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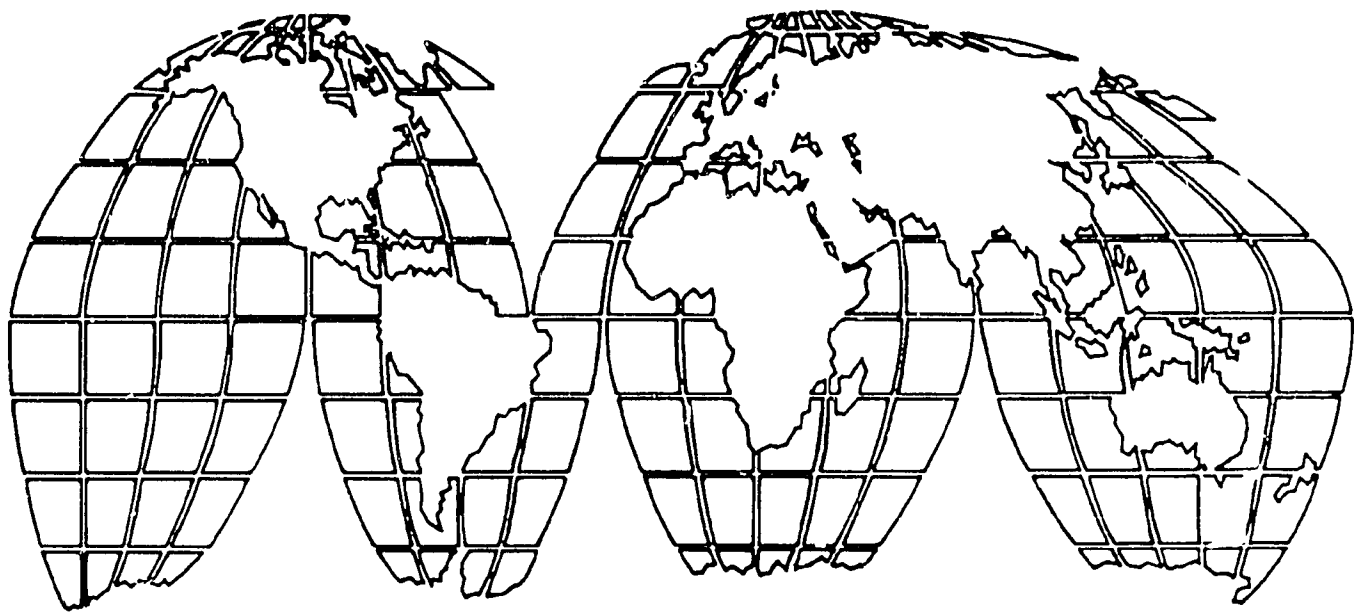
Sustainability of U.S.-Supported Health, Population, and Nutrition Programs in Guatemala: A Review of Malaria Eradication Projects (1958-1987)



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Sustainability of U.S.-Supported Health, Population, and Nutrition Programs in Guatemala: A Review of Malaria Eradication Projects (1958-1987).

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1. OVERVIEW

The development of potent residual insecticides during the 1940s and the successful malaria eradication program conducted in the United States by 1950 raised hopes for similar results throughout the world. By 1955, a global consensus had emerged that public programs should be reoriented to reflect the new, aggressive principle of eradication rather than the passive control philosophy that had characterized efforts for some 50 years.

In the Central American region, the Agency for International Development (A.I.D.), the Pan American Health Organization (PAHO), and UNICEF joined forces with the governments of Guatemala, Honduras, El Salvador, and Nicaragua (Costa Rica and Panama were included later) to launch malaria eradication programs in 1956. These programs basically followed the general eradication strategy laid out by the World Health Organization (WHO), which anticipated that eradication goals would be attained in 8-10 years. Intensive mapping, stratification, and institution-building efforts occupied 1955 and early 1956, National Service for the Eradication of Malaria (SNEM) was formed to head the effort in Guatemala. The first SNEM Action Plan for 1956-1961 ambitiously set July 1, 1960 as the target date for eradication of malaria in Guatemala.

[TABLE D-1]

Table D-1 illustrates the aggregate level and distribution of funding for the regional Malaria Eradication Program from 1956 through 1964, which was the year A.I.D. grant funding ended and roughly the date by which WHO had predicted success. Of total A.I.D. grants ($7.2 million) to Central American malaria eradication programs from 1956 to 1964, almost 40 percent went to Guatemala. Guatemala contributed almost $4 million to its malaria eradication program, or 39 percent of the $10.1 million total. On average, Central American governments picked up 44 percent of program costs. Guatemala fared comparatively well during this period.

Table D-1. Level and Sources of Funds for Malaria Eradication Programs in Central America, 1956-1964 (in U.S. dollars and percentages)

Country	Total Funding	Host Government	A.I.D.	PAHO & UNICEF
Guatemala	10,108,354	3,942,258	2,830,339	3,335,757
Regional Share (%)	36	32	39	38
Source Share (%)	100	39	26	33
Honduras[a]	5,021,500	1,556,665	2,159,245	1,305,590
Regional Share (%)	18	12	30	15
Source Share (%)	100	31	43	26
El Salvador	7,224,031	4,473,899	361,202	2,383,930
Regional Share (%)	25	36	5	27
Source Share (%)	100	62	5	33
Nicaragua	6,040,000	2,476,400	1,872,400	1,691,200
Regional Share (%)	21	20	26	19
Source Share (%)	100	41	31	28
Regional Total:	28,393,885	12,454,222	7,223,186	8,716,477
Regional Share (%)	100	100	100	100
Source Share (%)	100	44	25	31

Source: A.I.D. (1965, 9).

aHonduras funding levels are for FY 1958-1963.

Although direct comparisons are difficult, Guatemala spent some 2.5 times more than did its bordering neighbor Honduras, 1.6 times more than did Nicaragua and around 10 percent less than did El Salvador on their malaria eradication program. (These figures include all sources of funding.) Guatemala's much larger population does not explain these differences in program spending. (See Tables D-2 and D-3.) Less than half of the country's residents lived in malaria-prone areas, compared with almost all the population in Honduras and Nicaragua, and so, the target population in Guatemala was only slightly larger than that of other countries in the region. However Guatemala apparently was able to accomplish comparatively more than its neighbors during this period. By 1963, areas reported to be in the consolidation stage, and so no longer thought to require costly comprehensive spraying programs, accounted for almost two-thirds of the Guatemalan target population.

The very success of the program, however, contributed to a resurgence in malaria cases. In part as a result of the earlier success of the malaria eradication program, the fertile Pacific coastal plain was opened to increased cultivation. More agricultural activity meant both accelerated vector resistance, because of increased use of agricultural insecticides, and increased exposure to the disease because of a larger permanent and migrant worker population in the area.

The resulting resurgence of malaria cases--and its timing--created turmoil. A period of stasis and uncertainty followed, as individual donor groups reconsidered their goals and their position in the malaria eradication program. PAHO, A.I.D., and the U.S. Public Health Service developed a 3-year, loan-financed regional plan in early 1965, but A.I.D. did not formally authorize the necessary loan until December, the Loan Agreement was not signed until August 1966, and initial loan disbursements did not reach Guatemala until 7 months later. Thus, there was more than a 2-year gap in financing from what had been the main external source of project funds.

In its 1966 annual report, SNEM laid much of the responsibility for the resurgence of malaria cases on the Guatemalan Government, observing that eradication activities in 1965 and 1966 were far below required levels because of the government's failure to meet its commitment to absorb program costs that had previously been covered by A.I.D. Despite the agreement reached in August, SNEM remained wary about the continued uncertainty, and UNICEF made its $395,000 appropriation for the malaria eradication program in 1967 contingent on assurances that "adequate" local funding would be obtained. With the initial A.I.D. loan disbursement in March

Table D-2. Status of Malaria Eradication Program in Central America, 1963
(Population in 000s)

Country	Country Total	Malaria Areas by Phase			Malaria Area Population (percent)	Total Country Density (pop./km2)
		Total	Consolidation	Attack		
Guatemala	4,120	1,912	1,234	678	46	38
Honduras	2,008	1,892	941	951	94	18
El Salvador	2,511	1,641		1,641	65	119
Nicaragua	1,767	1,697	668	1,029	96	14
Total	10,406	7,142	2,842	4,299		
Average					76	28

Table D-3. Per Capita Funding of Malaria Eradication Programs in Central America, by Source, 1963
(U.S. dollars per person)

Country/Population Group	Total	Local Government	A.I.D.	PAHO & UNICEF
Guatemala				
Malaria Zone	5.29	2.06	1.48	1.74
Total Country	2.45	0.96	0.69	0.81
Honduras				
Malaria Zone	2.65	0.82	1.14	0.69
Total Country	2.50	0.78	1.08	0.65
El Salvador				
Malaria Zone	4.40	2.73	0.22	1.45
Total Country	2.88	1.78	0.14	0.95
Nicaragua				
Malaria Zone	3.56	1.46	1.10	1.00
Total Country	3.42	1.40	1.06	0.96
Regional Averages				
Malaria Zone	3.98	1.74	1.01	1.22
Total Region	2.73	1.20	1.01	0.52

Table D-4. Comparative Spending Growth:
SNEM, Ministry of Health and Government of Guatemala, 1971-85

Year	Expenditure Change (%)			Percent Change in GNP
	SNEM	Ministry of Health	Guatemalan Government	
1971	55.1	1.5	1.8	4.2
1972	3.1	10.6	23.4	5.9
1973	5.6	11.3	9.5	22.3
1974	38.0	17.9	22.8	23.0
1975	10.3	17.3	12.1	15.3
1976	6.4	13.5	55.3	19.7
1977	0.6	33.3	12.4	25.7
1978	4.1	4.9	16.2	10.8
1979	1.4	41.4	15.3	13.7
1980	22.6	45.3	29.6	14.1
1981	8.5	5.3	22.8	9.2
1982	-9.2	-24.6	-14.1	1.3
1983	-6.2	-6.5	-12.8	3.8
1984	-6.3	8.3	3.1	4.6
1985	-14.2	1.9	4.9	17.5

Sources: SNEM Annual Reports; Ministry of Public Finance; and National Statistics Institute.

1967, many of those qualms were put to rest, and the malaria eradication program went back to work rapidly and at higher levels of activity to try to recover lost ground. Spending levels increased by almost 90 percent over those of 1964-1966, despite reductions in Guatemalan spending for 1967. The increased efforts resulted in nearly immediate reductions in reported cases of malaria.

2. PRIOR CONDITIONS AND PROJECT INPUTS

Malaria control programs began in the 1900s, shortly after scientists had established the crucial relationships in the transmission cycle. Because of technical limitations, most of these efforts were expensive and only temporarily effective. In Guatemala, the Public Health Department began to coordinate diverse malaria control efforts beginning in 1928, but the lack of a reliable technology limited their effectiveness. Despite many well-designed and implemented programs, malaria remained the primary reported cause of deaths and illnesses in Guatemala in the early 1940s. Inadequate funding and the lack of low-cost, persistent insecticides were partly responsible, but the need for stepped-up international technical and financial assistance was becoming increasingly clear.

One response to this was the formation in August 1942 of the Inter-American Cooperative Public Health Service (SCISP). In the early 1940s, SCISP organizations were formed throughout Central America, providing a semi-independent liaison between host country governments and the U.S.-based SCISP parent organization, the Institute for Inter-American Affairs.

One of SCISP's primary objectives was the extension of existing malaria control efforts. SCISP collaborated with the Public Health Department in completing four malaria control projects in its first 2 years in Guatemala: engineering work in two major coastal cities, a large source-reduction project, and the initiation of basic investigations and research programs to improve the quality of information for policymakers. These initial efforts were well-received, and the cooperative agreement between SCISP and the Guatemalan Government continued,with the Government agreeing in 1944 to share equally in the costs of SCISP activities.

During this first period of U.S. assistance to malaria control efforts (1958-1964), the U.S. provided matching grants to the Government of Guatemala to support SNEM; to help with UNICEF vehicle, insecticide, and medicine acquisitions; and to provide a malaria technical adviser through 1963. During the

second period (1967-1970), U.S. assistance was provided through a loan to the Government of Guatemala that involved only periodic technical assistance and project review. UNICEF supplied insecticides, vehicles, and other project equipment (such as pumps and sprayers), while PAHO continued to provide technical assistance and modest amounts of supplies and materials.

Over the entire period of U.S. involvement (1958-1970), funds spent by the four major parties totaled $19.8 million: Guatemala supplied about 48 percent, the United States 26 percent, UNICEF 18 percent, and PAHO 8 percent.

3. SUSTAINABILITY

Judged according to the criterion of maintaining project outputs over a 3- to 5-year period after the termination of U.S. funding, the Guatemalan malaria eradication program was sustained. Malaria rates dropped for 4 years before increasing slightly in 1975. Even with the near doubling of the rate in 1986, the rate was lower than in 1970, when A.I.D. funding ended. As UNICEF indicated that it would be phasing out its operation shortly after A.I.D. and A.I.D. seemed unlikely to support malaria eradication efforts after 1970, the Guatemala Government rapidly took over and even accelerated project financing, at least in nominal terms.

Most of the important program activity levels were also sustained or increased after 1970. Blood test sampling levels remained consistently well above World Health Organization (WHO) guidelines, but at a relatively constant percentage of the population. Reported malaria cases dropped and sampling sizes increased over the 1971-1975 period. The passive case-detection system was expanding by 200 to 300 volunteers annually, and SNEM outreach workers continued to make house visits annually. Spraying operations reached 600,000 to 3 million people annually, even though SNEM slashed the number of sprayers in 1971.

Thus by all outward appearances, Guatemala had reached a consolidation stage, and SNEM activities were consistent with that interpretation.

However, what really suggests the sustainability of this program is the series of pragmatic adjustments that took place during the early 1970s, all reflecting a management transition away from costly, high-risk eradication strategy toward control

strategies. It was clear that if the extensive, multilateral efforts of the 1956-1970 period were unable to achieve eradication, that goal was unlikely to be attained independently. Since complete abandonment of the malaria program was inconceivable the only realistic option was to move toward a restructured program emphasizing control rather than eradication. With the realization that Guatemala would be bearing the lion's share of malaria eradication program expenses in the future came the partial integration of the malaria eradication program into the Ministry of Health, increased resource allocations for control rather than eradication efforts, and a gradual lowering of SNEM's institutional profile. Although talk of eradication continued to dominate public discussion, SNEM was in fact shaping itself and being shaped by higher authorities for the different, more sustainable role of controlling malaria.

Evidence of problems with the eradication program and timetable began accumulating early in the program. Guatemala encountered vector resistance just over 2 years into total-coverage spraying in malaria zones. The shift to DDT apparently produced a sharp drop in malaria incidence rates, although the reliability of activity and output statistics is questionable so early in the program. But this shift also increased operating costs because the spraying frequency was doubled. Pockets of resistance to DDT were soon discovered, and news of setbacks and delays in other eradication programs was abundant.

Under these circumstances, program managers and advisers, as well as those funding the program, began to think about shifting to a control strategy. If eradication were shown to be unattainable, the sustainability of the program would depend on how rapidly and effectively it was able to shift to a set of attainable goals related to malaria control.

Accordingly, the sustainability of this program was enhanced by realistic adjustments to changing conditions, including the implicit goal change from eradication to control. The program still requires some other changes as well, particularly in the structure and use of its management information system. Also many program components designed for an attack strategy are unsuitable or even inappropriate for malaria control.

4. CONTEXTUAL FACTORS

4.1 Natural Disasters

Although as a result of the 1976 earthquake some additional emergency spraying was required, the earthquake did not greatly

affect SNEM operations. The major effect of the disaster was indirect--it produced a large, one-time shift in public spending priorities. While expenditures in other public programs soared almost 45 percent in 1976, the Ministry of Health spent only marginally more than the year before. Although the Ministry and SNEM budgets increased substantially over the next 5 years, many Ministry officials felt that the gap between health sector budgets and other public sector spending was never really closed, and that health care priorities in general suffered as a result of the earthquake. However the data are inconclusive on this issue.

4.2 Political Environment

From the beginning of U.S. assistance to the malaria eradication program through most of the 5-year period following A.I.D. withdrawal, Guatemala was ruled by a series of unstable military governments. However, the malaria eradication program was largely isolated from these effects. SNEM was a vertical organization with its own internalized support systems and some heavy international players on its team. Its organization and makeup therefore served to buffer it from the effects of political instability.

The economic benefits that resulted from the cultivation of new lands opened as a result of the success of the malaria eradication program also created interest groups with a stake in the continuity of the program. Compared with the real and potential benefits of malaria eradication or control, the fiscal burden SNEM placed on the Guatemala Government was small, whereas the political repercussions of failing to adequately support the program were potentially large. Several informants reported that the economic significance of the program was recognized by all political regimes, civilian and military, and that as a result political support for SNEM was always high.

Despite continued political instability throughout the period of U.S. support to malaria eradication efforts, political factors actually served to promote continuation of the program.

4.3 U.S. Guatemalan Relations

During the 1958-1970 period, neither international nor regional politics had much direct effect on the malaria eradication program. If anything, growing U.S. interest in the entire region following the Cuban missile crisis encouraged increasingly cordial and accommodating relationships with host governments in the region.

However, U.S. development assistance priorities changed considerably during this period, shifting to rural water systems and latrines, primary health care, child survival, and family planning projects. The effect of this shift was to pressure Guatemala to assume full financial responsibility for the malaria eradication program and so avoid the kinds of political backwash it had felt during the cutback in malaria control efforts in 1965-1966. Although the financial burden was great, the government not only continued but also expanded the program in some respects.

On balance, U.S.-Guatemalan Government relations do not seem to have had any significant effect on the program. Possibly the large number of other A.I.D. assistance projects (in education and economic development as well as in health) in place or just beginning in the early 1970s led to support for the malaria program as a show of "good faith" by the Guatemalan Government. This conjecture could not be confirmed, however.

4.4 Sociocultural Context

The overall eradication strategy may have been technically sound, but it included many elements that proved unacceptable to the people who had to cooperate to make it a success. For example, spraying schedules were based on program needs rather than the convenience or wishes of the community. At any evidence of a malaria outbreak SNEM teams would administer drugs, whose side effects made many people feel worse than before. Although "free" presumptive treatment was to be provided, the blood sample required for screening was a cost to many. These and other elements of the eradication program demonstrated a failure of program officials to understand the need to tailor strategies to the diverse social and cultural groups that would be encountered in a nationwide program.

Many officials felt that the indigenous indian population was more cooperative than the ladinos, even though the program was much less responsive to the sociocultural conditions of indigenous groups. Generally, this cooperation was attributed to the relatively greater susceptibility of the indigenous groups to malaria, largely because of lack of significant exposure until the malaria eradication program opened the Pacific coast to cultivation and created a seasonal demand for their labor.

Recently, the Division of Malaria has undertaken several studies designed to increase the responsiveness of the malaria control strategy to sociocultural factors. These efforts are part of a broader strategy to integrate or coordinate appropriate aspects of the malaria program with the primary health care system.

4.5 Economic Context

Benefiting from favorable economic conditions and growing public budgets, the Ministry was able to absorb the costs of the malaria eradication program in the early 1970s without sacrificing its other programs. From 1970 to 1980, SNEM spending grew by an average of 15 percent annually, which was, however, a slower rate of increase than the 20 percent increase in Ministry and overall government spending.

Early in the 1970's, however, rapidly increasing insecticide costs and decreasing effectiveness created economic pressures that helped reinforce a shift from eradication to control strategies. The heavy reliance on foreign markets for insecticides was problematic and resulted in a public renunciation of the policy of total-coverage spraying. This renunciation simply made public a change in strategy that had already been occurring in the malaria eradication program, which had been phasing down spraying operations for some time.

The economic significance of the malaria program was clear by this time. Increased cultivation of export market crops had been responsible for a large part of the economic advances realized in the 1960s, and the relationship of this expanded output to malaria conditions did not escape attention. Guatemala would be willing to spend a great deal of money to preserve these gains.

In summary, economic factors worked strongly in the direction of sustaining the malaria eradication program in Guatemala.

4.6 Private Sector

Malaria control programs require centralized coordination, which leaves little scope for private sector involvement. Although some consideration has been given to contracting with private firms for spraying services, the sporadic nature of these operations and the need for supervision them make this impractical.

Although some businesses and farms have cooperated with SNEM and have covered some of the costs of spraying programs on their property and treatment for their employees, there is really no organized private alternative to public sector responsibility for malaria control efforts. Thus, the private sector has had no bearing on the success of the program.

4.7 Implementing Institution

Most of the day-to-day work under the malaria eradication program, was carried out almost exclusively by SNEM personnel. SNEM leadership was quite stable throughout the period of U.S. assistance and afterwards. The individuals leading SNEM efforts were a well-qualified and motivated group, who reportedly had benefited greatly from the early leadership and training programs provided by SCISP. Although SNEM officials were effectively following a general plan that had been laid out by others, their local experience was useful in tailoring the general program strategy to Guatemala. However, when problems were encountered in implementing the eradication program, policy decisions were not normally made independently at the country level.

SNEM was a strongly vertical organization at the outset of the eradication program, and its hierarchical structure and independence remained largely intact under a succession of different administrative units within the Ministry. Only in the early 1970s, when administrative authority over SNEM was passing from the Director General to the Malaria Division, did integration come to mean anything more than a line on an organizational chart.

As purchasing programs were further centralized, SNEM retained little control over supplies. The result was sometimes disastrous. During 1977, a year of extraordinary increases in reported malaria cases, not one house in Guatemala was sprayed because of the failure to receive supplies. Labor legislation has further restricted the flexibility of SNEM, and the organization no longer has the influence it had during the height of the campaign.

Despite these changes, SNEM retains most of the characteristics of a vertical organization, although recent changes in the leadership of the Malaria Division portend more serious and concerted integration efforts in the near future.

4.8 Donors

A.I.D., PAHO, and UNICEF had effectively defined their respective roles at the beginning of the regional program. The International Cooperation Agency (ICA, A.I.D.'s predecessor) and later A.I.D. would subsidize local (primarily labor) costs, UNICEF would concentrate on supplies, and PAHO would provide the major technical assistance. Each donor was to have a say in developing the country strategy and regional coordination plan. These relationships were stressed during the course of the program and basically held true to the end. Indeed, the high degree of coordination between these groups was repeatedly cited by informants as a key factor in the early success of the program.

This multidonor involvement is a form of the "bandwagon" phenomenon that occurs in many assistance projects, as donor groups are attracted to or approached for the same projects at the same time. As is frequently the case with multidonor involvement in related efforts, the donors withdrew their support around the same time. Although the malaria eradication program has been sustained, the transition was more difficult than it would have been had donor involvement and withdrawal been sequenced.

The different funding patterns of A.I.D. and UNICEF during the latter stage of their involvement are striking. A.I.D. contributions to the program were relatively uniform and high, but dropped off precipitously; in contrast, UNICEF gradually phased out its funding, a practice that is much more conducive to project sustainability under most circumstances (see Section 5.3.1). Despite the value of coordination among A.I.D., PAHO, and UNICEF, their near-simultaneous withdrawal placed a considerable financial burden on the Ministry of Health and strained Government resources. Accordingly, the lack of donor coordination in phasing program funding is considered to have inhibited the sustainability of the program.

4.9 National Commitment to Project Goals

The realized and potential benefits of malaria control generated considerable national interest and support for the program. In the the first flush of global excitement over eradication, Guatemalan public officials also saw the opportunity to multiply the effects of public investment through the anticipated international technical and financial assistance.

This high level of commitment to the program contributed greatly to its sustainability, and commitment and support remain strong for the goal of controlling malaria.

5. PROJECT CHARACTERISTICS

The general malaria eradication plan developed by PAHO provoked little discussion or negotiation with host governments following its introduction and refinement during the 1950s. The 8-10 year strategy had three phases: (1) 2 years for identifying and classifying malaria-affected regions and for institution building to carry out the subsequent program; (2) 4 years in the "attack" phase involving regular residual spraying of houses in affected areas, and (3) 4 years for consolidation, or identifying and responding to residual problems with radical treatments.

5.1 Project Negotiation Process

Little negotiation appears to have taken place on the technical aspects of this program, which were determined largely by international groups. The basic belief was that the strategy needed to be applied uniformly and simultaneously. Both sides appeared to believe that little would be gained from negotiations on the technical aspects of an eradication program, which entailed specialized knowledge.

The Guatemalan Government was more involved in negotiating funding and in applying specific technical criteria to local conditions, but its options were often limited by a long series of accounting restrictions and technical guidelines. The non-collaborative nature of the negotiation process does not appear to have affected the sustainability of the program.

5.2 Institutional Organization and Management

5.2.1 Vertical Versus Horizontal Design

After more than 30 years of frustrating pursuit of malaria eradication many developing country health care officials are quietly returning to the control strategies and principles that had been largely set aside when eradication campaigns were first mounted. As a result of these reformulated, more modest aims for malaria programs, the vertically organized, semi-autonomous units created by many countries to direct their campaigns are now under fire.

Citing ineffectiveness, increasing costs, and the emergence of many new and promising public health care innovations that must compete for public health care funds, many interested

observers are now urging the dismantling of these units and the integration of their functions into the regular operations of public health ministries. This change would put malaria control resource allocation decisions more on a par with other public health care concerns..

For SNEM, this process of integration has been going on for some time, although it still retains considerable autonomy. SNEM has also successfully integrated the inputs and activities of major donors into this vertical program. During the period of donor assistance, technical advisers were always on the scene, but SNEM's normal operations in no way depended on their contributions. SNEM operations followed a plan of action that had been jointly agreed to by all parties and that specified the roles and responsibilities of each.

The experience with SNEM supports the hypothesis that a vertical organization can be consistent with sustainability.

5.2.2 Managerial Leadership

Many of SNEM's original managers were drawn directly from the higher ranks of the Ministry's General Directorate. They were familiar with the previous efforts of the Malaria and Epidemic Diseases Section, and most stayed with SNEM for extended periods of time. Their institutional memory was an important factor in enabling SNEM to adopt new strategies for the 1970s.

Stable leadership promotes sustainable projects, not only by promoting stable policies, but also by providing a program with experienced leaders capable of identifying the need to adopt new strategies as circumstances change, which was the case with SNEM managers in the 1970s.

5.2.3 Administrative Systems and Training

The early administrative training and support provided by SCISP has frequently been cited as the major reason for SNEM's rapid development of institutional capability. SCISP also developed an excellent set of training materials that prolonged the benefits of this training support. PAHO provided funds and scholarships for training administrators and professionals abroad. Regular meetings were held within the region for directors of malaria eradication programs to permit first-hand sharing of experiences involving particular administrative,

technical, or professional matters.

Project evaluations and audits conducted at various stages of the project observed that the program was effectively administered, quite effectively, but that it was plagued by technical problems. Although there has been no consistent follow-up on the early administrative systems and training provided by SCISP, that original effort was sufficient to establish the strong administrative structure needed to maintain a vertical organization and the internal management mechanisms required to keep that structure strong in the future.

5.3 Financing

5.3.1 National Absorption of Project Costs

Despite visibly growing concern by UNICEF over the evolution of and its involvement with malaria eradication programs worldwide, the Government of Guatemala made almost no provision for absorbing the costs of insecticides, fumigants, and related materials, which were provided by UNICEF through 1973.

U.S. contributions and loans were picking up a share of local costs, primarily salaries. Because these allocations were comparatively stable and predictable, it was relatively easy for the Government of Guatemala to anticipate these costs in its budget programming. Nevertheless, when A.I.D. ceased its direct grants in 1964, the Guatemalan Government was not prepared to make up the shortfall, and total program expenditures in 1965 fell by more than 25 percent.

The end of A.I.D. funding was a difficult period for SNEM because of the uncertainty concerning new A.I.D. funding. At the same time, the antiquated Special Public Health Service (SESP), which had taken over administration of SNEM from SCISP in 1963 was dismantled, and SNEM was given semi-autonomous status within the Ministry, reporting directly to the Minister. The inability or unwillingness of government to increase SNEM's budget authorization may have been affected by these factors, or it may have been a result of the widespread corruption reported at the time. Whatever the cause, the result was politically damaging and embarrassing to the Guatemalan Government, which may have influenced the Government to react very differently in 1971.

The nature of the A.I.D. grant and loan agreements with Guatemala poses a problem for examining the hypothesized relationship between cost absorption and sustainability. During the early years of the malaria eradication program, Guatemala's contribution was relatively stable, in large part because of the Government's matching grant agreement with the United States and the desire to spread its contributions evenly throughout the duration of the project. Following the fiscal turmoil of 1965-1966, the U.S.-Guatemalan Loan Agreement ensured stability in Guatemalan malaria program appropriations by specifying precisely the total cost shares that Guatemala was to maintain. Thus, in both stages of A.I.D. involvement, the terms of the project agreements limited incentives for the government to phase in higher appropriation levels.

Nevertheless, some evidence of increased absorption of project costs is provided by the loan amendment authorizing an increase of $630,000, which was expressly requested by the Guatemalan Government and which, by the terms of the loan agreement, required a Guatemalan contribution of almost twice that amount. This de facto increase in cost absorption, supports the hypothesized relationship between cost absorption and sustainability. Furthermore, the Guatemalan Government not only absorbed these projects cost when A.I.D. withdrew, but it also increased its expenditures for malaria through 1981.

5.3.2 Foreign Exchange Requirements

The purchase of insecticides, larvicides, fumigants, and related materials is the largest single component of the malaria eradication program potentially requiring foreign exchange. A strong surge in the Guatemalan economy during 1972 made absorption of malaria eradication program costs comparatively painless, and SNEM had already identified some local sources for these materials which would reduce the need for foreign exchange.

However mosquito resistance to DDT necessitated a switch to Propoxur, a considerably more expensive insecticide. Despite increasing Guatemalan Government appropriations for insecticides, by 1974 the Division of Malaria--which had subsumed SNEM in mid-year--decided to limit spraying to restricted, priority areas rather than to continue to provide blanket coverage in all malaria-affected areas. This shift marked a significant step back from the eradication strategy, a step that had been presaged by the dismissal of large number of sprayers and field personnel in 1971.

In addition, the large foreign exchange requirement led to significant delays in the purchase of insecticides, which paralyzed the spraying program for a large part of 1974. By the following year, the period of consistent decline in reported cases and malaria rates had ended, and a virtual epidemic was just a year or two away.

The high foreign exchange component of the project was offset by adaptive management strategies (including reduced expectations) and did not prevent the project from being sustained, although it temporarily decreased its effectiveness some years after A.I.D. funding terminated.

5.3.3 Tradeoffs Among Government Priorities

Although SNEM appears to have fared rather well in terms of its executed budgets, it is informative to compare how well SNEM has done in relation to other health and public programs.

SNEM's share of the Ministry of Health executed budget has been consistently smaller than the Ministry's share of the Government's executed budget. In turn, the Ministry's share of the government's executed budget has been smaller than the government's share of GNP.

Over the 21-year period 1966-1986, SNEM expenditures accounted for an average of 5.4 percent of Ministry of Health spending, Ministry spending averaged 8.3 percent of total government spending, and government spending averaged 12.5 percent of GNP. Although SNEM's average over the period was 5.4 percent, it never reached that level in any year after 1976. Ministry appropriations to SNEM increased in the year (1971) following the end of the project, but after that, SNEM's share of Ministry spending steadily declined and then fell and then stabilized (see Table D-4). There was a brief increase in Ministry appropriations to SNEM in the 1980-1981 period, despite a decline in the Ministry's share of Government spending, to enable SNEM to fight the extraordinary outbreak of malaria. The pattern of Ministry funding of SNEM is similar to the way in which A.I.D. and UNICEF "primed the pump" from 1967 to 1970 before leaving the Ministry to its own fiscal devices.

The implication of this trend of SNEM's declining share in the Ministry budget is that SNEM was becoming less of a threat to other public health care programs and acquiring a much lower institutional profile. This trend does not necessarily pose a threat to the malaria control program over in the long run; indeed, the lower profile might even help.

During the period of U.S. support for the malaria eradication program, no shifts in national priorities were required; malaria eradication had been a public priority for more than a quarter of a century. Furthermore, the United States and other donors were supporting numerous other projects in the health sector during the period of the malaria eradication program, and as the analysis of SNEM funding indicates, there are no signs that SNEM was taking funds away from other programs. Thus the fact that the malaria eradication program did not seem to require any tradeoffs among national priorities supports the hypothesis that this factor would contribute to sustainability.

5.3.4 Cost Recovery

There has been little or no effort to institute cost-recovery mechanisms in the malaria program, other than to require large farms and businesses to finance the costs of certain programs. For a program that requires coverage of all malaria-affected areas nationwide, user fees, to the extent that they inhibit the use of the control system and lead to gaps in coverage, would be counterproductive. The absence of extensive cost-recovery mechanisms had no effect on sustainability; in this case, attempts at cost recovery could have been harmful.

5.3.5 Cost-Effectiveness

Although failing to eradicate malaria, the malaria eradication program did reduce incidence rates significantly, an accomplishment that justifies the investments in the program. Also, corruption and waste were minimal in the program, in part because of the vertical structure of SNEM and the interest and involvement of donor agencies.

Operating procedures reflected appropriate technical performance monitoring and response procedures, although the data produced were not of the quality needed to support reliable calculation of performance indices. The quick detection of resistance to dieldrin, for example, indicated that effectiveness measures were being properly applied. The "early warning system" based on reports of community volunteers, although incapable of producing reliable data on incidence rates, was effective in identifying outbreaks and general trends, thus permiting appropriate and timely response by SNEM.

Along with the incalculable benefits of reductions in illness and death from malaria, the program also made a substantial contribution to the economic well-being of the country. The Guatemalan economy is heavily dependent on agriculture. One of the major accomplishments of the malaria

eradication programs was to open large tracts of land to cultivation, particularly in the fertile Pacific coastal regions. These gains are tangible and significant, and they depend on maintaining the gains made in malaria control. Termination of the malaria program would lead to large losses in production following vector resurgence.

From a long-term perspective (benefiting from hindsight, of course), attempting to achieve the original eradication objective probably substantially increased the costs of the program. Nevertheless, the benefits produced by the malaria eradication program appear to have more than justified the investment. Furthermore, because the effectiveness of the program (the important economic and health benefits produced) is dependent on continued program outputs, the hypothesized relationship between effectiveness and sustainability is supported by this program.

5.4 Project Content Aspects

5.4.1 Project Design

The basic malaria eradication strategy for developing countries was designed by WHO. The program elements were carefully detailed in early training efforts and action plans, and they were understood at all levels of SNEM. Since eradication had to be an integrated effort among bordering countries, the staging and coordination of efforts was crucial. Clarity of goals encouraged sustainability and created the opportunity to shift to a more appropriate strategy in the future.

The duration and cost of the program, although much greater than originally planned, support the hypothesized relationship: longer periods of support and greater investments.

5.4.2 Training

Training was extensive and programs were substantially institutionalized within SNEM. For the large number of field workers, including sprayers and community volunteers, technical training was comparatively brief, followed by on the job training under the supervision of experienced personnel. Equally important, those who received training could expect to be hired by SNEM. However, little demand for these skills existed outside the malaria eradication program, so the training

components were not more sustainable than the other project components. However, because trainees could find employment only within the program; their incentives for performing well were high. The combination of appropriate training, institutional absorptive capacity, and monopsony (single buyer) conditions in the labor market all helped to promote the sustainability of this program.

Over time, the Health Education Section of SNEM developed extensive public education and middle-management training programs. For higher level administrative and technical personnel, specialized seminars, scholarships for overseas training, and funding for inspection visits to other countries were provided. Individuals who benefited from these training efforts almost always returned to SNEM to apply their new skills or information, thus contributing to sustainability.

Institutionalization of training activities is an effective device for maintaining autonomy and control over program direction, which in turn makes an organization more enduring. The major sources of pressure for changes in training (and operating) techniques were international and regional. As such, SNEM was further removed from local pressures concerning program operations and better able to weather its first few years of independence.

5.4.3 Personnel Incentives

Members of SNEM's management and professional staff were an elite and isolated group engaged in what they saw as a noble effort, so the internal esprit de corps was consistently high. Morale problems during the first 20 years could be traced mainly to external sources--inadequate funding or excessive delays, inability of other organizational units to coordinate their activities, and malaria resurgence along borders that was routinely blamed on inadequate programs in other countries. This internal unity produced low turnover rates among management and professional personnel and encouraged sustainability.

Subsequently, as administrative control of SNEM passed to the Malaria Division, SNEM's exposure to other program activities demanding managerial attention and resources increased, and SNEM's view of itself as an elite unit suffered, as did the morale of its workers. Increasingly, the staff saw themselves less as the elite strike force of the early stages of the program and more as one of many divisions competing for attention and funding.

Nevertheless, the momentum built up during the project period which was probably reinforced by the desire of SNEM personnel to show that they could accomplish the goal of the program independently, carried over into the early 1970s and encouraged sustainability.

5.4.4 Supplies and Logistics

The SNEM logistics system received strong support during the project and was able to manage and move supplies quite effectively. These strengths carried over after A.I.D. funding terminated, and few problems were encountered with internal logistics during the early 1970s. Over time, however, lack of complete control over the purchasing process caused great delays in acquiring adequate supplies of insecticides and disrupted attack operations, notably in 1977, when reported cases of malaria soared. The deterioarating condition of the vehicle fleet also became a matter of some concern in the latter part of the 1970s.

5.4.5 Technical Assistance

Most of the technical assistance services during the project period were provided by PAHO. Although program reviews involved multinational and multidisciplinary advisers, the advisers may not have had a sufficient diversity of perspectives to encourage early review and reconsideration of the feasibility of eradication strategy.

From a technical perspective, the technical assistance team was highly competent, but from a planning perspective, it was incomplete and biased in favor of short-term response procedures. Technical fixes were emphasized, and little thought was given to the potentially serious technical and financial problems that could result from a failure of the eradication strategy, that is, of the subsequent need to try to "control" a disease that had beaten off intensive efforts to eradicate it and grown stronger in the process.

By enhancing the technical skills of SNEM personnel, PAHO technical assistance helped them to perform their tasks more effectively and promoted sustainability. Although the eradication goal may have been pursued too long, SNEM technical personnel were better equipped to respond to whatever strategies management adopted. Accordingly, the technical assistance provided under the project promoted its continuity.

5.4.6 Appropriate Technology

Several technologies were employed in the malaria eradication program to address different stages of the malaria cycle, but the most visible and costly technology was the spraying program that was central to the attack phase. Residents were concerned about the safety of coating the interiors of their homes with a toxic substance. Deaths of pets and other animals in and around sprayed houses brought predictable reactions and increased the numbers of citizens who refused to allow their homes to be sprayed, even though they were legally obligated to do so. Many people washed their walls within minutes after they were sprayed, and SNEM never followed up on its house-spraying activities to find out why or how often this was occurring. This reluctance to participate also extended to treatment programs because of aversion to distasteful medications and their side-effects and the requirement to submit to a blood test before receiving medicines. Such reluctance to participate may not be a serious obstacle to a control strategy, but it may critically affect eradication efforts.

The major technical problem created by spraying and larvicide treatment is the development of vector resistance. If managers have rationally selected the cheapest insecticide that will do the job, the costs of spraying operations inevitably rise if resistance develops rapidly. Since resistance develops more rapidly the greater the exposure, unsuccessful blitzkrieg eradication programs are likely to be more expensive and to produce fewer benefits than would control strategies. Underestimating the adaptability of the disease vector and setting unrealistically high goals were the principal technical errors in the malaria eradication program in Guatemala and elsewhere.

Sustainability was not compromised by the use of some inappropriate technologies, and so the program gained the time needed to change or modify these technologies as problems were identified.

5.5 Community Participation

Community members had little or no say in the design of the program or in its implementation. Indeed, many aspects of the malaria eradication program were direct impositions on communities, carried out without consultation or forewarning.

However, the malaria eradication program did rely on a network of community volunteers to provide some rudimentary information from the field. Volunteers received brief training in blood sampling and dispensing of medicines and were regularly resupplied by their supervisor. The system has been examined and modified over time to make it more acceptable and effective in the community, and the size and significance of this network has grown over time.

The participation of community volunteers filled an important gap in the program. It provided a low-cost source of information from the field, which enabled more effective response to changing conditions and contributed to sustaining the project.

5.6. Effectiveness

The effectiveness of the malaria eradication program is indisputable. Lives were saved, illnesses were avoided, new tracts of fertile land were opened to cultivation, and economic productivity was increased. However, there was never any attempt to quantity any of these benefits, and so the rising costs of the program were often more visible than its benefits. Similarly, when the program shifted to the more appropriate long-term strategy of control, it was perceived as having lost its effectiveness rather than as having adapted to realities.

The cumulative gains achieved under this program, together with the realistic concerns over losing the benefits that had been achieved, combined to promote continued support of the project, albeit with the less ambitious strategy of seeking to control rather than to eradicate malaria.

6. CONCLUSIONS AND RECOMMENDATIONS

This case study has identified some important methodological implications for sustainability analyses. The first has to do with clarification of the dependent variable sustainability, which we are seeking to explain. The second relates to the multiple significance of an omitted independent variable, the secondary economic benefits and costs produced by the health project. By considering both of these issues, we can see that a sustained malaria control program evolved from an unsustainable eradication project.

The handling of the malaria eradication program following the virtual termination of external funding in 1970 forces reconsideration of the way we interpret the concept of sustainability and how we can recognize sustainability when we see it. Had a longer period than 3 years been used in evaluating whether a project had been sustained, it would have been considerably more difficult to argue that program outputs had been sustained. For example, some informants suggest that the continuing improvements observed in the early 1970s were attributable more to the inertial effects of the increased level of donor support in the late 1960s than to the efforts of SNEM after funding ended. Although this is unlikely, it points out the realistic possibility that strategies in the design and execution of assistance programs may lead to projects that score high in meeting specific sustainability criteria but do not really promote the kind of institutionalization that is being sought.

Emphasizing the sustainability of programs, projects, or components for its own sake is not the real objective; we want to be able to sustain the "good" effects of programs and avoid the "bad" ones. Rote repetition of past activities can be taken as evidence of desired sustainability only if the activities continue to accomplish the underlying health care objective. This is a minimum standard. Ideally, the objective will also be achieved as efficiently as possible, meaning that programs must be able to identify and adopt new ways of accomplishing objectives that save resources--resources that can be put to use elsewhere or applied to extending or expanding the current program.

This means that the output and activity measures used to gauge whether a project is sustained may change markedly over time. Shifts in the volume and type of program activity could be interpreted either as an efficient, adaptive management strategy or, if rigid criteria are applied as a failure to sustain program activities.

A related source of difficulty presented by the malaria program case was the issue of changing goals. Although it is desirable to make beneficial projects sustainable and to build explicit features into the design process to achieve this, the fact remain that objectives can change. Programs with characteristics that are specifically selected to promote continuity threaten to be less responsive to changes in goals or social preferences and to perpetuate themselves beyond the point at which they should be changed or terminated. A particular health care objective may lose in relative priority or it may be dropped entirely--for example, when it is found to be infeasible. Sustainable programs or projects must be flexible enough to adapt to such changes in priorities and objectives.

The shift in the goal of the Guatemalan malaria program from eradication to control reintroduced a necessary program ingredient that had been lost: the apparent feasibility of achieving organizational goals. However, the shift in program objective was made at the cost losing clarity and adding controversy to the objective: eradication is a relatively unambiguous concept, whereas the notion of a "socially acceptable" malaria incidence rate is ambiguous and prove to misinterpretation because of a reluctance to Explicity quantity such a goal. But whether the topic is explicitly addressed or not, the amount and geographic distribution of resource is explicitly addressed or not, the amount and geographic distribution of resources allocated to malaria control provide implicit measures of such unquantified goals.

Lacking clear and specific guidance on what is wanted and expected, the control program, has been conducted somewhat haphazardly and inefficiently in the decade since malaria rates began to skyrocket. Nevertheless, SNEM activities, despite bearing more than their share of the fiscal austerity measures taken in the early 1980s, helped produce a 45-percent reduction in the number of reported cases of malaria in just 4 years. This impressive showing, underscores the fact that the main source of program inefficiency is at the planning rather than at the operations level. Informants regularly cited the dedication of field workers and their commitment to program objectives. This same attitude apparently exists today, despite recent changes in labor laws that could encourage field workers to reduce their level of effort.

The current programmatic thrust is to promote integration or coordination of appropriate aspects of the control program with the primary health care delivery system. This movement toward integration basically follows the pattern laid down some years earlier by the highly praised and successful anti-tuberculosis campaign which began as a vertical program but was gradually absorbed into the overall health system as conditions warranted. If accompanied by required education and training efforts, integration should prove to be an excellent strategic move. Once again, however, this change is focused more on the means than the ends of malaria control; specific objectives have not been established and the program may continue to lack direction as a result.

More generally, the malaria study case suggests a kind of program life cycle or organizational evolution in which certain project characteristics may be desirable at one stage and undesirable at another. The original vertical structure of SNEM

represented the most effective way of accomplishing eradication goals in the opinion of most technical experts. Even when the aim of the program shifted toward control, the vertical organizational structure continued to serve it well for a period of years when priority control strategies required rapid-strike capabilities whenever an outbreak appeared. Such a rapid-strike capability in turn required an organizational ability to take relatively independent action.

SNEM independence of action was partially lost in a series of reforms during the mid-1970s that included centralization of most Government-purchase programs. This centralization resulted in damaging delays in the delivery of insecticides during 1977 and a cessation of spraying at that crucial point. Recent labor legislation has also severely affected the response capability of the malaria program by drastically restricting its ability to rely on field employees (sprayers, in particular) paid by the hour. Regionally organized spraying operations are considered to be the likely response to this development.

In sum, the original vertical structure of SNEM is being dismantled piece by piece as the malaria program becomes increasingly integrated into the public health system.

The second major methodological issue raised by the malaria case study relates to the treatment of important secondary benefits and costs. From a design perspective, health care projects that also promote demonstrable and significant economic benefits for the domestic economy would appear to be much more sustainable. Such projects build up local constituencies that will support continued activity because they have an economic stake in the process of health care provision. In some instances, stimulation of local industrial development can work to strengthen the country's foreign exchange position by increasing exports and decreasing imports.

The domestic manufacturing of insecticide in Guatemala has provoked much speculation about the progress that could have been achieved had early efforts been made to stimulate this industry in Guatemala. However, given the program's initial optimism regarding eradication, there was little reason for donors to have seriously considered this alternative early in the project. They were expecting a brief if difficult struggle before vector transmission of the disease was blocked, followed by a considerably reduced need for insecticides thereafter.

As thinking shifted from eradication to a long-term control strategy, domestic manufacturing became an option that could have received more attention. But by this time, however, international manufacturers had a strong financial interest in maintaining their market share for a primary input to a worldwide campaign and would have strongly opposed foreign stimulation of domestic insecticide manufacturing. Although the opportunity may have been missed in the Guatemala program, future health care project designs should explicitly consider the issue of local markets and incentives for encouraging the development of domestic industry. This point is related to the more general issue of linking intangible health benefits to concrete, visible economic benefits as a mechanism for promoting sustainability. Project designers should look carefully for such opportunities and they should incorporate explicit mechanisms for estimating the magnitude of these secondary benefits and for making this information public.