	-
	3rd	806	25 488	12.6	29	-	-	-	29	-	-	-	1	28	-
	4th	927	24 270	9.6	47	-	-	-	39	-	-	8	4	43	-
1964	1st	927	23 820	10.3	51	-	-	-	20	-	-	31	4	47	-
	2nd	938	39 275	16.7	118	1	1	-	58	-	2	56	7	111	-
	3rd	1 016	41 398	16.3	129	32	2	-	65	-	7	23	1	128	-
	4th	1 053	36 004	13.7	84	3	-	-	55	-	-	26	1	83	-
1965	1-4 b)	1 288	159 753	13.5	402	69	28	6	244	-	11	44	22	380	-

(a) December includes figures of areas in consolidation phase. (b) January-November.

Country: EL SALVADOR

Date attack phase began: 1 July 1956

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	2 918	21 146
Non malarious areas	467	1 846
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	0	0
Attack phase	2 451[a]	19 300
Preparatory phase	0	0
Total originally malarious areas	2 451	19 300

(a) See table No. 2

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	1	2	3
Evaluation operations	4	295	299
Administrative and other	-	39	39
Transport	-	41	41
Total	5	377	382

TRANSPORT FACILITIES

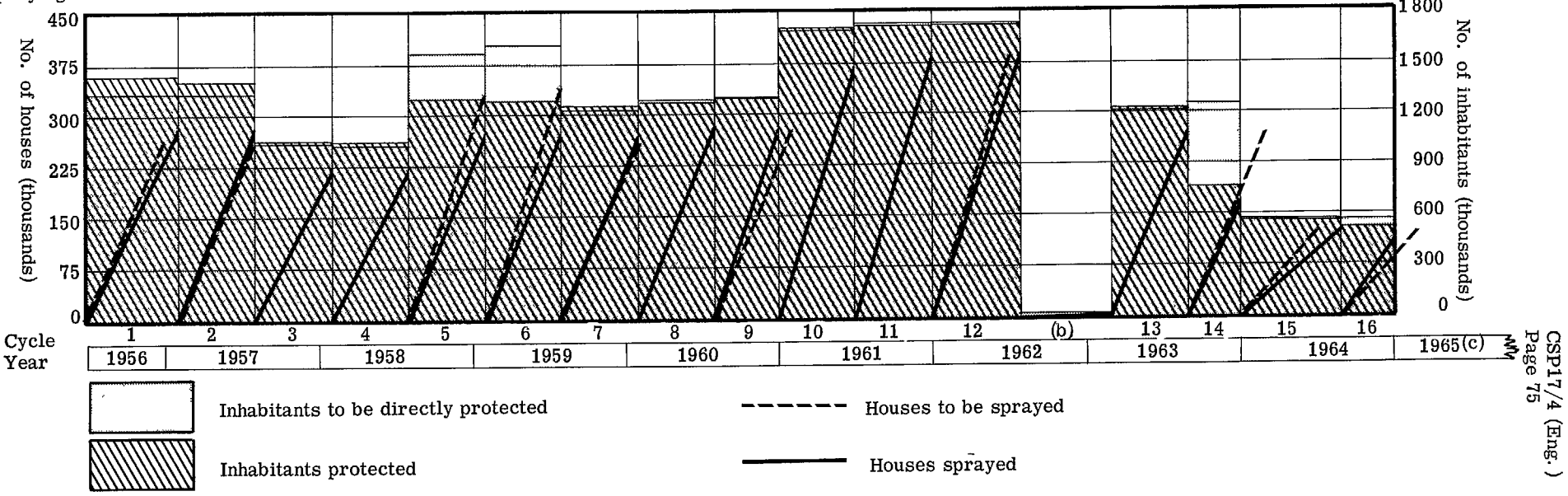
Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	1	43	33	77
Two-wheel vehicles	-	48	1	49
Boats	-	1	-	1
Animals	-	-	-	-
Other	-	-	-	-
Total	1	92	34	127

EL SALVADOR (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
3rd	Aug. 58-Jul. 59[a]	5th 6th	331 975 341 277	273 788 270 719	1 575 885 1 620 050	1 299 671 1 285 197	493 527	8.6 8.9
4th	Aug. 59-Jul. 60	7th 8th	261 102 278 991	265 361 276 050	1 237 362 1 289 775	1 257 537 1 277 428	573 545	7.7 7.7
5th	Aug. 60-Jun. 61	9th 10th	281 430 368 841	279 481 371 715	1 360 400 1 700 000	1 297 262 1 713 252	528 526	7.6 8.9
6th	Jul. 61-Jul. 62	11th 12th	380 283 387 944	377 551 386 094	1 748 922 1 742 645	1 736 431 1 734 366	546 562	9.2 9.5
(b)	Aug. 62-Feb. 63	(b)	3 901	3 816	20 117	19 680	809	6.7
7th	Mar. 63-Dec. 63	13th 14th	267 239 273 344	270 703 165 666	1 206 851 1 255 742	1 222 430 761 151	559 506	9.3 9.3
8th	Jan. 64-Nov. 64	15th 16th	127 000 125 806	125 854 114 441	581 745 577 568	576 496 525 392	536 533	8.4 9.4
(c)	Dec. 64-Dec. 65	(c)	-	6 396	-	...	-	-

(a) Date in which DDT started to be used; prior to that DDT and dieldrin were used. (b) Spraying discontinued; only one locality was sprayed. (c) Emergency spraying.



EL SALVADOR (Cont.)

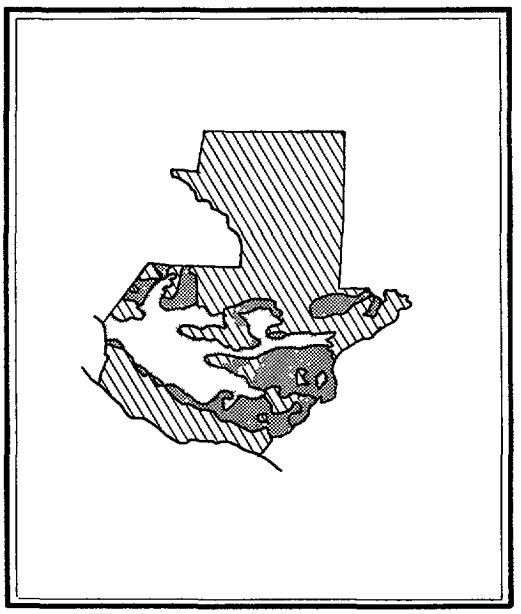
EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1957	29 171	6 661	22.8	3 001	3 655	5
1958	51 615	9 351	18.1	4 419	4 932	-
1959	71 295	17 521	24.6	4 051	13 470	-
1960	75 381	10 012	13.3	2 947	7 064	1
1961	127 293	12 563	9.9	2 965	9 594	4
1962	194 069	15 433	7.9	2 556	12 873	4
1963	238 791	17 846	7.5	1 879	15 962	5
1964	350 843	25 857	7.4	2 661	23 195	1
1965	506 442	34 070	6.7	2 186	31 884	-

Country: GUATEMALA

Date attack phase began: 1 August 1956

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	4 411	108 889
Non malarious areas	2 467	28 539
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	887	16 546
Attack phase	1 057	63 804
Preparatory phase	0	0
Total originally malarious areas	1 944	80 350

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	1	295	296
Evaluation operations	13	294	307
Administrative and other	-	17	17
Transport	-	27	27
Total	14	633	647

TRANSPORT FACILITIES

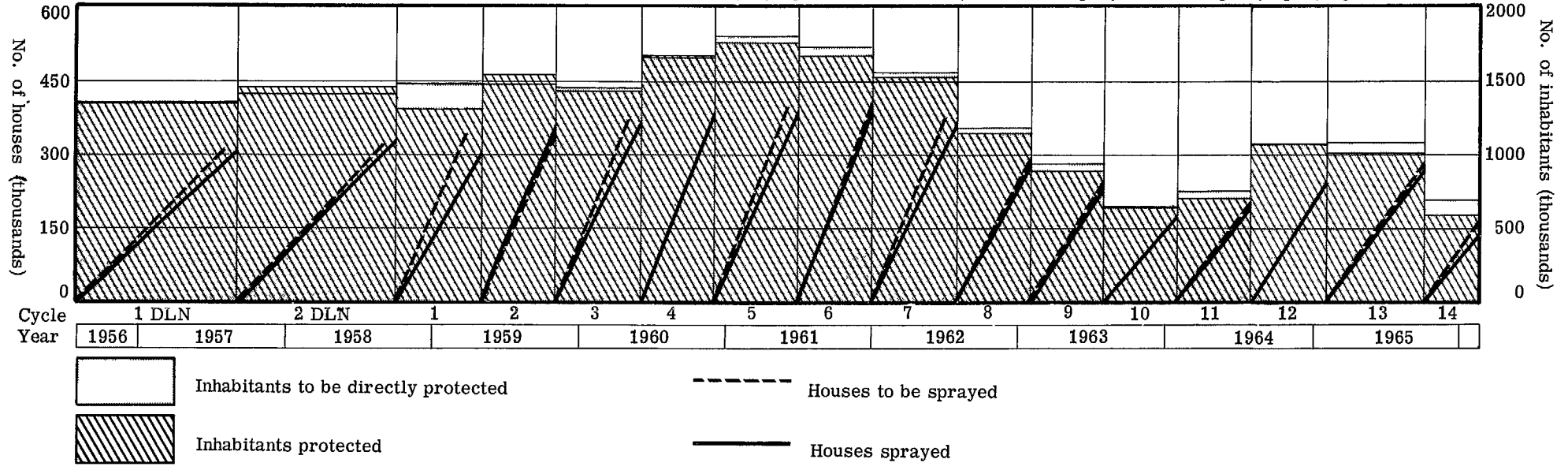
Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	26	9	7	42
Two-wheel vehicles	-	25	48	73
Boats	5	4	1	10
Animals	-	-	-	-
Other	-	-	-	-
Total	31	38	56	125

GUATEMALA (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin							
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	Dieldrin	
1st	Aug. 56-Aug. 57	-	-	-	1st	308 097	306 306	1 361 175	1 353 121	-	117	8.4
2nd	Sep. 57-Sep. 58	-	-	-	2nd	321 975	331 090	1 422 165	1 462 510	-	117	8.5
3rd	Oct. 58-Oct. 59	1st	341 000	301 329	-	-	-	1 482 670	1 310 317	427	-	8.8
		2nd	342 586	357 104				1 481 342	1 544 144	542		7.5
4th	Nov. 59-Nov. 60	3rd	373 641	368 269	-	-	-	1 460 936	1 439 781	541	-	7.1
		4th	377 381	378 636				1 654 816	1 660 207	560		8.1
5th	Dec. 60-Dec. 61	5th	396 588	386 737	-	-	-	1 815 183	1 769 971	588	-	7.8
		6th	406 807	393 090				1 737 473	1 678 906	557		7.9
6th	Jan. 62-Jan. 63	7th	375 000	368 135	-	-	-	1 562 625	1 534 089	553	-	7.5
		8th	291 490	280 687				1 185 781	1 141 867	589		7.5
7th	Feb. 63-Jan. 64	9th	243 511	231 824	-	-	-	949 936	904 382	537	-	7.6
		10th	175 000	171 061				642 950	628 563	502		8.0
8th	Feb. 64-Jan. 65	11th	205 686	193 780	-	-	-	748 945	705 594	510	-	8.1
		12th	239 819	239 859				1 060 576	1 060 758	508		8.0
9th	Feb. 65-Feb. 66	13th	281 102	268 636a)	-	-	-	1 067 260	1 019 937	506	-	8.2
		14th	165 071	140 535b)				709 112	603 723	517		8.4

(a) 115,204 houses were sprayed in annual cycles and 3,908 in emergency sprayings. (b) Includes 5,297 houses sprayed in emergency sprayings.



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1956 a)	8 030	2 111	26.3	538	1 573	-
1957	25 232	5 653	22.4	1 837	3 812	4
1958	62 119	12 829	20.6	5 043	7 786	-
1959	108 048	7 894	7.3	1 548	6 346	-
1960	129 741	3 387	2.6	417	2 969	1
1961	219 628	4 083	1.9	780	3 298	5
1962	275 003	5 783	2.1	1 539	4 224	20
1963	216 217	12 270	5.7	4 660	7 565	45
1964	167 261	17 241	10.3	4 293	12 914	34
1965	242 012	11 730	4.8	2 053	9 676	1

CONSOLIDATION PHASE AREAS

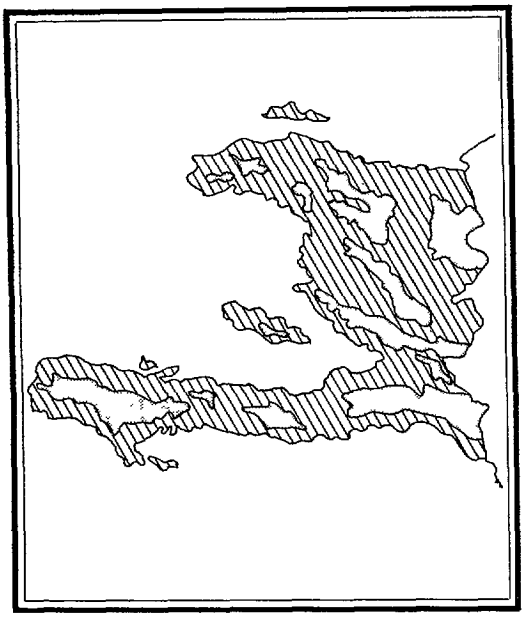
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1962	1st	175	2 399	5.5	2	-	-	-	2	-	-	-	1	1	-
	2nd	175	5 457	12.5	1	-	-	-	1	-	-	-	1	-	-
	3rd	498	20 655	16.6	93	1	-	-	26	-	-	66	18	75	-
	4th	581	19 859	13.7	117	1	-	-	71	-	-	45	42	75	-
1963	1st	890	20 834	9.4	297	-	2	-	144	-	-	151	68	229	-
	2nd	890	25 543	11.5	413	17	18	-	168	-	2	208	117	294	2
	3rd	1 234	40 400	13.1	1 082	89	64	-	169	-	-	760	359	723	-
	4th	1 234	45 372	14.7	1 054	72	58	-	73	-	-	851	353	699	2
1964	1st	1 009	26 989	10.7	454	64	122	-	134	-	-	134	67	385	2
	2nd	1 025	28 439	11.1	790	49	157	-	250	-	1	333	110	678	2
	3rd	1 025	30 529	11.9	941	-	-	-	-	-	-	941	180	759	2
	4th	1 057	35 840	13.6	975	41	56	-	127	-	-	751	353	622	-
1965	1st	1 057	36 831	13.9	656	58	142	-	38	-	-	418	58	598	-
	2nd	1 057	29 761	11.3	745	74	70	-	35	-	-	566	38	707	-
	3rd	887	31 344	14.1	676	36	24	-	17	-	-	599	76	599	1
	4th	887	40 614	18.3	665	128	36	-	21	-	-	480	88	577	-

(a) August-December

Country: HAITI

Date attack phase began: 1 January 1962

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	4 500	27 750
Non malarious areas	1 000	8 650
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	0	0
Attack phase	3 500	19 100
Preparatory phase	0	0
Total originally malarious areas	3 500	19 100

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	4	45	49
Evaluation operations	13	1 394	1 407
Administrative and other	1	137	138
Transport	-	61	61
Total	18	1 637	1 655

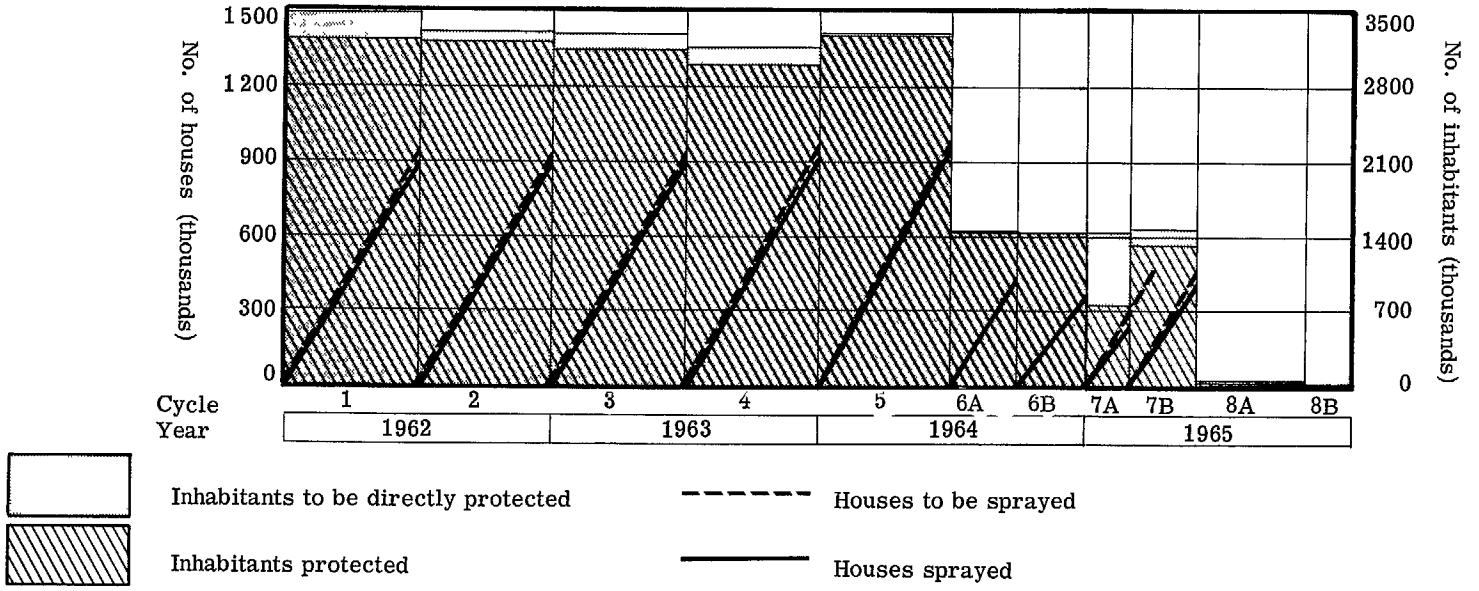
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	-	77	29	106
Two-wheel vehicles	-	-	1	1
Boats	-	2	-	2
Animals	-	-	-	-
Other	-	-	-	-
Total	-	79	30	109

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Jan. 62-Dec. 62	1st	952 301	885 549 [a]	3 490 183	3 245 821	220	14.3
		2nd	929 415	906 846	3 311 505	3 231 438	196	16.6
2nd	Jan. 63-Dec. 63	3rd	940 397	902 687	3 297 032	3 165 209	217	15.4
		4th	964 942	914 340	3 186 238	3 019 259	235	16.2
3rd	Jan. 64-Dec. 64	5th	984 853	974 136	3 317 674	3 281 609	243	16.1
		6th A [b]	457 066	454 029	1 459 549	1 449 893	127	16.8
		6thB [b]	465 260	455 353	1 446 450	1 446 458	122	17.5
4th	Jan. 65-Dec. 65	7th A [b]	465 907	246 414	1 447 900	765 795	119	18.3
		7th B [c]	465 907	404 692	1 477 205	1 283 123	234	17.9
		8th A [d]	5 657	5 418	21 175	20 280	487	9.9
		8th B [d]	8 178	6 296	26 511	20 411	254	14.2

(a) 10,016 houses sprayed with dieldrin. (b) Quarterly cycles, using DDT 1 g/m^2. (c) Quarterly cycles, using DDT 2 g/m^2. (d) Annual cycles.



HAITI (Cont.)

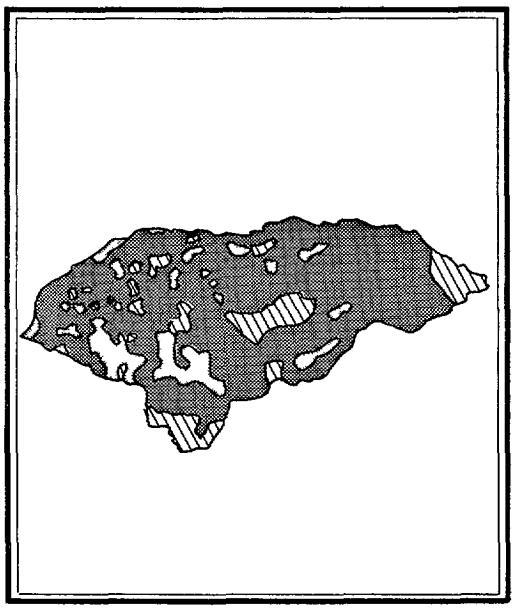
EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1962	111 142	4 033	3.6	3 441	20	572
1963	386 657	6 662	1.7	5 464	12	1 186
1964	473 297	19 170	4.1	18 422	24	724
1965	752 284	10 304	1.4	9 997	20	287

Country: HONDURAS

Date attack phase began: 15 July 1959

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	2 122	112 088
Non malarious areas	271	10 721
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	1 518	79 217
Attack phase	333	22 150
Preparatory phase	0	0
Total originally malarious areas	1 851	101 367

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	64	64
Evaluation operations	2	166	168
Administrative and other	-	50	50
Transport	-	38	38
Total	2	318	320

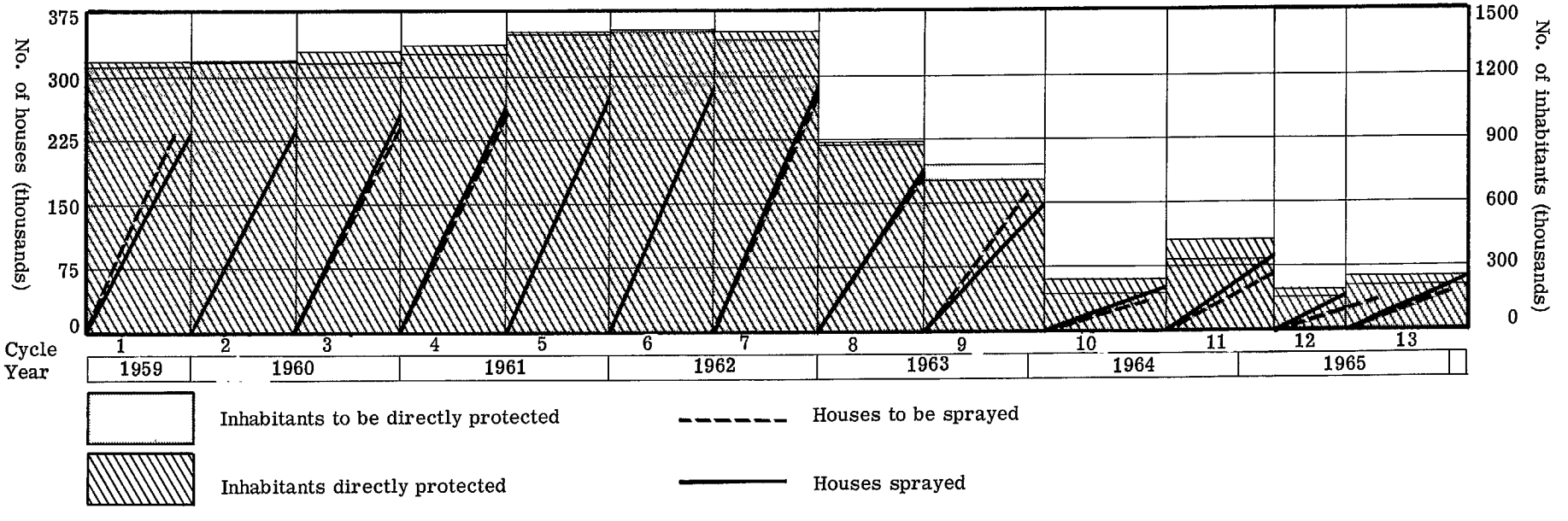
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	19	16	41	76
Two-wheel vehicles	-	70	-	70
Boats	-	-	3	3
Animals	-	117	40	157
Other	-	-	-	-
Total	19	203	84	306

HONDURAS (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Malathion							
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	Malathion	
1st	Jul. 59-Jun. 60	1st 2nd	232 771 241 726	236 963 242 059	-	-	-	1 252 773 1 277 280	1 275 237 1 279 148	406 368	-	9.8 11.4
2nd	Jul. 60-Jun. 61	3rd 4th	245 572 258 519	254 699 265 825	-	-	-	1 274 028 1 314 052	1 321 450 1 351 212	369 419	-	11.8 10.9
3rd	Jul. 61-Jun. 62	5th 6th	276 458 287 516	277 941 285 394	-	-	-	1 401 919 1 421 192	1 409 325 1 410 773	360 262	-	11.1 11.3
4th	Jul. 62-Jun. 63	7th 8th	282 186 187 905	290 056 191 321	-	-	-	1 376 785 877 892	1 415 286 893 861	373 377	-	11.1 11.0
5th	Jul. 63-Aug. 64	9th 10th	126 499 14 851	110 612 27 719	1st 2nd 3rd	19 776 17 471 21 499	20 440 18 286 23 066	781 085 171 805	712 355 240 031	404 505	440 343 575	10.5 9.0
6th	Sep. 64-Jun. 65	11th 12th	21 502 30 377	37 818 35 603	4th 5th -	23 274 22 039 -	23 614 24 997 -	328 950 137 790	425 513 161 522	567 474	550 411 -	8.4 8.7
7th	Jul. 65-Jan. 66	13th	38 035	54 654	-	-	-	182 636	262 438	464	-	8.9



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1958 a)	14 183	906	6.4	339	567	-
1959	66 391	6 675	10.1	3 170	3 504	1
1960	109 677	5 517	5.0	1 737	3 780	-
1961	164 965	4 334	2.6	861	3 472	1
1962	229 666	5 747	2.5	597	5 150	-
1963	168 647	6 721	4.0	669	6 052	-
1964	75 286	5 392	7.2	604	4 788	-
1965	113 763	5 082	4.5	141	4 941	-

CONSOLIDATION PHASE AREAS

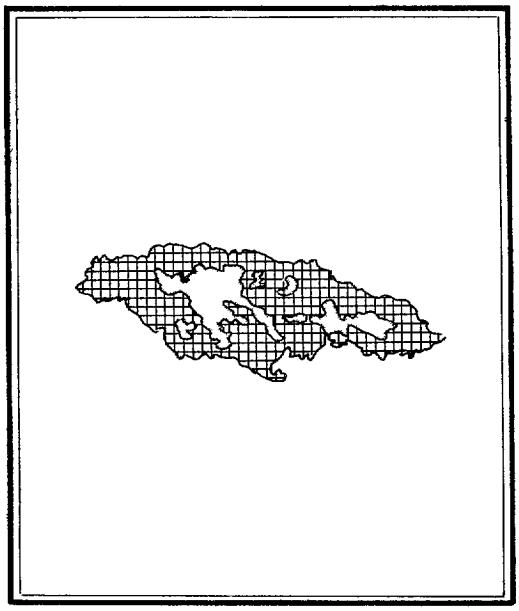
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1962	3rd	46	6 992	60.8	1	-	1	-	-	-	-	-	-	1	-
	4th		2 997	26.0	2	-	-	-	2	-	-	-	-	2	-
1963	1st	526	19 133	14.5	69	23	-	-	36	-	-	10	11	58	-
	2nd	526	19 790	15.0	41	12	6	-	21	-	-	2	3	38	-
	3rd	765	32 869	17.2	89	50	13	-	15	-	-	11	4	85	-
	4th	941	23 692	10.1	157	92	32	1	12	-	-	20	1	156	-
1964	1st	1 631	20 253	5.0	122	61	41	-	12	-	-	8	4	118	-
	2nd		29 169	7.2	161	84	49	-	18	-	-	10	-	161	-
	3rd		37 962	9.3	474	294	86	-	36	-	-	58	5	469	-
	4th		44 330	10.9	524	272	82	-	77	-	-	93	28	496	-
1965	1st	1 518	49 861	13.1	288	176	49	3	26	-	-	34	10	278	-
	2nd		45 502	12.0	333	191	49	12	31	-	-	50	4	329	-
	3rd		53 518	14.1	570	339	76	10	37	-	-	108	1	569	-
	4th		47 657	12.6	679	304	48	7	17	-	-	303	7	672	-

(a) Incomplete information.

Country: JAMAICA

Date attack phase began: 2 January 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	1791	11428
Non malarious areas	359	1400
Originally malarious areas		
Maintenance phase	1432	10028
Consolidation phase	0	0
Attack phase	0	0
Preparatory phase	0	0
Total originally malarious areas	1432	10028

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	-	-
Evaluation operations	1 (1)	87	88 (1)
Administrative and other	1	-	1
Transport	-	-	-
Total	2 (1)	87	89 (1)

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	-	32	6	38
Two-wheel vehicles	-	-	-	-
Boats	-	-	-	-
Animals	-	-	-	-
Other	-	-	-	-
Total	-	32	6	38

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive				
		Number	Percentage	P. falciparum	P. vivax	P. malariae
1958	56 266	205	0.4	199	-	6
1959	39 726	371	0.9	352	-	19
1960	136 123	133	0.1	122	-	11
1961	153 237	23	0.02	16	-	7

CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1960	3-4	313	48 411	30.9	2	-	2	-	-	-	-	-	-	-	2
1961	1-4	761	139 664	18.4	8	1	7	-	-	-	-	-	-	-	8
1962	1-4	1 282	246 592	19.2	2	-	-	1	-	1	-	-	-	1	1
1963	1-4	1 309	185 459	14.2	3	-	3	-	-	-	-	-	-	-	3
1964	1-4	1 365	134 824	9.9	1	-	1	-	-	-	-	-	-	-	1
1965	1st	1 432	24 443	6.8	1	-	1	-	-	-	-	-	-	-	1
MAINTENANCE PHASE AREAS															
1965	2-4	1 432	53 854	5.0	2	-	1	1	-	-	-	-	-	-	2

Country: MEXICO

Date attack phase began: 2 January 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1965

	Population (thousands)	Area km^2
TOTAL COUNTRY	40 707	1 969 367
Non malarious areas	20 222	914 592
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	12 995	595 500
Attack phase	7 490	459 275
Preparatory phase	0	0
Total originally malarious areas	20 485	1 054 775

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	35	2 396	2 431
Evaluation operations	62	1 031	1 093
Administrative and other	22	489	511
Transport	-	169	169
Total	119	4 085	4 204

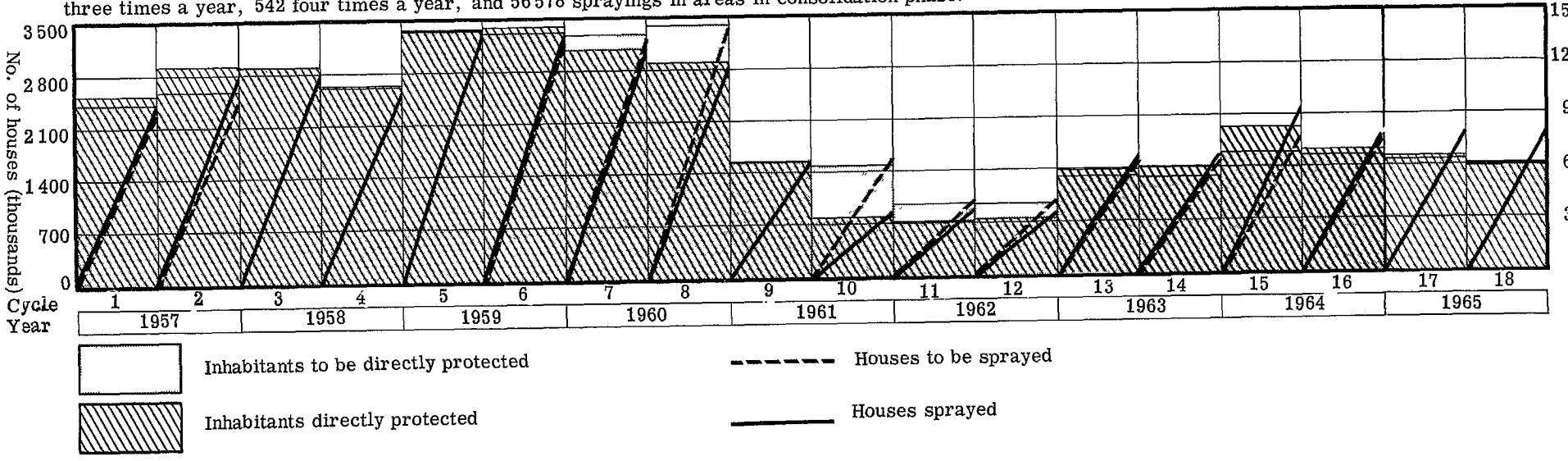
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	437	397	64	898
Two-wheel vehicles	-	-	-	-
Boats	10	2	-	12
Animals	1 829	164	-	1 993
Other	-	-	-	-
Total	2 276	563	64	2 903

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin							
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	Dieldrin	
1st	Jan. 57-Dec. 57	1st	2 292 841	2 143 023	1st	(a)	219 662	10 464 526	10 802 292	495	99	9.3
		2nd	2 434 486	2 298 952			459 064	11 113 428	12 597 171	417		9.9
2nd	Jan. 58-Dec. 58	3rd	2 060 985	2 103 570	2nd	731 872	685 814	12 545 513	12 531 599	402	110	10.3
		4th	1 869 911	1 971 557		666 929	531 742	11 362 506	11 212 496	424	113	10.5
3rd	Jan. 59-Dec. 59	5th	2 973 820	3 050 952	3rd	321 520	246 753	14 492 905	14 505 650	434	112	10.8
		6th	3 018 184	3 219 340		160 136	45 548	14 226 160	14 614 270	434	118	10.4
4th	Jan. 60-Dec. 60	7th	3 177 380	3 027 089	4th	68 977	21 390	14 163 856	13 301 924	369	94	10.9
		8th	3 376 695	2 869 083		(a)	1 000	14 681 870	12 481 041	247	83	11.1
5th	Jan. 61-Dec. 61	9th	1 575 106	1 582 503	-	-	-	6 571 342	6 602 052	356	-	11.2
		10th	1 575 106	852 287				6 409 106	3 468 283	414		10.5
6th	Jan. 62-Dec. 62	11th	1 036 386	783 060[b]	-	-	-	4 151 927	3 135 873	514	-	8.6
		12th	1 036 386	825 082				4 070 924	3 241 041	517		8.9
7th	Jan. 63-Dec. 63	13th	1 477 793	1 551 297[c]	-	-	-	5 686 547	5 969 938	512	-	8.6
		14th	1 477 793	1 606 125[d]				5 572 757	6 056 473	...		8.7
8th	Jan. 64-Dec. 64	15th	1 808 906	2 190 136[e]	-	-	-	6 869 682	8 317 653	486	199 g)	8.7
		16th	1 808 906	1 848 155[f]				6 770 916	6 917 988	476	249 g)	8.7
9th	Jan. 65-Dec. 65	17th	1 770 934	1 824 675[h]	-	-	-	6 278 670	6 469 365	423	-	9.4
		18th	1 770 934	1 812 043[i]				5 949 098	6 087 346	408		9.3

(a) Included in DDT column. (b) Includes 386 746 houses sprayed 3 times a year and 5 963 once a year. (c) Includes 160 295 houses sprayed 3 times a year, and 5 697 once a year. (d) Includes 128 743 houses sprayed 3 times a year, and 4 029 once a year. (e) Includes 11 457 houses sprayed once a year, 732 900 three times a year, and 51 423 four times a year. (f) Includes 3 907 houses sprayed once a year, 522 194 three times a year, and 42 692 four times a year. (g) DDT 1 g/m^2 (h) Includes 89 755 houses sprayed once a year, 172 789 three times a year, 34 831 four times a year. (i) Includes 34 698 houses sprayed once a year, 137 167 three times a year, 542 four times a year, and 56 578 sprayings in areas in consolidation phase.



MEXICO (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1957	175 080	4 387	2.51	514	3 856	17
1958	399 124	3 290	0.82	487	2 779	24
1959	815 038	3 202	0.39	443	2 705	54
1960	1 208 712	3 569	0.29	245	3 251	73
1961	828 360	8 735	1.05	337	8 283	115
1962	727 262	9 642	1.33	139	9 450	53
1963	710 448	12 906	1.82	279	12 581	46
1964	761 832	11 722	1.54	371	11 334	17
1965	793 271	8 699 a)	1.10	44	8 442	9

CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1958	1-4	59	4 449	7.5	-	-	-	-	-	-	-	-	-	-	-
1959	1-4	59	6 560	11.1	-	-	-	-	-	-	-	-	-	-	-
1960	1-3	70	4 058	7.7	-	-	-	-	-	-	-	-	-	-	-
1961	1-4	11 721	745 907	6.4	3 114	1 248	446	387		12	90	931	91	3 004	19
1962	1-4	15 592	1 240 130	7.9	4 367	1 211	487	3	695	2	642	1 597	43	4 577	17
1963	1-4	16 830	1 122 103	6.7	3 835	1 514	73	1	494	5	390	1 358	183	3 634	18
1964	1-4	12 740	833 491	6.5	1 683	914	78	2	407	4	11	267	83	1 595	5
1965	1-4	12 995	802 232 b)	6.2	1 414 b)	609	28	3	396	-	21	318	30	1 343	2

(a) Includes 204 re-examined samples. (b) Includes 50 050 samples and 131 positives from non-malarious areas, and also 39 re-examined samples.

Country: NICARAGUA

Date attack phase began: 10 November 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1965

	Population (thousands)	Area km^2
TOTAL COUNTRY	1783	139 000
Non malarious areas	70	6 615
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	730	91 888
Attack phase	983[a]	40 497[a]
Preparatory phase	0	0
Total originally malarious areas	1713	132 385

(a) Includes inhabitants in areas in recess from spraying

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	1	91	92
Evaluation operations	4	196	200
Administrative and other	2	39	41
Transport	-	62	62
Total	7	388	395

TRANSPORT FACILITIES

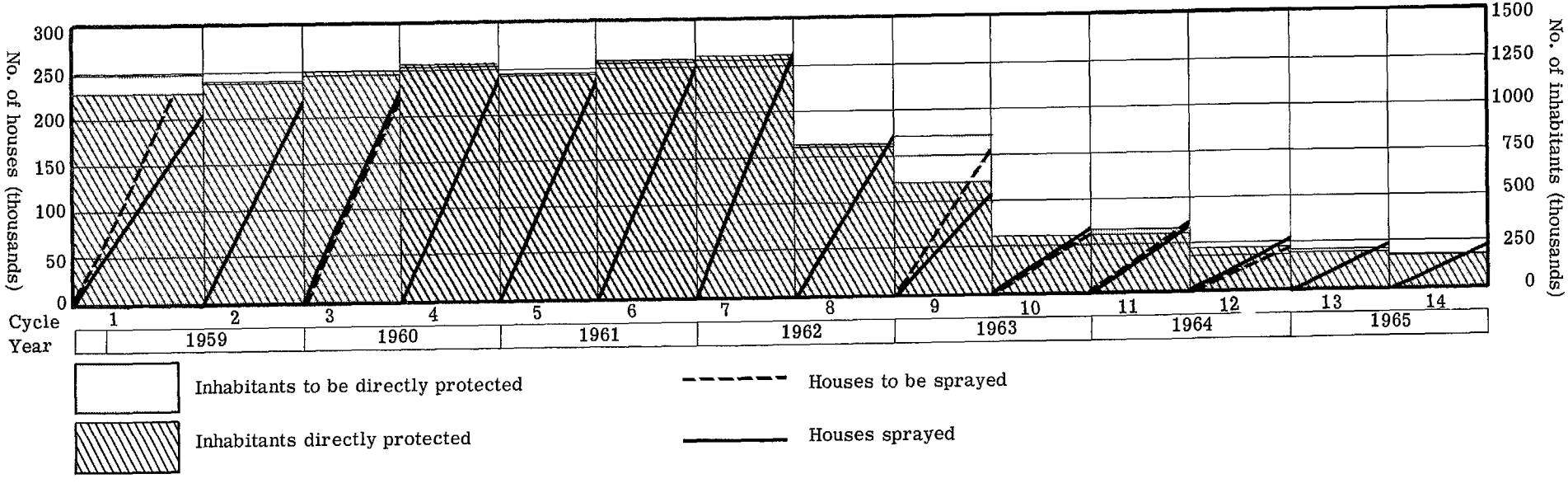
Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	21	35	1	57
Two-wheel vehicles	-	-	-	-
Boats	11	-	-	11
Animals	-	-	-	-
Other	-	-	-	-
Total	32	35	1	68

NICARAGUA (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Malathion							
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	Malathion	
1st	Nov. 58-Dec. 59	1st 2nd	223 220 218 312	205 930 218 645	-	-	-	1 244 452 1 202 244	1 148 052 1 204 139	401 325	-	9.2 10.3
2nd	Jan. 60-Dec. 60	3rd 4th	226 831 237 553	230 478 239 076	-	-	-	1 232 373 1 275 185	1 252 160 1 283 375	367 396	-	9.4 8.9
3rd	Jan. 61-Dec. 61	5th 6th	237 062 248 739	239 375 249 068	-	-	- 2 469	1 244 338 1 276 530	1 256 399 1 290 900	403 396	- 410	9.5 9.2
4th	Jan. 62-Dec. 62	7th 8th	259 760 163 746	259 743 164 623	(a)	... 5 372	5 079 5 710	1 289 708 821 913	1 314 866 827 823	409 440	309 399	9.6 9.3
5th	Jan. 63-Dec. 63	9th 10th	170 580 55 574	115 023 59 876	(a)	5 958 9 320	11 460 11 356	863 624 279 693	618 699 306 925	465 471	420 439	9.0 9.0
6th	Jan. 64-Dec. 64	11th 12th	65 151 34 068	55 884 37 139	(a)	9 445 11 375	12 098 16 925	337 690 187 480	307 741 223 046	491 493	473 409	8.3 7.7
7th	Jan. 65-Dec. 65	13th 14th	32 752 33 124	33 998 30 010	(a)	14 817 11 343	12 653 14 953	206 178 189 793	202 201 191 910	476 436	429 425	7.9 8.5

(a) The date of the cycles of malathion are in agreement with the cycles of DDT, although the malathion cycles are of four months.



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1958	23 982	890	3.7	...	...	...
1959	38 966	1 875	4.8	619	1 256	-
1960	74 074	7 528	10.2	4 217	3 311	-
1961	109 293	8 722	8.0	3 001	5 721	-
1962	162 733	11 200	6.9	3 428	7 772	-
1963	152 339	10 593	6.9	2 742	7 851	-
1964	173 068	11 197	6.5	2 403	8 794	-
1965	167 589	8 670	5.2	883	7 787	-

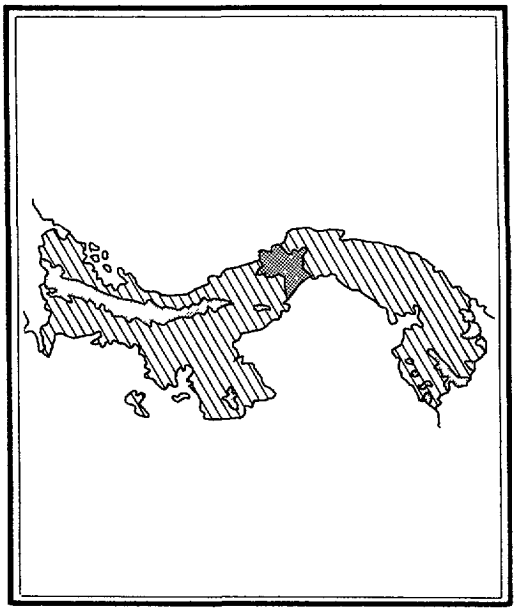
CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1962	3rd	515	9 463	7.3	41	8	6	-	20	-	1	6	10	30	1
	4th		9 531	7.4	118	49	7	-	30	-	-	32	16	102	-
1963	1st	533	8 974	6.7	52	7	1	-	28	-	2	14	9	43	-
	2nd		10 731	8.0	110	10	11	-	26	-	-	63	19	91	-
	3rd	668	21 869	13.1	385	169	15	-	78	1	-	122	278	107	-
	4th		20 937	12.5	419	308	12	-	98	-	1	-	172	247	-
1964	1st	695	17 564	10.1	343	200	33	-	45	-	-	65	169	174	-
	2nd		19 395	11.2	362	105	27	-	84	-	-	146	101	261	-
	3rd		21 520	12.4	527	143	42	-	86	1	-	255	87	440	-
	4th		16 064	9.2	587	206	38	-	149	-	1	193	149	438	-
1965	1st	730	18 122	9.9	422	268	25	-	108	-	5	16	75	347	-
	2nd		17 443	9.6	393	121	7	-	131	-	1	133	44	349	-
	3rd		15 067	8.3	347	79	94	-	140	-	-	34	18	329	-
	4th		18 310	10.0	443	100	95	-	79	-	-	169	17	426	-

Country: PANAMA

Date attack phase began: 19 August 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	1 244	75 650
Non malarious areas	50	5 810
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	0	0
Attack phase	1 194	69 840
Preparatory phase	0	0
Total originally malarious areas	1 194	69 840

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	272	272
Evaluation operations	3	42	45
Administrative and other	1	33	34
Transport	-	11	11
Total	4	358	362

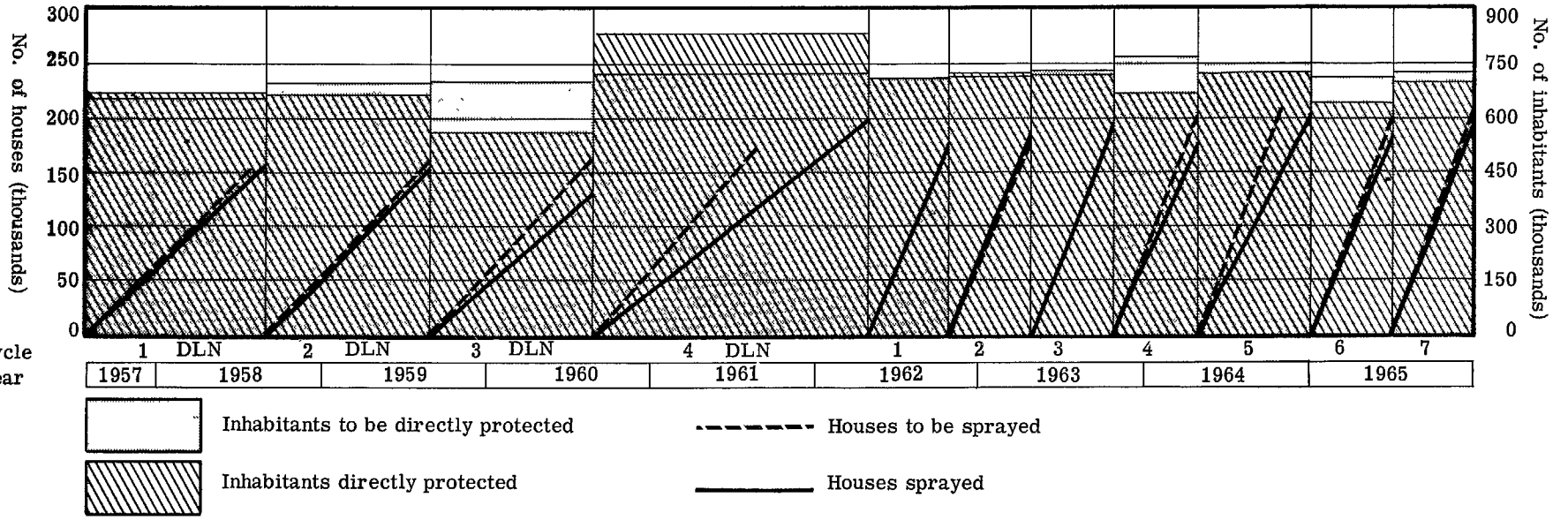
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	55	21	4	80
Two-wheel vehicles	-	11	-	11
Boats	9	1	-	10
Animals	-	-	-	-
Other	-	-	-	-
Total	64	33	4	101

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin							
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	Dieldrin	
1st	Aug. 57-Aug. 58	-	-	-	1st	152 957	155 963	659 856 a)	671 824 a)	-	119	6.5
2nd	Sep. 58-Aug. 59	-	-	-	2nd	161 700	154 638	697 574	667 095	-	145	6.9
3rd	Sep. 59-Aug. 60	-	-	-	3rd	165 102	131 270	707 462	562 514	-	129	7.3
4th	Sep. 60-Apr. 62	-	-	-	4th	172 121	199 265	722 392	836 229	-	138	6.8
5th	May 62-Apr. 63	1st 2nd	175 622 182 784	174 779 184 355	-	(b)	1 101c) 1 192c)	710 918 714 320	711 983 726 944	490 510	63 103	8.1 8.8
6th	May 63-Apr. 64	3rd 4th	197 379 205 165	193 960 176 912	-	(b)	1 024c) 1 268c)	733 060 771 827	724 166 670 310	477 455	77 71	8.9 9.3
7th	May 64-Jun. 65	5th 6th	209 126 206 495	201 976 183 650	-	(b) 1 332	1 078 c) 1 867 c)	750 420 724 990	728 633 647 164	440 421	77 77	9.0 9.0
8th	Jul. 65-Dec. 65	7th	205 050	196 902	-	1 105	1 133c)	730 020	701 266	421	73	8.8

(a) Estimated. (b) Included in DDT column. (c) Sprayed twice a year with 0.3 g/m^2.



PANAMA (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

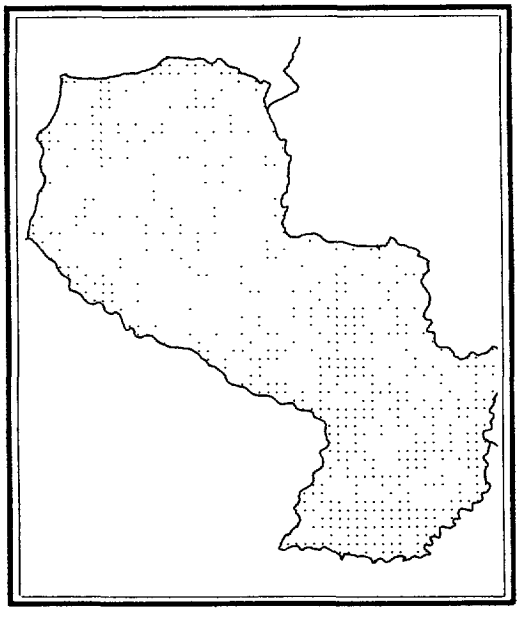
Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1957 a)	18 181	1 162	6.4	545	...	...
1958	91 933	6 067	6.6	1 461	4 537	69
1959	78 661	5 017	6.4	620	4 395	2
1960	77 099	4 463	5.8	670	3 792	1
1961	88 961	3 911	4.4	1 378	2 531	2
1962	145 012	3 249	2.2	631	2 618	-
1963	152 898	2 670	1.7	236	2 433	1
1964	131 887	1 804	1.4	101	1 703	-
1965	102 969	1 929	1.9	172	1 757	-

(a) August-December

Country: PARAGUAY

Date attack phase began: _____

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	2 144	406 752
Non malarious areas	363	162
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	0	0
Attack phase	0	0
Preparatory phase	1 781	406 590
Total originally malarious areas	1 781	406 590

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	2	21	23
Evaluation operations	5	52	57
Administrative and other	1	...	1
Transport	...	...	...
Total	8	73	81

TRANSPORT FACILITIES

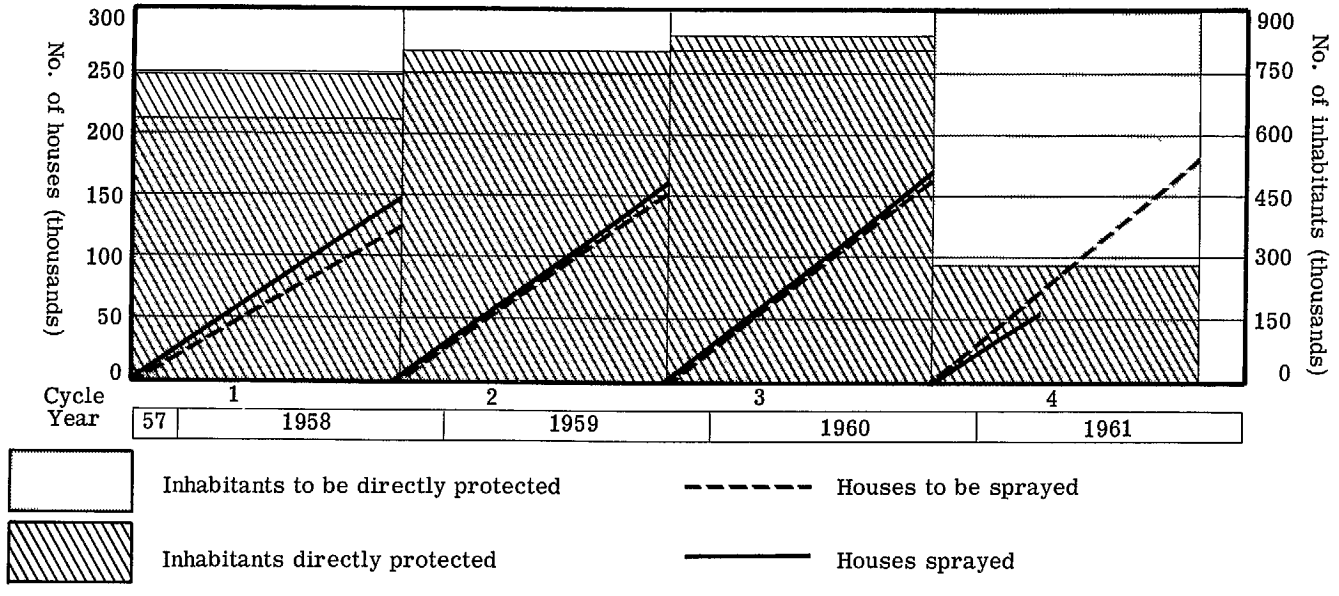
Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	10	4	13	27
Two-wheel vehicles	3	-	2	5
Boats	2	2	10	14
Animals	10	2	-	12
Other	-	-	-	-
Total	25	8	25	58

PARAGUAY (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle Dieldrin	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) Dieldrin	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Nov. 57-Oct. 58	1st	126 902	148 626	638 190	747 541	105	10.9
2nd	Nov. 58-Oct. 59	2nd	150 033	161 261	749 115	805 232	111	14.3
3rd	Nov. 59-Oct. 60	3rd	163 586	171 086	807 460	844 515	118	11.7
4th a)	Nov. 60-Mar. 61	4th a)	181 097	56 656	898 060	280 982	138	8.1
(b)	Jan. 65-May 65	-	-	5 631	-	27 213	129	6.6

(a) Program suspended, new program being planned. (b) Emergency spraying.



PARAGUAY (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1958	14 359	526	3.7	...	...	...
1959	11 379	641	5.6	1	640	-
1960	47 045	1 165	2.4	5	1 159	1
1961	27 995	1 528	5.5	9	1 519	-
1962	48 184	5 756	11.9	313	5 443	-
1963	92 806	3 443	3.7	313	3 130	-
1964	103 169	8 851	8.6	961	7 889	1
1965 a)	77 933	6 189	7.9	114	6 074	1

(a) January-November.

Country: PERU

Date attack phase began: 17 November 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1965

	Population (thousands)	Area km^2
TOTAL COUNTRY	11 107	1 381 800
Non malarious areas	7 228	438 600
Originally malarious areas		
Maintenance phase	46	31 000
Consolidation phase	2 334	268 200
Attack phase	1 499	644 000
Preparatory phase	0	0
Total originally malarious areas	3 879	943 200

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	3	211	214
Evaluation operations	9	139	148
Administrative and other	3	115	118
Transport	-	49	49
Total	15	514	529

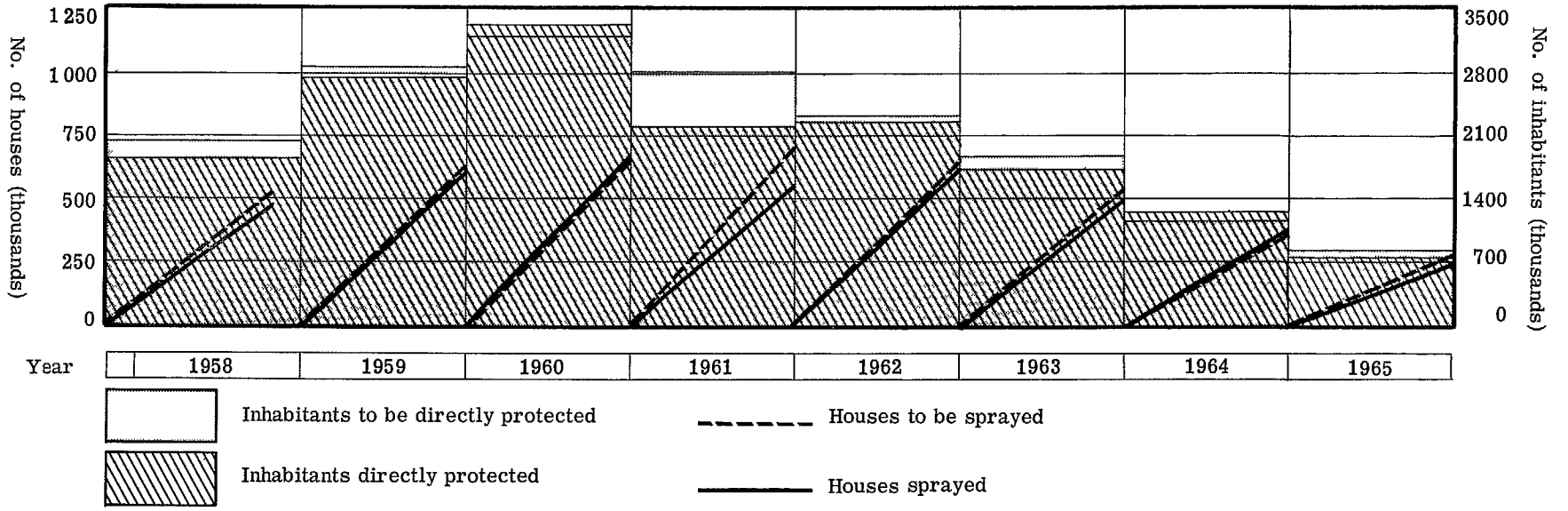
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	49	68	104	221
Two-wheel vehicles	-	-	1	1
Boats	102	-	-	102
Animals	-	-	-	-
Other	-	-	-	-
Total	151	68	105	324

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin							
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	Dieldrin	
1st	Nov. 57-Oct. 58	1st + 2nd	527 081	286 764[a] 79 266[b]	1st	(c)	122 120	2 054 035	1 867 208	426	115	7.8
2nd	Jan. 59-Dec. 59	(d)	637 241	271 065[e]	2nd	(c)	341 804	2 886 064	2 775 694	424	118	8.4
3rd	Jan. 60-Dec. 60	(d)	654 825	447 848 [e]	3rd	(c)	234 643	3 209 952	3 345 726	468	95	8.4
4th	Jan. 61-Dec. 61	(d)	714 740	534 037[e]	4th	(c)	25 005	2 826 797	2 210 988	410	109	7.9
5th	Jan. 62-Dec. 62	(d)	646 992	627 527[e]	-	-	-	2 354 405	2 283 960	465	-	8.7
6th	Jan. 63-Dec. 63	(d)	537 112	500 218[e]	-	-	-	1 885 800	1 756 286	459	-	8.1
7th	Jan. 64-Dec. 64	(d)	357 805	379 184[e]	-	-	-	1 182 617	1 253 290	473	-	7.9
8th	Jan. 65-Dec. 65	(d)	264 319	240 003[e]	-	-	-	860 017	780 901	507	-	7.2

(a) Sprayed once a year. (b) Sprayed twice a year. (c) Owing to different spray cycle timing in different regions, these data refer to the calendar year.
(e) Sprayings.



PERU (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1958 a)	...	649 b)	...	77	526	27
1959	148 413	4 658 b)	3.1	302	4 265	51
1960	342 503	3 901	1.1	256	3 559	86
1961	403 748	3 055	0.8	185	2 804	66
1962	399 309	2 196	0.6	81	2 035	80
1963	313 649	1 630	0.5	101	1 389	140
1964	308 283	1 613	0.5	301	1 222	90
1965	280 449	1 508	0.5	113	1 315	80

CONSOLIDATION PHASE AREAS

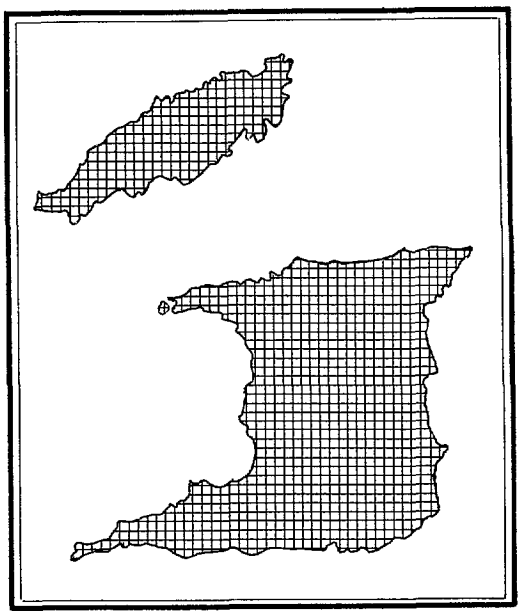
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1959	1-4	14	1 378	9.8	-	-	-	-	-	-	-	-	-	-	-
1960	1-4	15	7 277	48.5	5	-	-	1	-	4	-	-	-	1	4
1961	1-4	47	13 780	29.3	1	-	-	-	1	-	-	-	-	-	-
1962	1-4	864	71 330	8.3	20	2	1	1	12	4	-	-	1	16	3
1963	1-4	2 199	168 727	7.7	87	13	6	5	51	3	-	9	-	83	4
1964	1-4	2 204	186 205	8.4	321	209	45	-	25	2	3	37	1	316	4
1965	1-4	2 334	165 388	7.1	367	209	50	1	6	1	-	100	13	349	5
MAINTENANCE PHASE AREAS															
1963	1-4	43	8 581	20.0	4	-	-	1	1	2	-	-	-	2	2
1964	1-4	43	8 256	19.2	-	-	-	-	-	-	-	-	-	-	-
1965	1-4	46	6 260	13.6	2	-	-	-	-	2	-	-	-	-	2

(a) November 1957-October 1958. (b) Includes undifferentiated mixed infections.

Country: TRINIDAD AND TOBAGO

Date attack phase began: 2 January 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	990	5 605
Non malarious areas	144	161
Originally malarious areas		
Maintenance phase	846	5 444
Consolidation phase	0	0
Attack phase	0	0
Preparatory phase	0	0
Total originally malarious areas	846	5 444

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	17	17
Evaluation operations	2	140	142
Administrative and other	-	-	-
Transport	-	27	27
Total	2	184	186

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	3	11	15	29
Two-wheel vehicles	-	-	-	-
Boats	-	-	1	1
Animals	-	-	-	-
Other	-	-	-	-
Total	3	11	16	30

TRINIDAD AND TOBAGO (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1958	51 159	374	0.7	316	58	-
1959	101 039	92	0.1	63	28	1
1960	91 388	11	0.01	9	2	-
1961	89 569	-	-	-	-	-

CONSOLIDATION PHASE AREAS

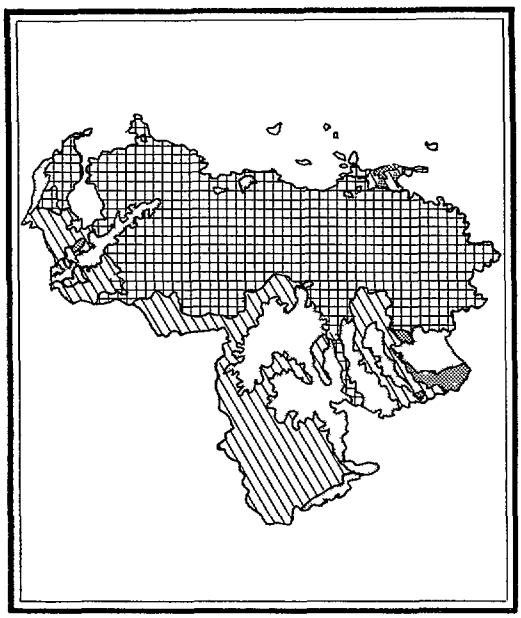
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1958	1-4	160	21 279	13.2	2	-	-	2	-	-	-	-	2	-	-
1959	1-4	160	361	0.2	5	-	-	5	-	-	-	-	4	1	-
1960	1-4	185	17 612	9.5	2	-	-	2	-	-	-	-	1	1	-
1961	1-4	197	11 602	5.9	1	-	-	1	-	-	-	-	1	-	-
1962	1-4	877	120 967	13.8	1	-	-	1	-	-	-	-	-	1	-
1963	1-4	828	108 388	13.1	-	-	-	-	-	-	-	-	-	-	-
1964	1-4	822	82 038	10.0	3	-	1	2	-	-	-	-	-	1	2
MAINTENANCE PHASE AREAS															
1965[a]	1-4	846	58 922	7.6	2	-	-	2	-	-	-	-	2	-	-

(a) January-November.

Country: VENEZUELA

Date attack phase began: 1945

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	8 579	912 050
Non malarious areas	2 177	312 050
Originally malarious areas		
Maintenance phase	6 028	469 714
Consolidation phase	132	7 896
Attack phase	242	122 390
Preparatory phase	0	0
Total originally malarious areas	6 402	600 000

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	1	443	444
Evaluation operations	19	677 (8)	696 (8)
Administrative and other	...	...	...
Transport	-	43	43
Total	20	1 163 (8)	1 183 (8)

TRANSPORT FACILITIES

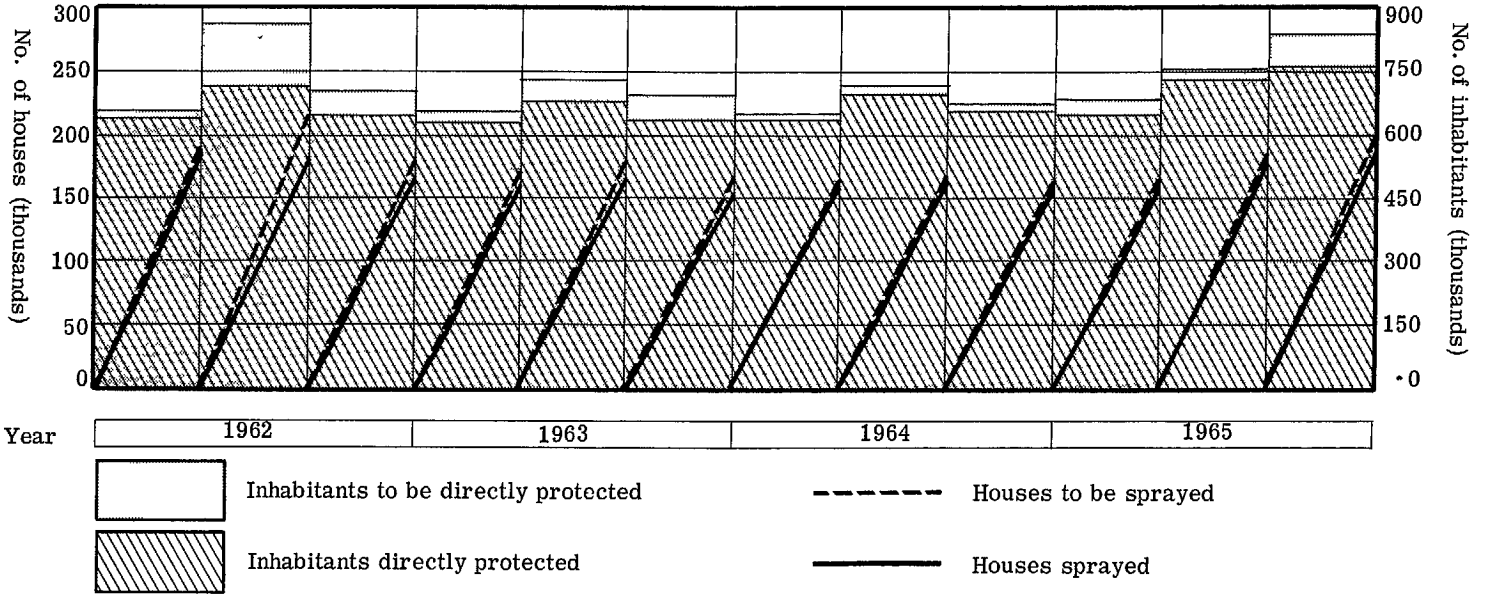
Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	106	100	42	248
Two-wheel vehicles	16	315	-	331
Boats	36	77	11	124
Animals	228	335	-	563
Other	43	-	-	43
Total	429	827	53	1 309

VENEZUELA (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin							
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	Dieldrin	
...	Jan. 62-Dec. 62	...	189 083	170 848	...	(a)	3 381 13 125 b)	712 276	643 634	422	198 173 b)	6.3
		...	220 919	175 962	...	(a)	1 100 5 704 b)	877 711	726 147	340	210 148 b)	6.5
		...	185 755	163 477	...	(a)	1 595 4 877 b)	715 343	654 399	332	247 126 b)	7.0
...	Jan. 63-Dec. 63	...	177 294	158 263	...	(a)	789 151 b)	712 190	639 525	359	198 182 b)	7.0
		...	179 385	163 952	...	(a)	870 1 161 b)	739 963	684 615	376	322 187 b)	7.0
		...	169 947	153 538	...	(a)	773 368 b)	703 241	640 057	370	303 163 b)	7.0
...	Jan. 64-Dec. 64	...	165 656	160 867 c)	...	(a)	(a)	659 840 d)	640 780	373	...	7.4
		...	174 388	169 599 c)	...	(a)	(a)	727 564 d)	707 599	391	...	7.5
		...	165 206	160 418 c)	...	(a)	(a)	681 949 d)	662 186	389	...	7.0
...	Jan. 65-Dec. 65	...	167 200 d)	159 854 c)	...	-	-	685 352 d)	655 241	394	-	7.0
		...	185 950 d)	177 758 c)	...	-	-	762 209 d)	728 630			
		...	200 068	185 004 c)	...	-	-	832 202	769 558	449.5	-	7.0

(a) Included in DDT column. (b) BHC. (c) Includes some houses sprayed with BHC or lindane. (d) Estimated.



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1958	269 448	975 a)	0.4	60	901	4
1959	232 710	765 a)	0.3	92	646	14
1960	247 429	1 346 a)	0.5	165	1 163	6
1961	230 336	1 175 a)	0.5	68	1 075	21
1962	172 280	883 b)	0.5	53	812	14
1963	153 406	2 194 b)	1.4	80	2 083	20
1964	141 977	3 948 b)	2.8	451	3 486	4
1965 c)	129 271	2 057	1.6	82	1 973	2

CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1958	1-4	469	69 614	14.8	50	-	-	27		-	23	-	2	46	2
1959	1-4	685	101 878	14.9	45	-	-	37		1	7	-	2	43	-
1960	1-4	291	93 047	32.0	112 a)	-	2	31	45	1	33	-	-	108	2
1961	1-4	174	64 923	37.3	57	-	4	15	9	-	29	-	-	57	-
1962	1-4	150	93 646	62.4	74 a)	-	1	29	7	-	37	-	22	51	-
1963	1-4	102	61 724	60.5	89 a)	-	-	32	7	-	50	-	26	62	-
1964	1-4	99	58 605	59.2	74	-	-	15	9	-	50	-	-	74	-
1965	1-3	132	41 227	41.6	20	-	-	11	3	-	6	-	10	10	-

(a) Includes undifferentiated mixed infections. (b) Includes undifferentiated mixed infections and unclassified species of parasites.
(c) January-September.

VENEZUELA (Cont.)

MAINTENANCE AND NON-MALARIOUS AREAS

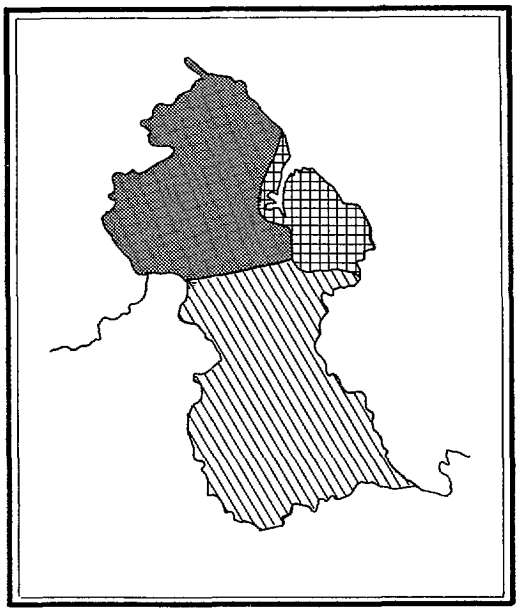
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
								Imported							
Year	Quarter					Autochthonous	Relapsing	from abroad	from areas within country	Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
1958	1-4	4 720	145 654	3.1	113 a)	-	-	79		5	28	1	6	100	6
1959	1-4	5 097	169 189	3.3	101 a)	-	-	87		6	7	1	14	73	9
1960	1-4	6 092	224 193	3.7	216 a)	-	6	44	92	4	70	-	14	197	4
1961	1-4	7 111	305 252	4.3	522 a)	-	11	52	122	4	333	-	13	498	5
1962	1-4	7 410	282 314	3.8	253 a)	-	5	52	84	2	110	-	5	244	3
1963	1-4	7 701	284 814	3.7	570	-	-	79	286	3	202	-	6	562	2
1964	1-4	7 973	317 731	4.0	1 862 a)	(b)	1 b)	180 b)	1 076 b)	1 b)	339 b)	-	12	1 846	2
1965	1-3	8 205	236 588	3.8	1 875	-	-	81	805	5	984	-	70	1 780	25

(a) Includes undifferentiated mixed infections. (b) Maintenance phase only.

Country: BRITISH GUIANA

Date attack phase began: April 1946

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	638	214 970
Non malarious areas	0	27 636 a)
Originally malarious areas		
Maintenance phase	602	28 515
Consolidation phase	26	77 467
Attack phase	10	81 352
Preparatory phase	0	0
Total originally malarious areas	638	187 334

a) Uninhabited area.

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	26	26
Evaluation operations	(1)	24 (3)	24 (4)
Administrative and other	-	29	29
Transport	-	12	12
Total	(1)	91 (3)	91 (4)

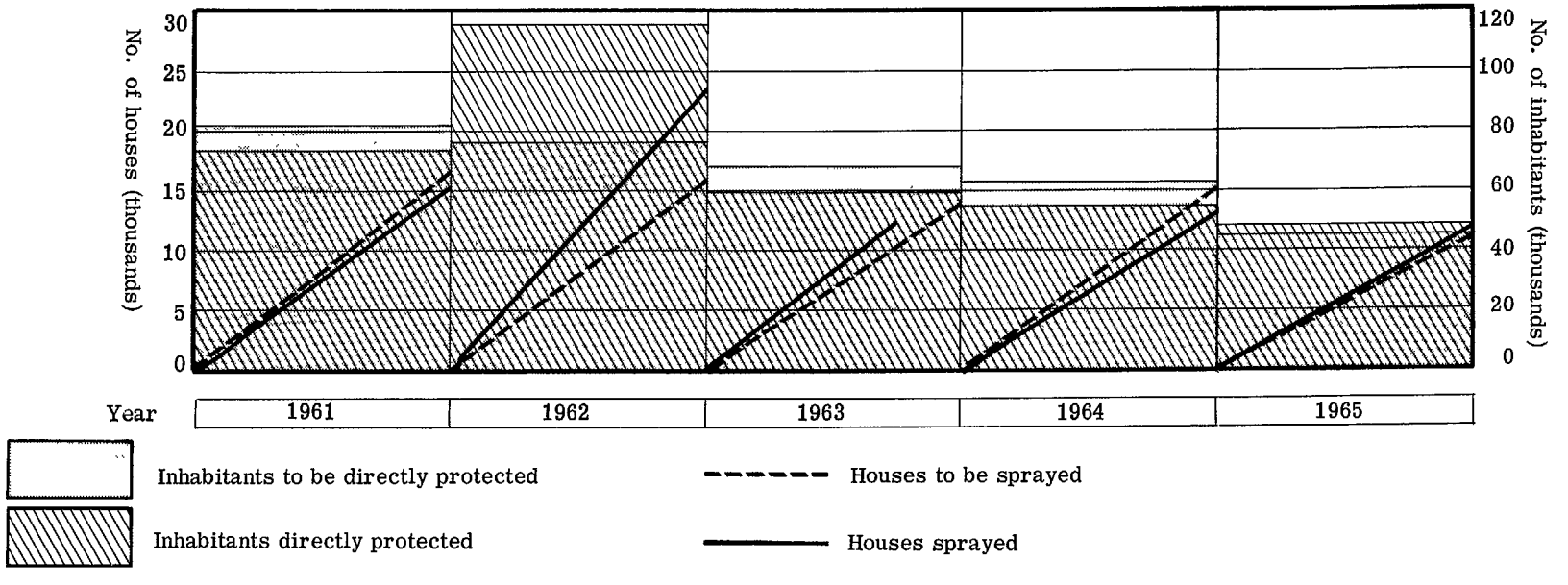
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	2	4	1	7
Two-wheel vehicles	-	-	-	-
Boats	1	3	-	4
Animals	7	-	-	7
Other	-	-	-	-
Total	10	7	1	18

BRITISH GUIANA (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed with DDT						Inhabitants directly protected		Insecticide used per house (g. technical)	Average houses sprayed per spray-man/day
		Once a year			Twice a year						
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	
...	Jan. 61-Dec. 61	...	16 538	15 107	-	-	-	82 062	74 964	195	4.6
...	Jan. 62-Dec. 62	...	9 542	10 273	...	6 131	13 535	76 563	116 305	183	8.3
...	Jan. 63-Sep. 63	...	6 726	4 270	...	7 218	7 961	68 123	59 542	346	7.3
...	Jan. 64-Dec. 64	...	6 563	5 408	...	4 236 4 236	5 280 2 384	63 243	54 986	295	4.3
...	Jan. 65-Dec. 65	...	6 358	4 631	...	2 341 2 341	2 759 4 001	46 000	47 467	227	4.6



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1958	1 520	51	3.34	23	8	20
1959	3 754	176 a)	4.68	53	100	13
1960	3 674	263	7.16	175	67	12
1961	15 515	218	1.40	57	156	5
1962	14 358	425	2.96	266	159	-
1963	16 780	473 a)	2.81	414	56	-
1964	35 091	223	0.64	190	33	-
1965	22 950	25	0.11	24	1	-

CONSOLIDATION PHASE AREAS

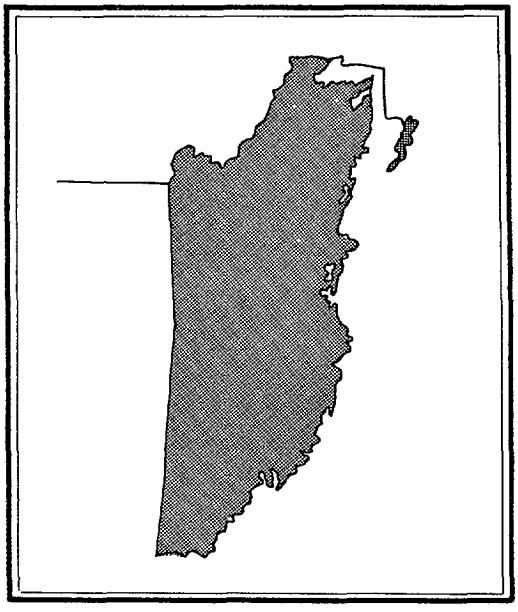
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1965	1-4	26	15 500	59.6	1	1	-	-	-	-	-	-	-	1	-
MAINTENANCE PHASE AREAS															
1958	1-4	430	1	0.0	-	-	-	-	-	-	-	-	-	-	-
1959	1-4	460	-	0	-	-	-	-	-	-	-	-	-	-	-
1960	1-4	494	-	0	-	-	-	-	-	-	-	-	-	-	-
1961	1-4	515	1 374	0.3	13	-	-	1	12	-	-	-	1	12	-
1962	1-4	556	21 088	3.8	21	17	3	-	1	-	-	-	-	21	-
1963	1-4	572	15 475	2.7	3	-	2	1	-	-	-	-	1	2	-
1964	1-4	589	20 094	3.4	2	-	-	2	-	-	-	-	2	-	-
1965	1-4	602	23 057	3.8	2	-	-	1	-	-	1	-	2	-	-

(a) Includes undifferentiated mixed infections.

Country: BRITISH HONDURAS

Date attack phase began: 4 February 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	105	22 696
Non malarious areas	0	0
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	105	22 696
Attack phase	0	0
Preparatory phase	0	0
Total originally malarious areas	105	22 696

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	-	-
Evaluation operations	1	12	13
Administrative and other	-	5	5
Transport	-	2	2
Total	1	19	20

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	2	8	1	11
Two-wheel vehicles	-	3	-	3
Boats	1	4	-	5
Animals	-	-	-	-
Other	-	-	-	-
Total	3	15	1	19

BRITISH HONDURAS (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1957	1 950	234	12.0	137	52	45
1958	4 374	288	6.6	117	147	24
1959	11 307	1 019	9.0	712	211	96
1960	13 307	196	1.5	55	138	3
1961	12 355	23	0.2	1	22	-
1962	7 895	2	0.03	-	2	-

CONSOLIDATION PHASE AREAS

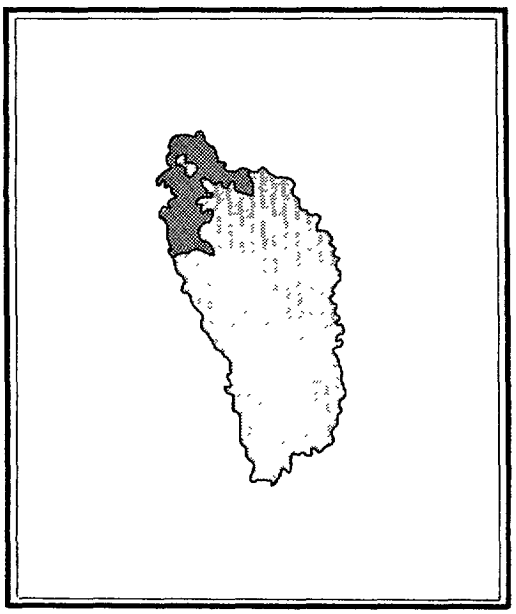
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1962	3rd[a]	100	3 004	18.0	14	6	7	1	-	-	-	-	-	14	-
	4th		3 657	14.6	4	4	-	-	-	-	-	-	-	4	-
1963	1st	100	3 284	13.1	2	2	-	-	-	-	-	-	-	2	-
	2nd		2 622	10.5	2	2	-	-	-	-	-	-	-	2	-
	3rd		3 114	12.5	-	-	-	-	-	-	-	-	-	-	-
	4th		4 065	16.3	13	13	-	-	-	-	-	-	-	13	-
1964	1st	104	3 439	13.2	7	7	-	-	-	-	-	-	-	7	-
	2nd		2 706	10.4	2	2	-	-	-	-	-	-	-	2	-
	3rd		3 173	12.2	18	16	1	1	-	-	-	-	-	18	-
	4th		2 508	9.6	8	7	1	-	-	-	-	-	-	8	-
1965	1st	105	2 298	8.8	1	1	-	-	-	-	-	-	-	1	-
	2nd		1 672	6.4	17	14	-	1	-	-	-	2	14	3	-
	3rd		3 430	13.1	155	154	-	1	-	-	-	-	149	6	-
	4th		3 387	12.9	33	31	-	2	-	-	-	-	25	8	-

(a) August-September.

Country: DOMINICA

Date attack phase began: 8 June 1959

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	64	790
Non malarious areas	49	638
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	15	152
Attack phase	0	0
Preparatory phase	0	0
Total originally malarious areas	15	152

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	-	-
Evaluation operations	(1)	6	6 (1)
Administrative and other	-	2	2
Transport	-	-	-
Total	(1)	8	8 (1)

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	-	2	-	2
Two-wheel vehicles	-	4	-	4
Boats	-	-	-	-
Animals	-	-	-	-
Other	-	-	-	-
Total	-	6	-	6

DOMINICA (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1959[a]	2801	46	1.6	46	-	-
1960	6151	6	0.1	6	-	-
1961	10113	3	0.0	1	-	2
1962	13373	-	-	-	-	-

CONSOLIDATION PHASE AREAS

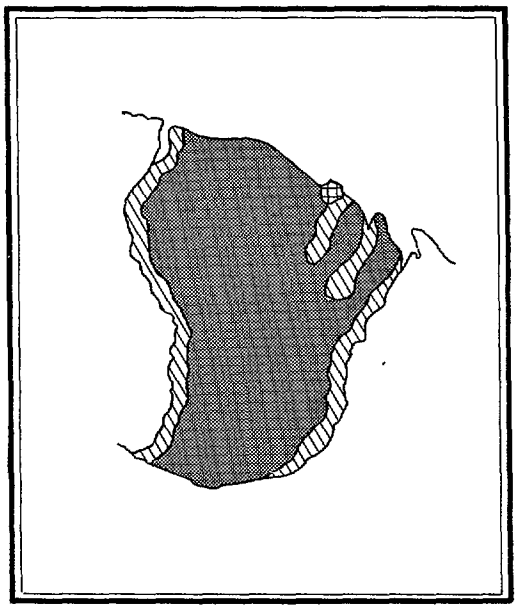
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1963	1st	14	4093	116.9	-	-	-	-	-	-	-	-	-	-	-
	2nd		4441	126.9	-	-	-	-	-	-	-	-	-	-	-
	3rd		3648	104.2	-	-	-	-	-	-	-	-	-	-	-
	4th		4593	131.2	-	-	-	-	-	-	-	-	-	-	-
1964	1st	14	4663	133.2	-	-	-	-	-	-	-	-	-	-	-
	2nd		4057	115.9	-	-	-	-	-	-	-	-	-	-	-
	3rd		3506	100.2	-	-	-	-	-	-	-	-	-	-	-
	4th		3928	112.2	-	-	-	-	-	-	-	-	-	-	-
1965	1st	15	918	24.5	-	-	-	-	-	-	-	-	-	-	-
	2nd		3491	93.1	-	-	-	-	-	-	-	-	-	-	-
	3rd		2147	57.2	-	-	-	-	-	-	-	-	-	-	-
	4th		3338	89.0	-	-	-	-	-	-	-	-	-	-	-

(a) June-December.

Country: FRENCH GUIANA

Date attack phase began: May 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	38	86 000
Non malarious areas	0	54 000
Originally malarious areas		
Maintenance phase	24	200
Consolidation phase	11	24 396
Attack phase	3	7 404
Preparatory phase	0	0
Total originally malarious areas	38	32 000

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	29	29
Evaluation operations	1	3	4
Administrative and other	-	3	3
Transport	-	6	6
Total	1	41	42

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	7	-	-	7
Two-wheel vehicles	2	-	-	2
Boats	8	-	-	8
Animals	-	-	-	-
Other	-	-	-	-
Total	17	-	-	17

FRENCH GUIANA (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin							
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	Dieldrin	
...	Jan. 64-Dec. 64	...	2 137	1 972	...	8 912	2 326 a)	37 915	14 762	330	...	...
...	Jan. 65-Dec. 65	...	2 127	1 246	...	8 912	7 318 a)	...	...	253	...	...

(a) Includes houses sprayed with DDT once a year, malathion and actidrine.

FRENCH GUIANA (Cont.)

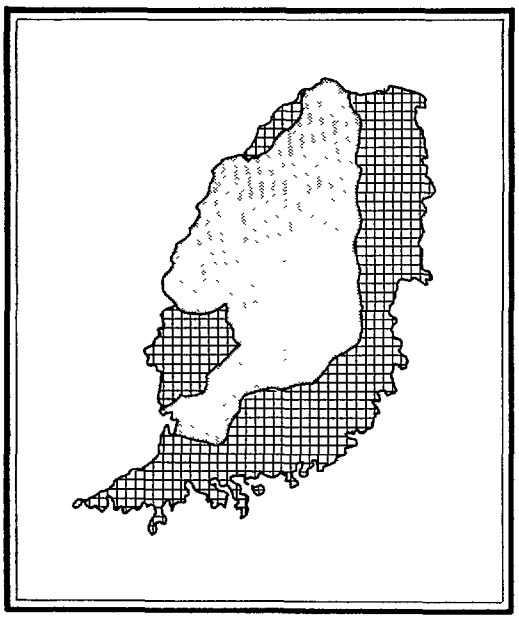
EPIDEMIOLOGICAL EVALUATION OPERATIONS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1960	3 343	37	1.1	30	6	1
1961	1 197	33	2.8	33	-	-
1962	2 183	70	3.2	60	10	-
1963	2 648	70	2.6	61	9	-
1964	3 025	48	1.6	16	32	-
1965	5 424	22	0.4	15	7	-

Country: GRENADA AND CARRIACOU

Date attack phase began: 12 February 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



(Island of Carriacou in Maintenance phase not shown in the Map)

	Population (thousands)	Area km^2
TOTAL COUNTRY	93	344
Non malarious areas	61	114
Originally malarious areas		
Maintenance phase	32	230
Consolidation phase	0	0
Attack phase	0	0
Preparatory phase	0	0
Total originally malarious areas	32	230

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	-	-
Evaluation operations	-	25 (2)	25 (2)
Administrative and other	-	-	-
Transport	-	-	-
Total	-	25 (2)	25 (2)

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	-	-	-	-
Two-wheel vehicles	-	1	-	1
Boats	-	-	-	-
Animals	-	-	-	-
Other	-	-	-	-
Total	-	1	-	1

GRENADA AND CARRIACOU (Cont.)

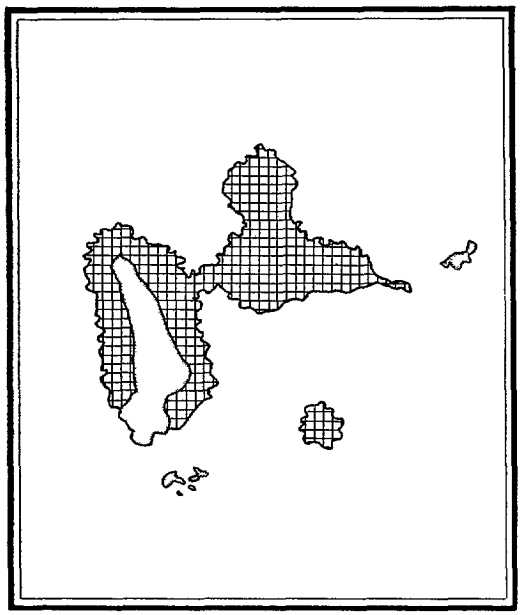
EPIDEMIOLOGICAL EVALUATION OPERATIONS, MAINTENANCE PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1962	1 - 4	37	1 996	5.4	-	-	-	-	-	-	-	-	-	-	-
1963	1 - 3	37	56	0.2	-	-	-	-	-	-	-	-	-	-	-
1964	1 - 4	39	517	1.3	-	-	-	-	-	-	-	-	-	-	-
1965	1 - 4	32	1 085	3.4	-	-	-	-	-	-	-	-	-	-	-

Country: GUADELOUPE

Date attack phase began: July 1956

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	300	1779
Non malarious areas	33	643
Originally malarious areas		
Maintenance phase	267	1136
Consolidation phase	0	0
Attack phase	0	0
Preparatory phase	0	0
Total originally malarious areas	267	1136

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	51	51
Evaluation operations	1 (2)	9 (42)	10 (44)
Administrative and other	-	3	3
Transport	-	7	7
Total	1 (2)	70 (42)	71 (44)

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	5	5	1	11
Two-wheel vehicles	-	-	-	-
Boats	-	-	-	-
Animals	-	-	-	-
Other	-	-	-	-
Total	5	5	1	11

GUADELOUPE (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1958	1 150	3	0.26	-	-	3
1959	3 903	-	0	-	-	-
1960 a)	4 450	2	0.04	...	...	...

CONSOLIDATION PHASE AREAS

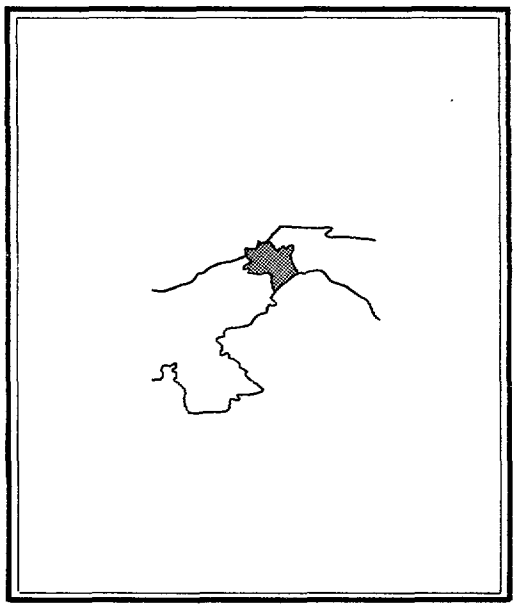
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1958	1-4	129	4 887	3.8	-	-	-	-	-	-	-	-	-	-	-
1959	1-4	133	3 691	4.8	-	-	-	-	-	-	-	-	-	-	-
1960	1-3	145	7 080	4.9	-	-	-	-	-	-	-	-	-	-	-
1961	1-4	186	11 857	6.4	-	-	-	-	-	-	-	-	-	-	-
1962	1-4	66	11 196	17.0	-	-	-	-	-	-	-	-	-	-	-
MAINTENANCE PHASE AREAS															
1961	1-4	58	2 407	4.1	-	-	-	-	-	-	-	-	-	-	-
1962	1-4	187	5 239	2.8	-	-	-	-	-	-	-	-	-	-	-
1963	1-3	260	17 170	8.8	1	-	-	1	-	-	-	-	-	-	-
1964	1-4	298 b)	21 831 c)	7.3	-	-	-	-	-	-	-	-	-	-	-
1965	1-4	300 b)	33 512 c)	11.2	-	-	-	-	-	-	-	-	-	-	-

(a) January-September. (b) Includes population of areas originally non-malarious. (c) Includes slides taken in non-malarious areas.

Country: PANAMA CANAL ZONE

Date attack phase began: 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	50	1432
Non malarious areas	0	0
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	49	1432
Attack phase	1	0
Preparatory phase	0	0
Total originally malarious areas	50	1432

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	(1)	(26)	(27)
Evaluation operations	(11)	(31)	(42)
Administrative and other	-	-	-
Transport	-	(4)	(4)
Total	(12)	(61)	(73)

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	2[a]	-	-	2[a]
Two-wheel vehicles	-	-	-	-
Boats	2[a]	-	-	2[a]
Animals	-	-	-	-
Other	-	-	-	-
Total	4	-	-	4

(a) Part-time

PANAMA CANAL ZONE (Cont.)

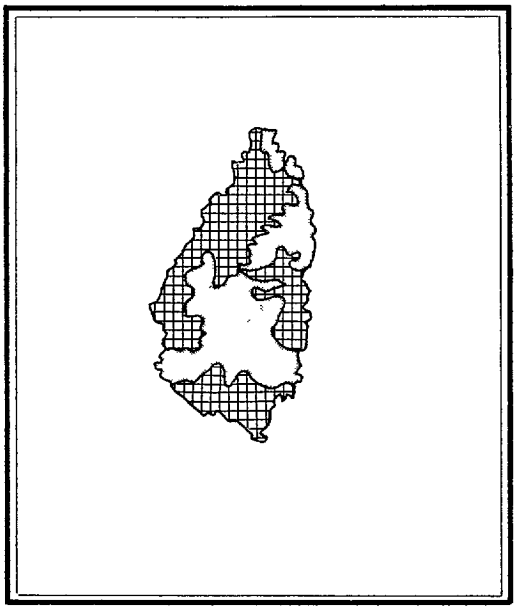
EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
								Imported							
Year	Quarter					Autochthonous	Relapsing	from abroad	from areas within country	Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
1960	1 - 4	41	2 656	6.5	27	27	-	-	-	-	-	-	3	24	-
1961	1 - 4	41	5 984	14.6	25	25	-	-	-	-	-	-	2	23	-
1962	1 - 4	44	677	1.5	18	18	-	-	-	-	-	-	-	18	-
1963	1 - 4	47	21 008	44.7	22	-	1	16	-	-	-	5	2	20	-
1964	1 - 4	50	26 228	52.5	21	7	3	1	10	-	-	-	-	21	-
1965	1-4	50	24 024	48.0	38	1	7	29	-	-	1	-	6	32	-

Country: ST. LUCIA

Date attack phase began: 16 January 1956

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	102	603
Non malarious areas	15	93
Originally malarious areas		
Maintenance phase	87	510
Consolidation phase	0	0
Attack phase	0	0
Preparatory phase	0	0
Total originally malarious areas	87	510

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	-	-
Evaluation operations	(1)	3 (2)	3(3)
Administrative and other	-	-	-
Transport	-	-	-
Total	(1)	3 (2)	3 (3)

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	-	-	-	-
Two-wheel vehicles	-	3	-	3
Boats	-	-	-	-
Animals	-	-	-	-
Other	-	-	-	-
Total	-	3	-	3

ST. LUCIA (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, MAINTENANCE PHASE AREAS

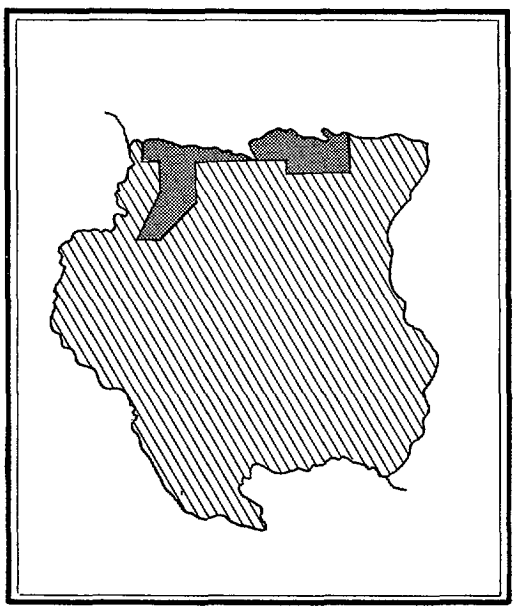
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled (annual rate)	Total No. of positive cases	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1962	4th	82	5 059	24.7	-	-	-	-	-	-	-	-	-	-	-
1963	1-4	82	15 136	18.5	7	2	2	-	-	-	-	3 a)	-	-	7
1964	1-4	84	13 368	15.9	4	-	4	-	-	-	-	-	-	-	4
1965	1-4	87	11 201	12.9	-	-	-	-	-	-	-	-	-	-	-

(a) Uncertain origin.

Country: SURINAM

Date attack phase began: 5 May 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1965



	Population (thousands)	Area km^2
TOTAL COUNTRY	328	163 820
Non malarious areas	128	70
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	134	5 600
Attack phase	66	158 150
Preparatory phase	0	0
Total originally malarious areas	200	163 750

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	52	52
Evaluation operations	1	37	38
Administrative and other	-	30	30
Transport	-	41	41
Total	1	160	161

TRANSPORT FACILITIES

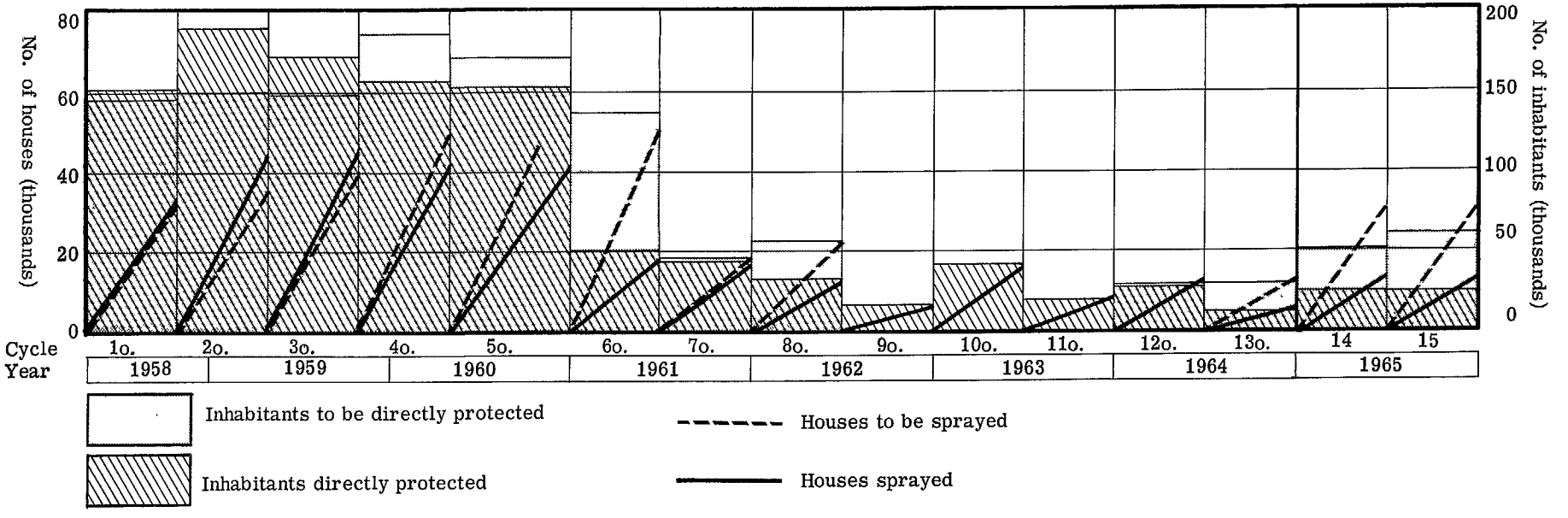
Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four-wheel vehicles	6	1	4	11
Two-wheel vehicles	-	10	-	10
Boats	15	5	3	23
Animals	-	-	-	-
Other	-	-	-	-
Total	21	16	7	44

SURINAM (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin							
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	Dieldrin	
1st	May 58-Apr. 59	1st	32 722	31 299	1st	(a)	2 554	147 314	152 422	310	58	5.8
		2nd	35 540	40 211		(a)	4 930	150 334	190 951	318	60	6.9
2nd	May 59-Apr. 60	3rd	39 683	37 563	2nd	(a)	8 342	149 287	172 694	274	58	8.0
		4th	50 024	37 445		(a)	4 713	187 640	158 143	250	57	7.8
3rd	May 60-Jun. 61	5th	46 537	36 861	3rd	(a)	4 571	172 233	153 687	263	65	6.2
		6th	50 652	16 298		(a)	2 187	138 229	50 462	211	56	6.0
4th	Jul. 61-Jun. 62	7th	18 485	15 533	-	-	1 320	47 746	43 526	211	54	5.7
		8th	22 351	12 984			-	57 732[b]	33 537[b]	-	-	...
5th	Jul. 62-Jun. 63	9th	...	6 397	-	-	-	...	16 523[b]	-	-	...
		10th	...	16 681				...	42 558			
6th	Jul. 63-Jun. 64	11th	...	8 458	-	-	-	...	19 164	-	-	...
		12th	12 824	5 603	1st	(a)	6 605	29 300	27 893	175	61	6.5
7th	Jul. 64-Jun. 65	13th	12 824	682	2nd	(a)	4 708	28 693	12 060	217	62	6.3
		14th	25 648	1 813	3rd	(a)	10 969	52 873	26 350	191	66	7.8
8th	Jul. 65-Dec. 65	15th	25 648	11 550	4th	(a)	(a)	58 279	25 260	...	...	...

(a) Included in DDT column. (b) Estimated.



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year	Slides examined			Species found		
	Total No.	Positive		P. falciparum	P. vivax	P. malariae
		Number	Percentage			
1958 a)	23 137	2 288	9.9	2 220	48	20
1959	46 687	2 703	5.8	2 343	30	330
1960	45 396	997	2.2	912	3	82
1961	21 530	620	2.9	573	-	47
1962	18 794	694	3.7	676	-	18
1963	28 835	1 849	6.4	1 817	7	25
1964	23 186	1 643	7.1	1 615	4	24
1965	27 378	4 237	15.5	4 213	7	17

CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands) (b)	No. of slides examined (c)	% of population sampled (annual rate)	Total No. of positive cases (c)	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	P. falciparum	P. vivax	P. malariae
								from abroad	from areas within country						
1961	1-4	225	14 894	6.6	26	-	-	-	26	-	-	-	23	-	3
1962	1-4	240	19 025	7.9	22	-	1	-	21	-	-	-	17	-	5
1963	1st	240	8 899	14.8	9	-	-	-	9	-	-	-	9	-	-
	2nd		11 054	18.4	4	-	-	-	4	-	-	-	3	-	1
	3rd		9 012	15.0	13	-	-	-	13	-	-	-	12	1	-
	4th		9 896	16.5	7	-	-	-	7	-	-	-	4	2	1
1964	1st	253	11 207	17.7	3	-	-	-	3	-	-	-	3	-	-
	2nd		13 444	21.3	6	-	-	-	6	-	-	-	5	-	1
	3rd		12 227	19.3	10	-	-	-	10	-	-	-	8	1	1
	4th		16 491	26.1	19	-	-	-	19	-	-	-	19	-	-
1965	1st	262	6 400	9.8	40	-	-	-	40	-	-	-	39	-	1
	2nd		2 841	4.3	16	-	-	-	16	-	-	-	15	-	1
	3rd		4 219	6.4	12	-	-	-	12	-	-	-	12	-	-
	4th		6 906	10.5	6	-	-	-	6	-	-	-	3	-	3

(a) May-December. (b) Includes the population of the city of Paramaribo, originally non-malarious area. (c) Includes slides taken and positives found in Paramaribo, originally non-malarious area.

III. SPECIAL TECHNICAL PROBLEMS

A. General

The year 1965 produced no new technical problems, and, except for drug resistance in Brazil, only minor changes in areas presenting technical problems. Since the nature of these problems and their extent have been fully described in recent annual reports, together with measures used to overcome them and the results achieved, the present report will deal with the changes in the area or the attack method used.

For the major problem areas, Mexico and Central America, little or no progress was made because financial difficulties prevented the application of supplementary attack methods on the scale necessary. In fact retrogression was noted in several programs which cut back their basic spray programs in order to expand mass distribution of drugs into more of the problem areas. This was especially noticeable in El Salvador where spraying was suspended in 1965. In spite of a late and scanty rainy season in the eastern portion of the country during 1965, when this portion was left unsprayed and unmedicated due to lack of funds, the incidence of malaria in this sector rose to the highest levels since the program started, and the total for the country reached 34,070 cases.

Other programs with problem areas showed little change in incidence because the changes in problems and programs were minor or offset each other.

B. The Status of Specific Problems

1. Physiological Resistance of Vectors

The main area of DDT resistance, i. e., that of A. albimanus in the Pacific coastal region of Central America, remained essentially unchanged. The areas with recent development of DDT resistance in western Guatemala showed trends to higher levels of resistance. The neighboring area in the southwest corner of Chiapas did not spread or change appreciably. Susceptibility tests done elsewhere in Mexico showed some survivors of the LC_{100} exposure to DDT in both A. albimanus and A. pseudopunctipennis, but in nearly every instance this was due to performance of the test at high temperature. Tests repeated later in the year in the same localities usually showed susceptibility. However, early DDT-resistance, as yet of little operational importance, was seen in a few localities in the state of Sinaloa and Guerrero in both species.

Evidence of DDT-resistance was discovered in A. albimanus in Cuba for the first time with up to 50 per cent survivors in the most resistant locality. This has not resulted in a problem area, however. The area of DDT resistant A. albimanus in the Dominican Republic increased in size, but the involved area remained free of malaria cases.

Resistance to dieldrin of a high order appeared for the first time in Costa Rica in a small area near the border with Nicaragua. The strain remains susceptible to DDT. The long use of DDT in house-spraying programs in Costa Rica (9 years) has not yet produced any recognized resistance in A. albimanus.

Dieldrin resistance has been discovered for the first time in Panama in the small dieldrin trial area on the north coast. As a result, further pursuit of this trial becomes useless. Malaria incidence has been rising recently in the test area.

2. Irritability

There has been a wider use of the new Excito-Repellency test box, not only in the Americas, but with samples of this device shipped to other regions for field trials. In western South America, the tests show the major vectors to be slightly or not at all irritable. This accounts in large measure for the much better performance of DDT against A. albimanus and A. pseudopunctipennis in those areas than in Central America and Mexico, even in the absence of resistance to DDT.

Irritability has been seen to some extent in E-R tests of A. punctimacula in Colombia and Ecuador, but escape usually does not take place before a lethal contact with DDT has been made. The E-R tests indicate that this factor should not be a serious handicap in the case of this species, and it apparently is not operationally.

Irritability remains a major problem in the Pacific coast of Mexico and in Haiti, Costa Rica and Panama, but of secondary importance compared to resistance in Central America, where both factors are limited to the Pacific coastal region almost exclusively.

Among the resistant A. albimanus of Nicaragua, Honduras and eastern El Salvador, a tendency for former high levels of irritability to diminish has been noted. In the usual case, this change aids the mosquito to survive long contacts with sprayed walls.

3. Resistance of P. falciparum strains to chloroquine

Resistance or suspected resistance of P. falciparum to chloroquine has been reported from increasing numbers of localities in the Amazon valley of Brazil, and adjoining areas of Peru and Bolivia. It has been confirmed also in the state of Espiritu Santo, Brazil. The resistance in Peru and Bolivia remains as yet unconfirmed, but in Bolivia especially, an improved DDT spray program has brought an epidemic situation nearly under control. There remain a to 15 cases per month of P. falciparum in the northern district of Pando-Beni, against less than half this number of P. vivax cases. This ratio of P. falciparum to P. vivax is suggestive of the presence of P. falciparum resistance, since this species has disappeared entirely from the rest of the country.

The problem of resistant strains of P. falciparum in the Rupununi district of British Guiana was overcome by well controlled house-spraying, and the last cases found there were in July 1959.

Chloroquine-resistant strains of P. falciparum remain in Colombia in the Magdalena valley and elsewhere. This seems to be reflected in the shift in parasite predominance from P. vivax in 1959 and 1960 to P. falciparum in the succeeding years. This predominance has been increasing as seen in the following table, and now is 65 per cent. Resistance was first discovered in 1960.

Table 18

MALARIA CASES DIAGNOSED IN COLOMBIA, BY SPECIES AND YEAR

Year	P. falciparum	P. vivax	Sum	Percentage P. falciparum
1959	1 195	2 942	4 137	28.8
1960	3 758	4 642	8 400	44.7
1961	10 235	6 694	16 929	60.4
1962	9 619	7 697	17 316	55.5
1963	9 113	8 311	17 424	52.3
1964	8 070	5 423	13 493	59.8
1965	10 087	5 549	15 636	64.5

Reorganization of the Service in 1965 and better coverage of involved areas with DDT spraying should reverse this trend.

4. Migration and colonization

Migration makes eradication of malaria more difficult and costly only where part of a country or region is about ready for or in consolidation, while another part remains malarious. If the areas between which migration occurs are equally advanced toward eradication the effect of migration per se would be slight. There is, however, the factor of precarious or inadequate housing for migrant laborers, many of whom sleep out of doors. And in colonization areas, there are the additional elements of construction of many new houses or alterations of sprayed ones which remain unprotected by DDT until the next spray round. These are additional causes of persistence of transmission in several problem areas, and are among the major causes in Ecuador, Colombia, Venezuela, Brazil and others, as well as having caused a major outbreak in Paraguay.

Several methods have been tried for coping with this problem, the most direct being the use of supplementary spray squads to do fill-in spraying of new houses or altered surfaces. Most programs have not been able to obtain the extra funds needed to put this operation on a sound basis.

C. Methods for Solving Technical Problems

1. Change to an alternate insecticide

Malathion was dropped in Honduras in March 1965 after the insufficient results seen in 1963 and 1964 in the cotton-growing areas in the south. This suspension was dictated by the desire to use available funds to start a mass drug campaign in the highest transmission areas, and not because of proof of lack of effect of malathion. It is expected that the combination of drugs and malathion will eventually be needed in areas of high transmission due to high DDT-resistance and a large component of outdoor transmission. As of June 1966 funds were still not in hand for any expansion of attack in any form.

Malathion has been continued in use in Nicaragua in some of the sugar estates and in a barrier zone of the city of Estelí. Here too lack of funds has prevented using any attack on an adequate scale.

Dieldrin was recommended instead of DDT for overcoming the irritability problem in Costa Rica, but the change was not applied until September 1965, and then due to operational deficiencies, the coverage was only fractional. No evaluation is yet possible.

Also for the problem of irritability, a trial of BHC was recommended for a portion of the problem area in Guerrero state in Mexico, but as yet funds have not been made available for the evaluation and application has not started.

Experimental hut trials and village scale trials of OMS-33 (Baygon), a carbamate residual insecticide, were initiated in 1965 in El Salvador.

2. Anti-larval measures

Larviciding with fenthion was tried in the drainage ditches and rain pools of Puerto Barrios in Guatemala but too much dependence was placed on the use of Civic Action (military personnel) and the operation was not well done. The larger plan for larviciding in upland valleys with resistant vectors was not begun because of lack of funds.

Larviciding with Paris green is still in use along the southern shore of Lake Managua, Nicaragua, but was insufficient alone to prevent re-infection of some of the "barrios" of Managua by imported cases. House-spraying with malathion proved to be a very effective supplement in these foci.

Larviciding was given a field trial in selected river valleys of Sinaloa and Culiacan in northwest Mexico through an entire season, and shown to be effective and economically feasible in some situations. Norms of operation and cost figures were developed. The method is not being pursued at present because of financial difficulties. On a small scale, reduction of breeding places by drainage was combined with the larviciding operation.

3. Re-scheduling or increasing the cycles of DDT

The former El Salvador plan of applying DDT during two cycles of three months each was not employed in 1965. Spraying was stopped entirely when the available funds were applied to mass drug distribution. In any event, it has been shown that there are many local exceptions to the general mosquito-breeding pattern in every broad area. Lagoons and lakes in the coastal plain have produced their maximum mosquito density in the dry season, and conversely, some localities in the foothills and upland valleys are surrounded by enough flat terrain to have predominantly rainy-season transmission. This further complicates the attempt to schedule one or two cycles of spraying in such a way as to concentrate the most effective residual protection in the season of maximum transmission.

The use of three cycles of 2 g./m^2 of DDT annually was continued in an experimental area in Oaxaca State, Mexico, but was combined after September 1965 with an extension of active search for cases to all localities and radical treatment of all cases found. No further evaluation of the benefits of increase of spraying cycles by itself is possible in this area.

The trial of four cycles of DDT of 1 gr. per square meter each was terminated in Haiti in February 1965, when it became apparent that it was not producing appreciable further reductions in malaria over the preceeding schedule of two cycles per year, and when the available funds were required in order to mount a mass drug-distribution program in all of the problem area. It should be noted that while DDT had not succeeded in halting transmission in many areas of Haiti, suspension of its use in large areas in July 1964 for financial reasons had serious repercussions in late 1965 when many areas essentially free of malaria for several years began to experience outbreaks.

4. Mass drug distribution

Five countries of Central America had mass drug-distribution campaigns during 1965, but for financial reasons not one was adequate in area, and some were deficient in personnel, supervision and transport as well. Attempts to economize have also led to loss of superior personnel and inability to recruit well-qualified personnel.

In El Salvador, a decision was made to increase the drug coverage somewhat by sacrificing DDT spraying. The effect of withdrawal of spraying was evident not only in the eastern end of the problem areas left with no attack measures, but malaria cases increased in the formerly highly successful Zone I both in treated areas and in the post-treatment vigilance areas. How much of this was due directly or indirectly to increase of imported cases coming from the untreated and unprotected eastern part of the coastal plain it is impossible to say, but the deterioration in Zone I in 1965 without spray was obvious, compared with 1964 when DDT was in use. Unfortunately funds for putting the program on an adequate basis are still not available as of mid-June 1966.

In Nicaragua, shortage of finances has prevented completion of any single program, as personnel were shifted from treated areas to sudden emergency problem areas, without resources to maintain the vigilance necessary. Good results were generally seen while drugs were in use but importation from untreated portions of the problem area soon reinfected any cleared area. In some of the persistent foci in the malathion-sprayed sugar estates, the addition of mass drug distribution was temporarily effective.

Mass drug distribution of chloroquine-pyrimethamine was recommended on a very large scale for Haiti (570,000 persons) by an Evaluation Team in February 1965, expecting that if a complete attack could be mounted on all problem areas simultaneously, the reservoir could be reduced to a controllable size by the time the then-current DDT applications began to be exhausted. Reinfection by migration would also be controlled. One full round of DDT at 2 g/m^2 was to be applied before the major transmission season in all areas of persistent transmission, even of low degree, and the remainder of the annual budget was to be applied to mass drug distribution and limited evaluation activities. There were several delays in initiating drug distribution in the various areas that obviously needed it, due to delays in receipt of the large additional supplies of drugs required. As the start of the program was delayed, more and more localities were observed becoming malarious again. These were programmed for mass drug distribution, but again the start was delayed due to having insufficient drug on hand. By the year's end, 1,350,000 persons were under treatment, and this later rose to 1,650,000 as more and more formerly cleared areas were put under mass drug distribution as they began to break down, or show indications that transmission could be re-established.

A number of small outbreaks were seen during 1965 in areas where spraying had been done, and after mid-year in areas where spraying had been suspended in June 1964. This is now recognized as indication that DDT had been preventing transmission prior to that time, as the migration pattern has not changed. Spraying was not resumed as the available funds for the year were totally committed, mainly to the drug program. The year was ended with no balance left, in spite of the fact that many drug programs were not started as soon as they were recognized as necessary.

In Haiti, drug programs have several advantages over those in other countries. A large pool of well-educated and unemployed personnel exists, and new recruitment or quick replacement of unsatisfactory workers is easily done. The country is very densely populated making economical coverage and thorough coverage (re-visits) practicable by drug distributors travelling on foot. The people are disposed to cooperate well, and they do. A high percentage of acceptance is achieved.

Evaluation is made of every locality which shows persistence of autochthonous cases, and to date operational failure has been found to be the usual cause. Occasional planning failure was

also seen. Treatment areas followed political divisions, with the result that some epidemiological units were only partially treated.

Supervised treatment has been given to those cases which apparently arose in spite of regular medication. Operational failure or vomiting was found, but no evidence of drug resistance has been observed as yet.

IV. RESEARCH

A. Insecticide Testing Team - AMRO-0209

A decision as to the future course of this team was made in a joint meeting between WHO and PAHO on March 24, 1965. It was decided to incorporate the team fully into the WHO network of collaborating insecticide-testing laboratories and field stations and to make it the WHO unit for field trials of new insecticides in the Americas. A decision was reached to concentrate on OMS-33 (Baygon) for the Stage IV, V and VI trials. This is a relatively new carbamate insecticide, and the most promising of the group which had passed the first three stages of the WHO screening scheme. A complete plan of operations was drawn up with WHO advice for the stage IV (Experimental Hut) trials with resistant A. albimanus in this scheme. Seven huts were built on the shore of Lake Jocotal in El Salvador, in June and July 1965, and five were sprayed with OMS-33 July 25 and resprayed December 2. Two were kept unsprayed as controls. Four of the huts had mud walls and three were made of thin sticks or poles, common types of construction in the area. All had straw-thatch roofs. Window traps were placed in each of the four walls, and louvers also to permit natural entrance of mosquitoes. Two persons slept in each hut each test night to serve as bait.

Of the sprayed mud-walled huts, one was sprayed to three meters, one to the peak of the roof (4 1/2 meters), and in one the mud surface was left unsprayed to simulate conditions that soon transpire when sorptive mud walls are sprayed. In this hut, only the roof, door, window frames and cots were sprayed. (The two large canvas cots were sprayed in each hut). Two pole huts were sprayed, one up to three meters, the other up to the peak of the roof, 4 1/2 meters. Because mosquitoes could escape easily through the walls of the pole huts, a new type of wall trap was designed to catch all those passing through the openings between the poles. This proved very effective and useful, because many more mosquitoes left the huts through the walls than through the window traps.

The density of mosquitoes dropped markedly when the level of the lake rose with the onset of rains, so naturally-entering mosquitoes were often too scarce to give significant results. Release tests were performed in weeks when naturally entering mosquitoes were too few, using unfed resistant A. albimanus from a colony or from wild sources if these could be obtained. The results were very similar to those employing naturally-entering mosquitoes.

Although bio-assays were made of the deposits in the experimental huts, the chief purpose of the huts was to check on the duration of effectiveness of OMS-33 on walls when the mosquitoes entered and fed naturally and left the house whenever they wished to do so. A fairly close agreement was noted between the 30-minute bio-assay test and the hut kills with the insecticide. Both began to fail at about 13 weeks at the end of the rainy season, and at eight or nine weeks in the dry season.

It had previously been discovered by this Unit in panel tests that low relative humidity during the day preceding a bio-assay test greatly reduced the killing power of OMS-33 deposits, but that the lethal effect of deposits returned again after a day of high relative humidity. This has been observed repeatedly in both bio-assay tests and hut kills, in experimental huts and in the village-scale trials. A useful relative-humidity index has been developed to correlate with fluctuations in lethality of deposits.

After eight weeks of observations in the huts, OMS-33 was sprayed in three villages, in a total of 320 houses. The feasibility of its use and the circumstances causing intoxication to spraymen and residents of the houses were observed, and experience was gained in management of the few cases of mild intoxication seen. Carbamates in general and Baygon in particular act by inhibition of cholinesterase, but with several differences from organophosphorus insecticides which also act in this way. The inhibition is rapidly reversible even without treatment. Warning symptoms come on early in gradual exposure, long before serious levels of insecticide are absorbed. As a result, wherever contact is gradual, nausea, vomiting, sweating, headache, weakness, miosis, etc.

give an early warning that absorption has been going on a little too fast. Termination of the exposure permits rapid and full recovery, without accumulation. Experience gained in village-scale trials permitted establishment of norms of spray procedure and precautions necessary for safety.

Evaluation of the effectiveness of OMS-33 in the three villages was made by bio-assay of deposits, continuous weekly measurements of mosquito density, and most clearly by search in the morning for live A. albimanus on the walls and in the thatch, and dead ones on the floors. For the first few weeks large numbers, often more than 100, of dead mosquitoes could be found on the floors and none on the walls. Then numbers of dead mosquitoes began to decrease, and eventually more live ones could be found on the walls than dead ones on the floors. Many live ones of course escaped before the morning searches were done.

During the second round of village spraying in December, rapid methods of making tests of cholinesterase using finger-puncture blood were perfected. These methods permitted extensive and repeated sampling of spraymen during the spraying of 3,200 houses in expanded village-scale trials in 1966

With feasibility of spraying and effectiveness of OMS-33 determined on a small scale by the year's end, the decision was reached to make a large area trial in 1966 just before the rainy season.

The Insecticide Testing Team made many other incidental observations using bio-assay methods and E-R tests. Three strains of A. albimanus were kept in colony. The unexpectedly rapid effect of relative humidity on lethality of deposits of OMS-33 was worked out. Base-line data were obtained for the area to be used for expanded village-scale trials in 1966.

Seasonal observations of mosquito density revealed very large differences in pattern between localities in the same general area, depending on different breeding places, e.g., the presence or absence of a lake or a tidal lagoon.

B. Malaria Eradication Epidemiology Team - AMRO-0210

This team was re-established and began its operations in Mexico in September 1964. The objective was to evaluate the operational effectiveness of full-scale search for cases and radical treatment of all cases found when these methods are used as a supplement to careful application of DDT at 2 gr./m^2 three times per year. From September 1964 until July 1965 the number of cases found was not greatly reduced from the level of previous years. However, the majority of the cases were being found in new localities which were being sampled for the first time. Those localities in which cases were known to have occurred previously, and whose known cases were all given radical treatment in the first few months of the program, tended to remain negative. Many localities positive in 1964 remained negative in 1965.

The gross number of cases began to rise in June 1965, but unlike previous years, dropped and remained low the rest of the transmission season, in spite of monthly active search for cases in 100 per cent of the localities. It is interesting that only a very few localities accounted for the big majority of cases discovered in the transmission season.

A study was started in January 1965 and continued to April 1966 in seven localities which seemed to have persistent transmission. Four of them cleared up under the routine established. They all were made the subject of intensive epidemiological-entomological study as to the causes of persistence. As elsewhere, multiple and varied causes were found: new construction between cycles due to colonization, outdoor contact between people and vectors, incomplete housing, movement of migrants from other infected areas into or through an area of high anopheline density, etc. In one instance, a major source was a large planting area with temporary houses, used by many people for years, and never sprayed because its existence was unsuspected. Moderate to marked effects of irritability were found, and partial resistance was suspected twice, once in a cotton-growing area, and once in the absence of cotton. Confirmation has not yet been done.

Mass radical treatment was tried in several localities with persistence of transmission. It was completely effective in some, but in others transmission was soon re-established by reason of importation of cases from untreated areas.

A detailed report is being prepared and will be published.

C. Study of Resistance of Malaria Plasmodia to Drugs - AMRO-0212

This project was engaged from January to the end of March 1965 in completing the study of the efficacy of a 4-day treatment for P. falciparum resistant to 4-aminoquinolines. Using strains resistant to chloroquine, pyrimethamine, and other drugs, a combination of pyrimethamine (50 mg. daily for 4 days) and a long-acting sulfonamide, sulfamethoxypyridozine (1 gr., 0.5, 0.5 and 0.5 gr. total 2.5 gr. in 4 days), was proved curative. Although the Center was closed March 31, case follow-ups were continued until May 31 to detect possible relapses.

Due to earlier experience with toxicity under this regimen (leucopenia, anemia, reduction of platelets) this schedule was not approved for field trials or usage. Instead a shorter schedule was started in field tests in October 1965 by the Campanha de Erradicação da Malária of Brazil, with the cooperation of PAHO advisors. A 2-day schedule was employed consisting of a total dose of 50 mg. of pyrimethamine and 1.5 gr. of sulforthodimethoxine, a still longer-acting sulfonamide. In an area where 50 per cent or more of those cases followed-up relapsed after 2,100 mg. of chloroquine, less than 5 per cent of the cases have suffered recrudescences within an equal 30-day period following this schedule. It is not yet known whether this strain was sensitive or resistant to pyrimethamine alone. Further trials are planned.

D. Field Investigations of Mass Drug Treatment - AMRO-0217

During 1965, negotiations were entered into with the Gorgas Memorial Laboratory in Panama and the Government of Panama for an investigation of the usefulness and acceptability of a tablet of combined pyrimethamine and primaquine in mass drug treatment on a 2-weekly schedule, at the hands of medicators. Several years ago it was shown by the Gorgas Memorial Laboratory that 50 mg. of pyrimethamine and 40 mg. of primaquine on a weekly schedule was effective in eradicating both P. falciparum and P. vivax from 2 villages in Panama.

Preliminary studies resulted in the rejection of one site and selection of another. The contractual agreement was signed in April 1966 and work has begun.

E. Malaria Eradication in Problem Areas (Morelos Project) - Mexico-0201

During 1965, plans were drawn up and an agreement signed with the Government of Mexico to carry out an operational study of the feasibility and effectiveness of a program in which one employee is given multiple functions in a limited area. This employee is to be responsible for all case-finding activities in his territory, plus fill-in spraying of any surface of any house on which DDT deposits are not visible to the eye. He will travel on foot, and his assignment will be such that he can cover his area once each month. For each five such functionaries there will be one chief who will do primary case investigations and radical treatment.

The program started operations in January 1966, and will run for two years.

F. Study of Drug Therapy on Malaria - Colombia-0201

During 1965, the Malaria Eradication Service of Colombia made a trial use of a triple combination of antimalarial drugs for the rapid treatment of P. vivax infections in the hope of producing a radical cure in much less than the 14 days generally recommended.

The 3-day schedule used consists (for adults) of the following: 750 mg. of chloroquine, 100 mg. of pyrimethamine, and 75 mg. of primaquine. Children's dosages are reduced proportionally. The results of a pilot study and of the treatments carried out and followed-up in field operations in 1965 were so encouraging (less than 5 per cent combined relapses and re-infections), that a formal study plan for a controlled field trial was prepared. The efficacy of the 3-day schedule will be compared with that of the 14-day standard primaquine therapy using a modified paired-sample plan. An agreement has been signed and work is beginning with PAHO advice and assistance in support of local costs.

V. INTERNATIONAL COOPERATION

The distribution of PAHO personnel assigned to ME projects in the past three years and to be assigned in 1966 is presented in Table 19, by program and by category of consultant. Expanding programs require some increases in technical advisory services in Brazil and Haiti.

PAHO provided five fellowships for study of malaria eradication techniques at international training centers, and seven grants for study travel as an additional means of strengthening technical expertise, in 1965.

Table 20 includes information about supplies and equipment (except drugs) supplied by PAHO to the various national programs. These articles are essentials which cannot be obtained through UNICEF nor from local sources.

Drugs provided are shown in Table 21. These are almost entirely for use in presumptive and radical-cure treatment; medicines for collective treatment programs, when these are undertaken as an attack method, are provided by UNICEF. Some programs have purchased drugs from their own funds when necessary.

Table 22 presents the figures of international support provided to the individual programs and to research efforts by the four sources of international or bilateral funds in 1965 and the estimated amounts of such support for 1966. Comparing expenditures in 1965 with those anticipated for this period (XIII Status Report), it is apparent that PAHO/WHO and USAID expended less than was expected, while UNICEF expended somewhat more. Delays in expansion plans in some programs and lack of qualified personnel to fill posts were primarily responsible for the lower than anticipated level of PAHO expenditures. UNICEF increased its aid to several programs above their scheduled allocations, notably to the Mexican, Ecuadorian and Costa Rican campaigns and by smaller sums to several others. AID contributed $1,800,000 to the PAHO Special Malaria Fund in 1965 in addition to direct grants to programs. Grants by AID are being increasingly replaced by long-term loans, which are included in Table 15.

The dollars spent in international and bilateral aid form a small proportion of total expenditures on malaria eradication, but they increase the effectiveness of the total many-fold. The UNICEF, AID and PAHO/WHO assistance represented by these contributions is essential to the progress and ultimate success of the eradication effort.

Table 19

PAHO/WHO FULL-TIME PROFESSIONAL AND TECHNICAL STAFF ASSIGNED TO COUNTRY, INTER-COUNTRY AND INTER-ZONE MALARIA ERADICATION PROJECTS IN THE AMERICAS, FROM 1963 TO MAY 1966

Country or other political unit	Medical Officers				Sanitary Engineers				Sanitary Inspectors				Entomologists				Other			
	1963	1964	1965	1966	1963	1964	1965	1966	1963	1964	1965	1966	1963	1964	1965	1966	1963	1964	1965	1966
Argentina	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bolivia	1	1	-	1	1	-	-	-	2	2	2	2	-	-	-	-	1[a]	2[b]	2[b]	4[c]
Brazil (Excl. São Paulo)	2	2	1	3	3	3	2	2	2	2	3	3	-	-	-	-	-	-	-	-
Brazil (São Paulo)	-	-	-	-	1	1	-	-	2	1	-	-	-	-	-	-	1[d]	1[e]	-	-
Colombia	2	1	1	1	1	2	2	2	4	6	5	5	-	1	2	2	-	-	-	-
Costa Rica	-	-	1	1	-	-	-	-	3	3	3	3	-	-	-	-	-	-	-	-
Cuba	1	1	1	1	1	-	-	-	1	2	2	2	-	-	-	-	-	2[af]	1[a]	1[a]
Dominican Republic	1	2	1	1	1	1	1	1	3	2	2	2	-	-	1	1	-	-	-	-
Ecuador	1	2	2	2	1	1	1	1	4	3	2	2	1	-	-	-	1[e]	1[e]	1[e]	-
El Salvador	2	2	2	2	1	1	-	-	1	2	2	2	1	-	-	-	-	-	-	-
Guatemala	2	1	1	1	1	1	1	1	3	3	3	3	-	1	1	1	1[e]	-	-	-
Haiti	1	2	1	2	1	1	1	2	3	3	3	2	-	-	-	-	-	-	-	-
Honduras	1	1	1	1	1	-	-	-	2	2	2	2	1	1	-	-	-	-	-	-
Jamaica	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2[f]	-	-	-
Mexico	2	3	3	3	1	1	1	1	1	1	1	1	1	-	-	-	1[e]	-	-	-
Nicaragua	2	2	1	1	1	1	1	1	2	2	3	3	1	1	-	-	-	-	-	-
Panama	1	1	1	1	1	1	1	1	3	3	3	3	-	-	1	1	-	-	-	-
Paraguay	-	-	-	-	-	-	-	-	1	1	1	1	1	-	-	-	-	-	-	-
Peru	1	1	1	1	1	1	1	1	5	4	4	4	-	-	-	-	-	-	-	-
British Guiana	-	-	-	-	-	-	-	-	2	1	1	1	-	-	-	-	-	-	-	-
British Honduras	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Surinam	1	1	1	1	-	-	-	-	3	3	3	3	1	1	1	1	1[f]	1[f]	1[f]	2[fg]
Windward Islands	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Inter-zone or inter-country projects	8	7	8	10	2	1	1	1	-	-	-	-	4	2	2	2	14[h]	8[i]	9[j]	5[k]
Total	32	31	27	33	19	16	14	14	49	46	45	44	11	7	8	8	22	15	14	12

- None.
(a) Administrative officer. (b) Administrative officer and assistant engineer. (c) Three administrative officers and one assistant engineer. (d) Malaria statistician. (e) Entomological aide. (f) Health educator. (g) Health educator and laboratory technician. (h) Six administrative officers, one laboratory technician, three entomological aides, one entomological assistant, one operations analyst, one parasitologist assistant and one translator. (i) Three administrative officers, one entomological assistant, one program officer, one operations analyst, one laboratory technician, and one health educator. (j) Three administrative officers, one entomological assistant, one entomological aide, one program officer, one operations analyst, one laboratory technician and one health educator. (k) One administrative officer, one entomological assistant, one entomological aide, one operations analyst, and one health educator.

Table 20

EQUIPMENT AND SUPPLIES, EXCLUDING DRUGS, CONTRIBUTED BY PAHO TO MALARIA ERADICATION PROGRAMS IN THE AMERICAS, 1958 TO DECEMBER 1965

Country or other political unit	Protective equipment						Laboratory supplies						Others				
	Helmets	Bands	Visors	Gloves	Ponchos	Life-jackets	Mailing tubes	"Surgi-tube" (rolls)	Plastic tubes	Micro-scopes	Micro-scope accesso-ries	Slides (gross)	Vehicles and motors (a)	Insecti-cides (lbs.)	Kardex files	Test kits adults	Test kits larvae
Argentina	-	-	-	-	-	-	9 000	10	20	1	22	-	-	-	-	1	-
Bolivia [b]	50	180	160	40	80	135	10 000	21	70	1	-	-	3	-	-	5	-
Brazil [c]	-	-	-	-	-	936	288 000	32	40	90	17	-	3	-	-	51	8
Colombia [d]	-	-	-	-	-	450	100 000	10	20	3	2	-	-	-	-	23	2
Costa Rica	-	-	-	-	24	35	500	40	52	-	-	-	-	-	40	2	-
Cuba	-	-	-	-	-	-	15 000	30	20	10	1	-	-	-	-	1	3
Dominican Rep. [e]	366	332	664	166	166	-	17 000	28	20	3	-	-	3	-	-	3	2
Ecuador	431	412	824	206	206	151	50 000	30	20	2	15	-	2	-	-	4	-
El Salvador	230	476	952	238	238	55	23 000	190	56	4	6	-	3	2 900	66	4	1
Guatemala	541	500	1 000	250	255	24	43 000	40	52	4	2	1 340	2	-	7	2	1
Haiti	341	682	1 364	341	341	40	17 000	11	-	1	8	-	6	-	-	1	2
Honduras	165	330	660	165	165	10	20 000	60	52	1	2	70	-	-	1	2	-
Jamaica [f]	25	200	400	194	209	-	22 500	10	20	-	-	-	1	-	-	8	12
Mexico [g]	-	-	-	-	-	75	555 040	143	15	-	-	-	1	-	-	38	1
Nicaragua	117	234	468	117	117	-	28 000	100	64	3	4	157	1	-	77	4	1
Panama	137	274	548	137	137	75	22 000	62	52	4	2	35	1	-	66	3	-
Paraguay	174	808	408	102	773	122	43 000	18	20	1	-	-	2	-	-	6	1
Peru	618	1 236	3 672	368	668	372	5 000	10	20	2	1	-	(1) 1	46 410	24	3	-
Trinidad and Tobago	-	-	-	-	-	-	1 150	10	20	-	-	-	-	-	-	-	1
British Guiana	36	72	144	96	36	-	2 000	-	-	-	3	-	-	-	-	-	-
British Honduras	61	38	76	19	19	10	1 900	10	20	-	1	-	2	-	-	1	-
Dominica	-	-	-	-	-	-	630	-	-	-	-	-	1 [h]	-	-	-	-
French Guiana [i]	-	-	-	-	-	-	-	-	-	1	-	-	(3) 5 [j]	-	-	2	1
Grenada	-	-	-	-	-	-	120	-	-	-	-	-	-	-	-	-	-
St. Lucia	-	-	-	-	-	-	110	10	20	-	-	-	3 [k]	-	-	-	-
Surinam [l]	55	10	20	5	5	-	2 550	26	20	2	2	-	(4) 1	-	-	2	1
Total [m]	3 347	5 784	11 360	2 444	3 439	2 490	1 276 500	901	693	133	88	1 602	(8) 41	49 310	281	165	37

- None

(a) Station wagons unless otherwise indicated; marine motors in parentheses. (b) Plus $750.00 for the local purchase of tires. (c) Plus $3,707.00 in miscellaneous items. (d) Plus $542.50 in miscellaneous items. (e) Plus $400.00 in miscellaneous items. (f) 210,000 imperial gallons of kerosene also provided. (g) Plus 8,500 lancets for taking blood samples and $539.80 in miscellaneous items. (h) Motorcycles. (i) Plus $1,194.00 in miscellaneous items. (j) Two motorcycles. (k) One station wagon and two motorcycles. (l) Plus $4,763.72 in miscellaneous items. (m) Plus $13,131.95 in miscellaneous items for inter-zone projects.

Table 21

DRUGS PROVIDED BY PAHO TO MALARIA ERADICATION PROGRAMS IN THE AMERICAS, 1958-1965

(In thousands of tablets)

Country or other political unit	1958-1964[a]					1965[b]					Total				
	Chloroquine 150 mg.	Primaquine		Pyrimethamine 25 mg.	Chloroquine Primaquine combined	Chloroquine 150 mg.	Primaquine		Pyrimethamine 25 mg.	Chloroquine Primaquine combined	Chloroquine 150 mg.	Primaquine		Pyrimethamine 25 mg.	Chloroquine Primaquine combined
		15 mg.	5 mg.				15 mg.	5 mg.				15 mg.	5 mg.		
Argentina	1 144	65	35	297	-	(161)	10	-	-	-	983	75	35	297	-
Bolivia	3 465	90	40	21	10	(814)	-	10	-	-	2 651	90	50	21	10
Brazil (excl. São Paulo)	49 613	658.5	294	-	200	4 660	450	70	100	-	54 273	1 108.5	364	100	200
Brazil (São Paulo)	2 143	117.5	26	184	-	(1 500)	-	-	(100)	-	643	117.5	26	84	-
Colombia	12 376	374.5	119.5	664	-	4 020	666	451	600	-	16 396	1 040.5	570.5	1 264	-
Costa Rica	1 124	147	26	213	1 385	1 380	68	1	-	-	2 504	215	27	213	1 385
Cuba	1 330	30	24	80	-	520	-	-	-	-	1 850	30	24	80	-
Dominican Republic	3 194	19	168	10	-	600[c]	5	6	-	-	3 794	24	174	10	-
Ecuador	4 890	265.5	190	195	-	405	5	-	-	-	5 295	270.5	190	195	-
El Salvador	4 090	157.5	240	128	2 070	2 145	162	210	-	-	6 235	319.5	450	128	2 070
Guatemala	5 369	596	59	27	8 049	1 500	(19) 24	-	-	-	6 869	601	59	27	8 049
Haiti	5 620	82.5	-	280	-	500	-	-	-	4 750[d]	6 120	82.5	-	280	4 750[d]
Honduras	4 694	436.6	379	88	1 290	1 080	200	(2)100	-	-	5 774	636.6	477	88	1 290
Jamaica	879	18	-	288	50	-	-	-	-	-	879	18	-	288	50
Mexico	14 511	2 172	2 151	5 250	4 092	12 465	1 000	-	2 250	-	26 976	3 172	2 151	7 500	4 092
Nicaragua	4 399	212.5	162	6	6 933	(96) 700	200	170	-	-	5 003	412.5	332	6	6 933
Panama	2 272	202.5	28	146	-	(149) 300	(29) 120	(1)	-	-	2 423	293.5	27	146	-
Paraguay	2 830	25	7	48	-	550	3	7	-	-	3 380	28	14	48	-
Peru	7 956	619.5	188	196	-	1 500	200	70	-	-	9 456	819.5	258	196	-
Trinidad and Tobago	965	940.5	859	180	-	(150)	(0.5)	(439.5)	(59)	-	815	940	419.5	121	-
British Guiana	286	181.5	73	267	-	(50)	-	-	-	-	236	181.5	73	267	-
British Honduras	200	14	13	6	22	-	8	2	-	-	200	22	15	6	22
Dominica	90	1	1	45	-	-	-	-	-	-	90	1	1	45	-
French Guiana	30	1	-	-	32	-	-	-	-	-	30	1	-	-	32
Grenada	43	0.5	-	45	-	-	-	-	-	-	43	0.5	-	45	-
St. Lucia	68	1	-	70	-	-	0.5	0.5	-	-	68	1.5	0.5	70	-
Surinam	1 043	11	11	497	200	94	-	2	-	-	1 137	11	13	497	200
Total	134 624	7 439.6	5 093.5	9 231	24 333	29 499	3 073	657	2 791	4 750[d]	164 123	10 512.6	5 750.5	12 022	29 083

- None

(a) Plus 278,500 aspirin tablets, 400,000 camoprin tablets, 56,120 lbs. chloroquine diphosphate, 3,510 lbs. of tricalcium phosphate, 20 tons of calcium arsenate, 411,000 aspirin-caffeine tablets, 25,000 tablets of quinine sulphate, and 2 Kg. chloroquine silicate powder. (b) Besides there were provided 800 lbs. of chloroquine diphosphate, 300 lbs. of tricalcium phosphate, 10 Kg. of camoquine powder, 8,000 quinine tablets 5 gr., 1 000 lbs. amodiaquine powder. (c) In addition, 500,000 tablets were provided to replace those lost during political disturbances. (d) Chloroquine 200 mg./Pyrimethamine 15 mg.

Note: The figures in parentheses represent transfers to other programs.

Table 22

INTERNATIONAL CONTRIBUTIONS TO MALARIA ERADICATION PROGRAMS IN THE AMERICAS
1965 AND ESTIMATED 1966

(U. S. dollars)

Country or other political unit	Date of initiation of total coverage	1965				1966 (estimated)			
		PAHO/SMF	WHO and WHO/TA	UNICEF[a]	AID(USA) (fiscal year)[b]	PAHO/SMF	WHO and WHO/TA	UNICEF[c]	AID(USA) (fiscal year)
Argentina	Aug. 1959	237	-	137 700	-	36 155	-	90 000	-
Bolivia	Sep. 1958	44 614	-	45 700	300 000[d]	71 744	-	9 000	100 000[d]
Brazil (excl. São Paulo)	Aug. 1959[e]	206 111	11 573	-	126 000	293 241[f]	70 278	-	119 000
Brazil (São Paulo)	Jan. 1960	6 906[g]	-	-		18 384	-	-	
Colombia	Sep. 1958	199 646	-	336 200	-	204 500	-	350 000	-
Costa Rica	Jul. 1957	32 491	34 780	45 600	-	35 178	38 607	65 000	483 000
Cuba	1962	-	57 610	69 300	-	-	65 844	6 000	-
Dominican Republic	Jun. 1958	135 440	-	81 500	-	102 219	-	85 000	-
Ecuador	Mar. 1957	82 080	20 355	276 100	250 000	96 722	19 500	225 000	-
El Salvador	Jul. 1956	26 214	76 772	5 700	100 000	49 795	94 182	300 000	50 000
Guatemala	Aug. 1956	50 979	57 853	130 900	-	64 683	80 889	500 000	-
Haiti	Jan. 1962	127 439	-	294 700	1 400 000	134 733	-	135 000	1 400 000
Honduras	Jul. 1959	24 039	35 644	12 500	150 000	23 588	39 610	150 000	-
Jamaica	Jan. 1958	-	-	4 000	-	-	-	-	-
Mexico	Jan. 1957	85 101	170 851	1 317 300	-	72 518	216 600	1 655 000	-
Nicaragua	Nov. 1958	55 266	73 752	106 600	220 000	54 340	76 780	180 000	-
Panama	Aug. 1957	32 068	70 203	125 300	-	39 768	81 377	175 000	-
Paraguay	Oct. 1957	22 285	-	-	-	77 768	-	-	-
Peru	Nov. 1957	111 531	-	171 200	-	122 422	-	160 000	-
Trinidad and Tobago	Jan. 1958	-	-	-	-	-	-	-	-
British Guiana	Jan. 1947	18 862	-	4 800	-	17 332	-	3 000	-
British Honduras	Feb. 1957	14	-	700	-	500	-	1 000	-
Dominica	Jun. 1959	4	-	-	-	-	-	-	-
French Guiana	Sep. 1963[h]	781	-	-	-	2 000	-	-	-
St. Lucia	Jan. 1956	-	-	-	-	-	-	-	-
Surinam	May 1958	92 014	-	11 100	-	133 720	-	15 000	-
Inter-country Projects and general services		223 344[i]	232 054[i]	-	-	515 615[j]	442 029[j]	-	-
Total		1 577 466	841 447	3 176 900	2 546 000	2 166 925	1 225 696	4 104 000	2 152 000

- None.
(a) Rounded to the nearest hundred; shipping not included. (b) Provisional. (c) Rounded to the nearest thousand; shipping not included. (d) Counterpart fund. (e) Program developed by states, date of first area shown. (f) Includes $25,000 for the Training Center in Rio de Janeiro (Brazil-0202) (g) Includes $2,752 for the Training Center in São Paulo (Brazil-0202). (h) Date of signature of agreement between PAHO/French Guiana Prefecture. (i) Not included PAHO and WHO Regular Fund for the Washington Office. (j) Included PAHO and WHO Regular Fund for the Washington Office.