AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A (A = Add, C = Change, D = Delete) — Amendment Number

DOCUMENT CODE: 3

2. COUNTRY/ENTITY: Haiti

3. PROJECT NUMBER: 521-0143

4. BUREAU/OFFICE: LAC — 05

5. PROJECT TITLE (maximum 40 characters): Management of Malaria

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 09 DD 30 YY 86

7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4)

A. Initial FY 82 B. Quarter 4 C. Final FY 86

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY 83 B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total	1,161	839	2,000	4,293	3,707	8,000
(Grant)	(1,161)	(839)	(2,000)	(4,293)	(3,707)	(8,000)
(Loan)	( )	( )	( )	( )	( )	( )
Other U.S. 1.						
Other U.S. 2.	–					
Host Country	–	1,850	1,850	–	8,585	8,585
Other Donor(s)	2,460	–	2,460	9,900	–	9,900
TOTALS	3,621	2,689	6,310	14,193	12,292	26,485

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	2. Loan	D. OBLIGATIONS TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
(1) HE	520	542				500		8,000	
(2)									
(3)									
(4)									
TOTALS						500		8,000	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each): 760 | 710

11. SECONDARY PURPOSE CODE: 510

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code	BR	ENV					
B. Amount							

13. PROJECT PURPOSE (maximum 480 characters)

The purposes of this five-year Project are:
(1) To strengthen the institutional capacity of the GOH (SNEM) to plan and implement effective malaria control activities with the Dominican Republic in executing a joint, island-wide anti-malaria program; and
(2) To significantly reduce the mortality and morbidity of malaria in Haiti by targeted attacks on the geographical foci of the disease.

14. SCHEDULED EVALUATIONS

Interim MM 04 YY 84 | MM YY | MM YY

Final MM 12 YY 86

15. SOURCE/ORIGIN OF GOODS AND SERVICES

☐ 000 ☒ 941 ☐ Local ☐ Other (Specify) _____

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.)

17. APPROVED BY

Signature: Gordon A. Hill

Title: Director, USAID/Haiti

Date Signed: MM 09 DD 09 YY 82

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION

MM DD YY

AID 1330-4 (8-79)

TABLE OF CONTENTS

		Page
I.	PROJECT SUMMARY AND RECOMMENDATIONS	
	A. Recommendation	1
	B. Summary Project Background	1
	C. Summary Project Description	2
	D. Summary Financial Plan	3
	E. Issues	4
II.	PROJECT BACKGROUND	
	A. Statement of the Problem	6
	1. The Global Malaria Problem	6
	2. Malaria in Haiti	7
	3. Antimalaria Efforts	9
	4. Critical Aspects of the Malaria Problem	11
	B. Relationship to U.S. Strategy in the Caribbean	13
	C. Relationship to Haitian Development Goals	15
	D. Role of Other Donor	16
	E. Project Rationale and Strategy	20
III.	PROJECT DESCRIPTION	
	A. Project Goals and Purposes	24
	B. End of Project Status	25
	C. Project Activities	27
	1. Strengthening SNEM Institutional Capabilities	28
	a. Human Resources Development	28
	b. Strengthening Management System	34
	c. Strengthening Technical Capacity	35
	2. Mobilization of Community Resources	36
	3. Development of a Malaria Surveillance System	40
	a. The Stratification Process	40

b. Components of the Surveillance System 43

c. Operational Research 46

4. Implementation and Improvement of Malaria Control Field Operations 47

a. Intradomiciliary Spraying 47

b. Chemotherapeutic Method 50

c. Larval Mosquito Control 52

d. Area Spraying 53

e. Source Reduction 53

f. Biological Control 54

IV. PROJECT ANALYSES

A. Technical Analysis 56

B. Social Soundness 65

C. Institutional Analysis 77

D. Financial Analysis and Plan 97

1. Project Cost Options 97

2. AID First Year Funding 99

3. Subsequent Year AID Funding 101

4. Other Donor Support 103

E. Economic Analysis 104

V. PROJECT IMPLEMENTATION

A. Implementation Plan 125

B. Disbursement Procedures 125

C. Procurement and Contracting Procedures 128

D. USAID Monitoring Requirements 128

E. Evaluation Plan 130

1. FY 84 Evaluation 130

2. FY 86 Evaluation 131

F. Conditions Precedents, Covenants & Special Provision

ANNEXES

A. Statutory and other Exhibits

Exhibit 1. Section 611(e) Certification
2. Grantee's Application for Assistance
3. Draft Project Authorization
4. Statutory Checklist
5. PID Approval Cable STATE 160981
6. IEE
7. Amended IEE

B. Logical Framework

C. Supplementary Technical Information

1. Simplified Description of Falciparum Malaria in Haiti
2. Epidemilogical Overview of Malaria Incidence
3. Listing of High Priority Stratified Foci
4. Research Report, "Acute Diarrhea: An Important Symptom of Malaria Among Children" (Drs. Jean Pape & B. Mondestin)
5. Recommended Drug Treatment Schedule
6. Projected Population at Risk of Malaria , 1982-1992

D. Supplementary Project Implementation Information

1. Listing of Needed Operations Research Studies
2. Recommendations of USEPA consultant
3. SNEM Staffing Plan 1983-1986
4. Khaled Hafez's report, August 1982
5. Suggested Guidelines for Training to Improve Management
6. Suggested Multisectoral Linkages for SNEM
7. Computerization Plan for SNEM Administrative Systems
8. Replacement Vehicle Requirements over LOP

E. Supplementary Financial Notes

1. Financial Contributions to SNEM 1960-1982 in Constant Dollars.
2. Proj. 521-086 SHS II Contributions to SNEM Operations
3. SNEM request to GOJ dated 8/11/82
4. Farwell's Report, "Haiti Malaria Control Program, May 1979

F. Supplementary Background Information

1. GOH Decree Establishing SNEM
2. Memo of Understanding
3. Report of the Second Working Meeting on Malaria Between Haiti and the D.R. (3/82)
4. Chronology of Major Events in Anti-Malarial Activities
5. Vehicle Status Report, February 1982
6. SNEM Budget for FY 1982

REPUBLIQUE D'HAITI
DEPARTEMENT DE LA SANTE PUBLIQUE
ET DE LA POPULATION

LEGENDE

= Foci (MALARIA) BOUNDARIES 1975-79 DATA

Zone I

Zone II

REPUBLIQUE DOMINICAINE

MAI 1981

JOSEPH FREDERIC

I. PROJECT SUMMARY AND RECOMMENDATIONS

A. Recommendations

The Mission Project Review Committee recommends LAC Bureau approval of:

a) $8,000,000 in grant funds for a five-year project to assist the Government of Haiti (GOH) to establish a cost-effective nation-wide malaria control program by FY 1986 (project funding would span five fiscal years, 1982-86).

b) an initial funding level of $500,000 in FY 1982 grant funds to facilitate early procurement of technical assistance, supplies and equipment required for effective project implementation.

B. Summary Project Background

The island of Hispaniola, shared by Haiti (approximately one-third of the island) and the Dominican Republic (approximately two-thirds) is the only Caribbean territory where malaria remains a substantial public health hazard. This is primarily because the disease is endemic and periodically epidemic. Approximately 4.5 million Haitians or 75% of total population live in malarious or potentially malarious areas, and more than 10% of the population inhabit locales experiencing annual disease rates of 20 or more cases per 1000 population each year. Detected, confirmed cases now total over 50,000, and the actual number of malaria cases is estimated at 200,000 or a prevalence of 4%. The predominant malaria parasite found in Haiti, Plasmodium falciparum is the most debilitating and dangerous type of malaria.

Earlier anti-malarial activities, commencing during the late 1940's, were successful in steadily reducing the incidence of the disease through the late 1960's. However, due to a combination of negative technical (vector resistance to DDT), political and institutional factors, the years subsequent to 1968 have witnessed a strong resurgence of malaria in Haiti similar to that observed in other parts of the world.

Efforts to eradicate or control the disease in Haiti are constrained by four factors: 1) Geography - the climate and terrain of Haiti allow the mosquito and parasite to flourish in pockets throughout the country; 2) Social milieu -

the mobility of individuals , illiteracy, ignorance of disease and basic sanitation, as well as poverty per se aid in the spread of malaria in Haiti; 3) Technical constraints - the complexity of the disease in Haiti requires that additional operational and epidemiological research be carried out to properly design and focus program implementation on cost effective anti-malarial measures; and 4) Administrative problems - the shortage of trained staff and committed leadership and the weak reporting and management systems of SNEM have inhibited the reduction of malaria incidence in Haiti. This project is designed to cope with the geographical and social situation while actively strengthening the administrative and technical capability of the GOH to control malaria.

C. Summary Project Description

The proposed five-year project will cost an estimated $26.5 million. AID will contribute $8.5 million in health account grant funds, the Japanese Government $8.0 million worth of the insecticide, Fenitrothion, the Pan American Health Organization $1.9 million in technical cooperation and the GOH $8.1 million in counterpart contributions. The project goal is to improve the health and the economic welfare of Haitians, and particularly that of the rural poor. The project purposes are to strengthen the institutional capacity of the GOH to execute an effective national malaria control program and to significantly reduce the incidence and prevalence of malaria in Haiti. The project will be implemented by SNEM, the National Service for Endemic Diseases, a semi-autonomous agency of the Department of Public Health and Population (DSPP). The project purposes will be achieved through the following activities: a) strengthening of the institutional capability of SNEM to plan, implement and evaluate malaria control activities, b) mobilization of community resources, c) upgrading of SNEM operational research capacity, d) development of epidemiologic stratification and surveillance systems, and e) strengthening malaria control field operations.

By the end of the project, SNEM will have developed a functional management information system; be capable of gathering, processing, utilizing foci-specific data for planning and evaluation; be conducting field operations in a cost-effective manner which maximizes community participation; be able to optimize use of various malaria control measures and will have greatly reduced the annual number of malaria case.

AID-financed project inputs will include provision of materials for field studies and operational research, technical and management training, financing of costs of malaria control field operations, short and long-term advisory assistance and procurement of service vehicles, insecticides, protective supplies and other equipment necessary to implement this program.

D. Summary Financial Plan

Under this project A.I.D. will provide $8.0 million in grant funds to finance a portion of SNEM's malaria control activities in FY 1983-1986. Initial funding is to be authorized in FY 1982. Additional funding is to be made in increments, subject to the availability of funds and congressional notification.

The AID grant will help finance long and short-term technical assistance ($1.2 million) vehicles ($1.2 million), anti-malarial drugs, supplies and equipment ($2.1 million) and the local costs of field studies and operational research ($700,000) and the local costs of field operations ($2.8 million).

The Government of Haiti contribution is expected to be $8.5 million over the life of project or 32% of all costs (including technical advisory cooperation) and 65% of operational cost. Assistance from the Japanese Government estimated at $8 million, of which $2.0 million is already committed, is expected to cover the cost of the insecticide, a portion of the required vehicles, spray equipment and protective clothing. It is also expected that PAHO will provide technical cooperation valued at approximately $1.9 million over the life of project.

E. Issues

Four issues have arisen which potentially could jeopardize the long-term success of the Project. The issues and their current state of resolution are discussed below:

1. AID Project Funding

In the PID, total life of project costs were estimated at $6.5 million. More precise calculations made during intensive review have revealed

that 1) an $8 million AID contribution is required to fully cover project costs and that 2) up to $2 million is required during the first two years (1982-83) of the Project to allow early procurement of required epidemiological supplies, drugs, spray equipment and vehicles. As explained in the Economic Analysis, a project funded at the higher option i.e. $8 million would feasibly reduce the incidence of malaria over a three year period to a level which would require ten years to accomplish under the lower option. The internal rate of return for the additional funding is estimated to be in excess of thirty percent. If the additional funding is not made available, field level activities will be delayed and qualitative improvements in epidemiological activities, operational research and community mobilization activities will lag. In addition, intradomiciliary spraying will be more limited. Furthermore, as discussed elsewhere, a lower AID commitment may impact negatively on a Japanese decision to proceed with full funding of insecticide requirements under the project. The net result will be a decidedly smaller impact on the malaria problem and a lower expectation of SNEM capability to sustain a gradual decrease in malaria cases. This issue is discussed more fully in the Economic, and the Financial Analyses.

2. GOH Contribution

The GOH will be committed to an $8.485 million equivalent contribution to the project, including $4.485 million from Public Treasury sources. GOH budgetary constraints, which are not expected to be alleviated in the near term, may necessitate substitution of PL 480, Title I funds now planned for allocation for rural health activities per se, during the LOP in lieu of Public Treasury commitments.

3. Government of Japan Support

Assistance from the Government of Japan (GOJ) is legislatively approved on an annual basis. The GOJ has already approved a $2.0 million grant for purchase of fenitrothion to be delivered in January 1983 for the spring spray campaign. This supply of insecticide will be adequate for the comparative field trials in 1983-84 and targeted operational spraying of 50,000 houses at reduced cycles during the same period. Discussions are

already underway between SNEM and the GOJ for continued assistance with insecticide in the period beyond and the GOJ has already indicated informally its preliminary interest in providing an additional $2 million grant in its FY 1983 request to the Japanese Diet. Insecticide procurements made under this 1983 grant would be available in 1984. Subsequent grants are anticipated as the GOJ has informally indicated its commitment to the SNEM Executive Committee program. If this assistance does not materialize as planned, other sources of support will be identified. This issue is dealt with more fully in the Project Background-Other Donor Assistance.

4. Integration of SNEM with the Department of Health and Population (DSPP)

The project presumes that SNEM will remain a semi-autonomous vertical health agency during the LOP. The Rural Health Delivery System (RHDS) project design requires rationalization of public health system elements to prevent duplication and promote integration where feasible and appropriate. However, the RHDS project paper clearly recognizes that integration of the malaria control activities of SNEM depends on a low malaria incidence in order to minimize the risks of malaria epidemics while organizational integration takes place. The joint AID/PAHO/GOH evaluations of the Haitian malaria program in 1979 and 1981 recognized the need for a strong SNEM working in close collaboration with the DSPP and existing health facilities to reduce the incidence of malaria to "reasonable" levels, but warned against premature integration of SNEM into a weaker administrative support structure. As central DSPP support capacity improves, the possibility of integrating various administrative tasks such as vehicle maintenance, procurement, warehousing etc. without diminishing services increases. SNEM has already taken positive steps to reorganize its field structure to correspond to the present health Districts and Regions. Over the LOP SNEM will participate actively in the training and retraining of public health staff for their rural health functions including malaria detection and treatment. The strategy of gradual integration as the DSPP becomes stronger and malaria declines is compatible with WHO policy guidelines, as well. The issue is discussed further in the Institutional Analysis.

II. PROJECT BACKGROUND

A. Statement of the Problem

1. The Global Malaria Problem

Malaria eradication or control has been a goal of many developing countries, international organizations, and bilateral donors including the U.S. Assistance has been largely justified on humanitarian and health grounds although the economic consequences of malaria on development can be quite significant. The types of programs vary from vertical programs organized to directly attack the disease to efforts integrated within a country's general health services. During the 1960's, nearly 90 countries had national programs to combat malaria.

Malaria deserves particular attention because of its prevalence in both temperate and tropical climates and its effect on the social and economic development of individuals and communities. In terms of social impact, malaria can retard the mental development of infants, increase the absences of children from school, result in lost workdays for the labor force, and shorten life expectancies. When combined with other diseases which are common in many developing countries, malaria contributes to increased morbidity and mortality rates.

The economic impact of malaria can be considered in terms of lost income to the victims, reduction in productivity, effects on tourism and development, and expenditures to combat and treat the disease. An important point is that the malaria vector and parasite are becoming more resistant to insecticides and drugs. As the disease spreads, greater quantities of increasingly expensive commodities are now required to combat the problem or reduce it to previous levels.

Malaria is a complex disease caused by a parasite. Man is the reservoir and the anopheline mosquito acts as the intermediary in spreading the parasite from person to person. The female mosquito ingests the malaria parasite when biting an infected person. The parasite develops within

the mosquito and approximately 10-15 days later is transmitted to an uninfected non-immune person by the feeding mosquito. The parasite then moves through the blood to the liver where it multiplies for 6-15 days and whereupon malaria symptoms develop (fever, chills, etc). Those most susceptible to the parasite are children under five, pregnant women and others with little or no immunity.

Transmission of malaria can be halted by interrupting contact between infected persons and the mosquito, between infected mosquitos and non-immune persons or by eliminating the parasite in man or the mosquito. Annex C-1 describes malaria in Haiti and identifies points in the transmission cycle where intervention is possible. A comprehensive malaria control program to-day uses a combination of measures which are carefully planned and executed to reduce malaria. Until DDT and chloroquine became available, the only means to control malaria was through measures which either eliminated the mosquito through permanent source reduction (drainage) or which protected man from the mosquito (e.g. netting). DDT applied on the walls of homes was viewed in the 1950's and 60' as the most effective means to rapidly eradicate the disease. With the appearance of mosquito resistance to DDT, partly due to extensive use in agriculture, and parasite resistance to drugs in combination with the relatively high cost of constant epidemiological vigilance and surveillance (to detect, treat, investigate and classify each and every malaria case), antimalaria programs in Haiti and elsewhere have been forced to retreat and reconsider their strategies and methods.

Thus, although some countries and regions have successfully eradicated malaria and/or reduced morbidity and mortality, the overall objective of controlling the disease has not been achieved. The 1982 GAO report on malaria cites WHO figures indicating that the annual number of malaria cases detected globally between 1972 and 1980 increased from 3.1 million to over 7.7 million (an increase of 150%). During the same period reported malaria in the Americas increased 110%; in Haiti the increase was 91%.

2. Malaria in Haiti

The island of Hispaniola which Haiti and the Dominican Republic share is the only Caribbean island where malaria remains a public health

hazard. The disease is endemic in many areas of the country below an altitude of 500 meters, but pockets of malaria transmission sometimes occur even above this elevation. The geological nature of the island gives rise to innumerable springs and seepage areas at tidewater which affect the malaria picture. In addition, coastal highways have been built at sea level without sufficient provision for carrying this water to the sea. One, therefore, finds in many areas a continuous mosquito breeding site, miles in extent, along the shoreward side of highways. The same situation develops where roads are built across irrigated alluvial plains and act as unintentional dams to the runoff of surplus irrigation water.

When climatic conditions are favorable for the development of the parasite in the mosquito vector and mosquito densities are high, the disease spreads rapidly. Fluctuations in annual rainfall in the various parts of the country make it very difficult to anticipate peak months of transmission and thus to plan the correct timing of the mosquito and parasite control measures. Approximately 4.5 million or 75% of the Haitian population live in potentially malarious areas, although normally the risk outside the malaria mosquito breeding sites (foci) is relatively low. Exhibit 2-1 identifies key foci throughout Haiti experiencing high levels of malaria transmission during the 1975-1979 period. No significant changes in the number or location of foci have been observed using 1980-1981 data.

Perennial malaria transmission occurs in the coastal-estuary areas with major transmission occurring during September-January and a minor peak of transmission during April-June. Seasonal transmission occurs in the remaining malarious parts of the country. Studies undertaken during the period 1915-34 indicated that malaria affected most of the population. In 1928, a prevalence study done by Dr. Carl Wilson showed that 23.5% of workers and 50.5% of children under fourteen had malaria parasites. A Rockfeller Foundation study in 1940-42 determined that 31% of the schoolage population had malaria. Parasite surveys in the Artibonite Valley in the 1950's before malaria eradication or control efforts were begun indicated that 30% of the population had malaria.

Table 2-1 NUMBER OF MALARIA FOCI, AFFECTED LOCALITIES, HOUSES AND ESTIMATED POPULATION BY PRESENT SNEM ZONES

Based on 1975-1979 data

Zone	Number of Foci 1/	Localities 2/	Population 3/	Houses 4/
I	128	2084	567,384	191,434
II	113	985	418,536	130,202
III	116	1884	408,932	112,095
Total	357	4953	1,394,852	433,731

1/ Foci are permanent mosquito breeding areas where detected malaria transmission occured either seasonally or throughout the year during the period 1975-1979. All foci with either medium or high malaria morbidity rates are included, i.e. 10 or more cases per 1000 population annually.

2/ Localities within the foci boundaries represent about 20% of all localities in Haiti below 500 meters in altitude.

3/ Population in the foci is 31% of all persons residing in potentially malarious.

4/ Because of additional sleeping structures (huts) in rural areas, the ratio of people to structure (house) is only 3.2; house does not correspond to household.

Epidemiological reports for 1975-1979 indicate that 11% of the population lived in localities experiencing annual disease rates of 20 or more cases per 1000 per year. At the same time, almost 40% of the at risk population lived in areas with no recorded cases for these 5 years. Thus, high rates of malaria appear concentrated in clearly defined geographical foci which provide ideal breeding areas for the mosquito and the malaria parasite.

The predominant malaria parasite found in Haiti is *P. falciparum*, the most dangerous and debilitating of the four types of malaria experienced by humans. As compared to these other malaria types, it is responsible for more deaths, more brain damage due to cerebral hemorrhage and longer debilitation during convalescence.

3. Anti-Malarial Efforts

During the 1940's and 50's anti-malarial activities, primarily permanent drainage and public works, were initiated to cut malaria transmission. Targeted spraying with DDT began in 1950. In 1961, a time-limited malaria eradication program was launched with the participation of UNICEF, the Pan American Health Organization (PAHO) and USAID (USOM). The National Service for the Eradication of Malaria (SNEM) was created in 1961 to implement the eradication program. Country-wide intradomiciliary spraying with DDT was initiated in 1962. In 1965 a mass drug distribution program was initiated as an alternative strategy for interrupting malaria transmission. By 1968, the slide positivity rate had declined to 0.2% and the total number of reported malaria cases was 2,562. (The slide positivity rate is the number of malaria positive slides compared with all fever slides examined.). However, in 1969 field activities and epidemiological surveillance activities were cut back and reported malaria cases began increasing to their current levels.

DDT resistance was first detected in 1968, at a time when eradication seemed within reach. As resistance to the vector increased, government priorities were concurrently shifted, to "development activities" and SNEM was increasingly unable to cope with the task of controlling the localized malaria epidemics which were occuring with increasing frequency. The eradication program, based on the worldwide model developed and encouraged

by the World Health Assembly which aimed at quickly interrupting malaria transmission, was unable to adapt its activities to respond to the emerging problem of widespread insecticide resistance.

Hindsight reveals various reasons for the failure to eradicate malaria in the 60's. DDT resistance was clearly one important technical constraint. Other reasons also seem important today. The political situation in Haiti in the late 1960's and early 1970's was clearly not focused on development. During this period Haiti had almost no rural health services and regular access by road to isolated communities was a major continuing program obstacle. Haitian Government (GOH) financial participation in the eradication program from 1962-1968, was never more than 4% of the total annual project cost. When additional funds were required after 1968 for expensive case finding and targeted attacks on pockets of continuing malaria, GOH funds were not forthcoming.

In the classic malaria eradication approach followed from 1962-68, attention was focused on executing the spray attack. There was, therefore, little development of analytic or epidemiological research capability in SNEM or the GOH which was needed to monitor and adapt field activities effectively and understand the mosquito and its natural breeding sites. Since these skills were not available to redirect and steer the anti-malaria program into effective activities, field work after 1968 became routine and execution was uneven. As the program drifted into mediocrity, key trained personnel left SNEM and reported malaria cases increased dramatically from year to year. By 1978 reported cases (verified by blood slides) had reached over 53,000. Thus, in the 10 years between 1968 and 1978 reported malaria cases per 1000 population had grown from 0.71 to 12.4 cases.

In 1977, USAID provided a $6 million grant to SNEM under its Strengthening Health Services II project for planned malaria control activities during the period 1978-82. For the first time in SNEM history, funds were committed to cover planned activities over a five year period in order to facilitate detailed annual planning. Project implementation began in 1978. This project was initially aimed at arresting the increasingly apparent malaria epidemic surging through the country. In 1979 a joint AID/PAHO/GOH

program evaluation team catalogued a long list of technical and administrative weaknesses which needed to be addressed if malaria was to be contained. Many of the key recommendations were subsequently implemented, including a pilot field test of the efficacy of DDT, Malathion and Fenitrothion for intra-domiciliary spraying. This pilot project was completed in 1981 and the pilot test results and the SNEM program were again evaluated. Of the tested insecticides, Fenitrothion proved to be the only residual insecticide capable of cutting malaria transmission. In addition, the evaluation team found that SNEM had made substantial progesss in improving its capability to implement its programs. However, the team concluded that a classic eradication program, for which only the household spraying portion would cost nearly $60 million, was too expensive for serious consideration. The team further indicated that active control activities should be continued while the feasibility of less expensive eradication or control strategies was being explored.

4. Critical Aspects of the Malaria Problem

There are four key aspects to the malaria problem in Haiti which critically affect the capacity of the Government of Haiti to significantly impact on the disease.

1. Geography

The climate (temperature, humidity, rainfall patterns) and rugged terrain are ideally suited for both mosquito vector and the malaria parasite. The frequent occurrence of hurricanes and tropical storms expand and extend natural breeding sites. The rural population, while living in small scattered hamlets, are nevertheless frequently in contact with the mosquito and the parasite; transmission is thereby facilitated. The terrain makes tracking the disease arduous and difficult. These constraints cannot be dismissed but, with careful planning and monitoring, their effects can be mitigated.

2. Socio-demographic factors

The social situation affecting malaria and its spread is in

large measure a reflection of the underdevelopment of the country. The mobility of Haitian market women and laborers is well documented; undoubtedly this contributes to the spread of malaria. General illiteracy (less than 25% of adults are literate) and ignorance of disease and basic sanitation undermine efforts to involve the population in anti-malaria activities. Poverty itself has created patterns of behavior, which facilitate malaria transmission, e.g. seasonal labor mobility and outdoor living to avoid crowded, inadequate housing. The populace, however, can be mobilized to actively support appropriate anti-malaria activities. In fact, there are approximately 6,700 community volunteers, Collaborateurs Volontaires (CV), scattered throughout the malarious areas who collect slides from fever cases and provide materials to these persons. These CV's attest to the willingness of communities to participate when properly approached and motivated.

Local communities can also be mobilized to undertake self-help permanent drainage and mosquito source reduction and sanitation. This project will assist SNEM to evolve strategies for more effectively mobilizing community resources. Informational and educational methods and techniques for enhancing community support and participation must also be developed and tested. A properly motivated and involved citizenry can significantly assist SNEM in ultimately eradicating malaria. Without this support and participation, SNEM will have difficulty in achieving its interim operational targets.

3. Technical Questions

The SNEM program evaluation in 1979 and 1981 provided various suggestions and recommendations regarding priority operational and epidemiological research to define program strategy, to improve the allocation of human and financial resources and to determine the relative results attainable, i.e. reductions in malaria morbidity and mortality. Answers to these technical questions are urgently needed in order to plan and implement cost effective anti-malarial measures. Thus, from a technical feasibility standpoint, the SNEM program requires an active and effective operational and field research program. Various planned project activities to strengthen

SNEM's technical capacity and planned operational research studies are discussed more fully in the Project Description section of this document.

4. Administrative Considerations

Resolution of the problems cited above requires trained staff, dynamic leadership and strengthened reporting and management systems. Over the past year a number of improved procedures have been initiated to improve management. However, field management and supervision remain areas where improvement is necessary. There is an immediate need for simplified, standard and regular reporting on all program activities and an improved management information system to facilitate rational decision-making. In addition to these obvious management problems, there are a range of broader administrative constraints with which SNEM must somehow cope, including staff morale and incentives, uncertain funding, foreign exchange constraints, and coordination with existing health facilities.

Implementing an increasingly effective anti-malaria campaign is clearly a complex undertaking. The proposed project, described in Section III of this document, is designed to build upon the strengths of SNEM and to resolve the as-yet unanswered technical questions while carefully dealing with the program constraints. USAID/Haiti believes that while the problems and constraints are substantial, a strong and effective anti-malaria program is feasible and can and should be initiated immediately through the implementation of this project.

B. Relationship to U.S. Strategy in the Caribbean

The proposed project forms an integral part of USAID/Haiti's public health sector strategy and its overall country development strategy. Malaria is considered by the Mission to be a public health threat whose scope exceeds the direct effects of the disease on more than 200,000 Haitians each year. The fundamental USAID strategic objective in public health is to reduce mortality and morbidity of the rural poor, especially children. This is being sought through substantial investment in a basic national health system, emphasizing preventive measures and primary care. The establishment of this

system is a complex and time consuming task which must proceed on a step by step basis. The national health system infrastructure, being established in part through the RHDS project, is in an early stage of development and is not capable of effectively addressing and monitoring malaria at its current incidence levels. USAID/Haiti believes it would be premature to dismantle an existing, intensive, vertical malaria program and transfer the complicated task of reducing malaria to an administrative/logistic support structure that is only in development. Therefore, the project has chosen to build upon the vertical program now in place, until malaria can be reduced below the 10 cases per 1000 level in areas of perennial transmission and 5 cases per 1000 nation-wide.

The importance of malaria vis-à-vis other diseases common in Haiti stems from the facts that (1) it affects most severely children and pregnant women; (2) that the malaria parasite in Haiti is the most debilitating in the world, and (3) that malaria undetected and untreated is frequently an underlying or associated (e.g. with gastroenteritis and/or malnutrition) cause of the high rate of infant mortality in Haiti. Further it contributes to lost workdays, low rural labor productivity and poor school attendance. Finally the increasing frequency of malaria outbreaks in urban areas and around beach resorts is working as a disincentive to tourism, a major source of foreign exchange for Haiti.

For these reasons, the Mission and the GOH consider the control and ultimate eradication of malaria from the island of Hispaniola in collaboration with the Dominican Republic to be high priority health and development strategy objectives.

The project will be an integral component of the Mission portfolio and given the extent of the malaria problem which impacts negatively on a number of sectors in Haiti, the Project will be necessity forge synergistic relationships with other USAID financed activities in health, transportation, agriculture and the private sector. The USAID health sector investment is primarily through the above mentioned $17.5 million RHDS project aimed at improving the basic health of Haitians so that social and economic development will be facilitated. An underlying assumption for achieving rural primary

health care service and coverage and goals is that malaria will decline as a public health problem and free health sector resources to address other basic health needs.

Among the Mission's more successful projects have been those in the transportation sector. However, this access leads to increased mobility for, inter alia, human carriers of the malaria parasite. Increased attention to adequate drainage under AID road construction/rehabilitation projects can be instrumental in eliminating a preventable negative impact of road building i.e. creation of potential vector breeding grounds in the influence area of the road.

The Mission's agriculture/food production strategy is directly and detrimentally affected by malaria since the best lowland agricultural areas are also the areas of highest malaria endemicity. Peaks of malaria transmission occur during seasons when agricultural labor is most required. Field level activities in improved cropping, soil conservation, irrigation and agricultural extension under the AID Integrated Agricultural Development (PDAI) Project cannot be optimized in malarious zones.

A primary thrust of U.S. strategy to stimulate Haitian development is aimed at the creation of opportunities for the enlargement of private sector participation in national development investments. "Private sector" is interpreted broadly to encompass such divergent interests as commercial, agro-industrial, basic food production, tourism and transformation industries. High malaria endemicity has obvious negative intrasectoral implications for private enterprise initiatives in Haiti, particularly as concerns the attraction of foreign investment and tourism. At current levels of endemicity malaria undermines USAID's development strategy.

C. Relationship to Haitian Development Goals

The GOH has become increasingly cognizant of the impact of endemic malaria on labor productivity, tourism and relations with neighboring countries. It has established the eradication of malaria as one of the five critical health sector goals outlined in the FY 1981-1986 five year plan. The

GOH has contributed public funds in increasing amounts since 1973, and in 1982 SNEM received almost 10% of the total GOH health budget. Malaria ranked third among diseases treated in the Les Cayes Health District (South Region) in 1980. (Intradomiciliary spraying in the Sumit III area from 1980-82 has drastically reduced malaria as a problen in Cayes). The treatment of malaria may account for as much as 20% of outpatient visits and 10% of hospitalizations nationwide. The GOH is taking its commitment to control and eventually eradicate malaria very seriously (the current Minister is a former Director of SNEM), and this commitment is reflected in the GOH absorption of more than 50% of SNEM operating costs. This is also shown and in the discussions and planning already carried out with the Health Ministry and parallel SNEM in the Dominican Republic.

D. Role of Other Donors

1. The Role of PAHO

In the Americas, the Pan American Health Organization (PAHO), an autonomous but affiliated regional organization of the World Health Organization and the World Health Assembly, has played a prominant role in the development and desing of anti-malarial strategies and programs. As an international organization, PAHO has concentrated on providing training and technical cooperation with its limited funding. Because of the Latin character of the region, francophone Haiti has frequently been the recipient of technical advisors unable to speak French and with experience and expertise not fully responsive to Haitian health sector needs. Although in the past PAHO and USAID have frequently differed greatly in their programs and approaches to improving health status, relationships between USAID and PAHO have become more positive and collaborative recently. Over the past wo years, PAHO has consistently and generously provided the bulk of technical assistance and training for anti-malaria activities available to SNEM. It must be noted that by its nature PAHO is almost never in an advocacy role at the country level but tends rather to respond to the

initiatives of the host government. This has meant that PAHO advisors frequently accept without objection or comment policies or activities which may not be feasible or the best use of available resources.

In implementing its health strategy, USAID/Haiti has attempted to collaborate closely with PAHO. USAID, PAHO and the GOH constitute the Executive Committee which guides and assists SNEM in developing and executing its multi-year and annual anti-malarial plans. The Joint Evaluation teams in 1979 and 1981 were composed of technical experts selected by both AID and PAHO with the concurrence of the GOH. In developing the design of this project, PAHO/W was able to provide the services of a senior malariologist who reviewed the design and made several important contributions. To successfully implement this project PAHO must provide high quality, long-term advisors and short-term consultants. USAID discussions with PAHO/Haiti suggest that support as outlined in this Project Paper is within PAHO's available resources and that they support the project strategy and overall project plan.

2. The Role of the Japanese Government

In 1980 the Government of Japan (GOJ) provided a $1.25 million grant to SNEM which included 250 tons of fenitrothion, 15 vehicles and sophisticated laboratory equipment for malaria serology research. In 1982 the GOJ has again provided a grant of $2.0 million for the purchase of 400 tons of fenitrothion, which will be delivered beginning in January - February 1983. The assistance from the Japanese government has been welcomed by the Haitians and future assistance has been solicited. The 400 tons of insecticide are adequate for the planned use during 1983 and 1984, for eighteen months of comparative dosage trials and operational spraying.

During 1983-84 the critical program limitations will be the funding to support both operational research and the cost of spraying including protective equipment, transport, cholinasterase testing and supervision; while extensive training and development of the management information and logistics support systems are pursued. USAID has informally encouraged the GOH to invite the GOJ to participate more actively in the total SNEM program and to become a member of the Executive Committee. A copy of the

most recent correspondence between SNEM and the Japanese Embassy in Port-au-Prince is found in Annex E-3. Since the GOJ has traditionally been unable to make multi-year commitments, it is not possible to obtain written confirmation of their interest in supporting SNEM over the project period. However, at the least it is expected that an additional $2.0 million grant of insecticide, equipment and supplies will be made in July 1983 for delivery in 1984. This will provide a minimum amount of insecticide and supplies for the targeted spraying operations envisaged after 1984. A more positive support would involve additional $2 million grants in 1983, 1984 and 1985 of which at least $500,000 annually could be allocated for procurement of needed spray equipment, protective equipment, transport and perhaps construction of the two new Zonal Offices.

3. Other Potential Donors

One of the planned outcomes of this project is an enhanced capacity of SNEM to plan, execute and evaluate malaria control activities. As a consequence of these skills, their active program to mobilize community resources and the growing awareness of the importance of man-made malaria, it is anticipated that SNEM will be able to attract additional support from other donor groups. Their ability to do so will be one measure of project success. In addition, as will be discussed in the Institutional Analysis, linkages with Haitian development projects in road building, irrigation, municipal water, sewage and sanitation and housing where other donor groups are active should reduce malaria and, perhaps more importantly, help to appropriately channel part of these resources into protection of the affected populations from malaria.

4. Project Rationale and Strategy

1. Program Alternatives

There are essentially four program alternatives which can be considered. One option, an immediate malaria eradication campaign followed by indefinite surveillance by an ill-prepared health system is not feasible for a variety of administrative, operational, social and financial reasons. The

price tag for an initial all-out attack over a six year period has been put at $140 million. At the other extreme, a second alternative equally impractical would be a completely Haitian anti-malaria campaign with no USAID support and consequently little other international support. Such a U.S. position would be subject to immense political pressure from various corners. Any project which would be then initiated would have lost the momentum and technical commitment in SNEM and the DSPP gained over the past two years and face the awesome task of confronting a malaria problem of immensely greater proportions than now exists.

The two remaining options are somewhat more palatable. Thus, in a third alternative, AID support to SNEM would continue but with an initial funding level of $1.3 million in combined FY 1982-83 support increasing over the life of project to a total LOP grant of $6.5 million. The fallacies in this approach to funding are several. First and foremost is the fact that SNEM badly needs vehicles and supplies in the first project year to carry out malaria operational research and establish baselines for subsequent cost effectiveness analysis of the various interventions. Such needed purchases have been deferred over the past several years. Secondly, delaying such purchases and activities can only mean that they will cost more in the future. This effect is clearly demonstrated by a constant dollar analysis of contributions to SNEM over the past twenty years (See Annex E - 1). Additionally, spray operations today are substantially more expensive due to the need for both closer monitoring and supervision and extensive protective equipment as well as the relative cost of organo-phosphate insecticides vis-a-vis DDT. Inflation over the past four years forced SNEM to defer its purchase of needed vehicles and equipment. Over 50% of the vehicle fleet is more than 5 years old in a country where average vehicle life in rural areas is three years. The higher cost of maintaining such vehicles further limits funds for activities and means that vehicles are more often in the shop for repairs. These issues are further addressed in the Institutional and Financial Analysis section. Initial funding at this third program level would in our judgement make the project far less attractive as an investment since it would then be almost impossible to implement the comparative insecticide dosage trials with adequate assurance of the validity and comparability of the results. The massive inhouse retraining to orient SNEM personnel toward

malaria control and the reorganization of the CV system would also suffer. Almost certainly, a slower implementation pace would result in key young SNEM staff moving on to other more challenging and promising health care jobs. The sum of these consequences could mean the difference between project success, i.e. building a SNEM capable of controlling malaria with substantially reduced future donor support, and project failure, i.e. leaving Haiti with the huge financial and social burden of malaria but also without the tools necessary to effectively control the disease. The relative costs and anticipated benefits of this approach are discussed in Section 4-D, Economic Analysis.

The necessity of a fourth program option has become strikingly evident in the intensive Mission review and final design of the project. It differs from the third option in that it views continued USAID assistance not as any obligation but rather as an opportunity to maximize desired changes and maturity in SNEM, while solving and resolving critical technical uncertainties in malaria control which confound and interfere with the planning and implementation of a cost-effective malaria control program in Haiti. This alternative would maximize insofar as possible USAID funding to meet the requirements of this innovative approach. In fact, lessons learned in implementing this project can be applied and adapted in many countries of the region and other countries where malaria remains a problem. In concrete terms, this means providing maximum initial FY 1982 and FY 1983 funding so that detailed planning and implementation for the first two critical project years is assured. It also requires closer active monitoring of SNEM and its operational and research activities to insure that activities occur as planned and are evaluated as required. Section V, Project Implementation Plan and Chart 5 - 1 outline the necessary steps planned for effective project implementation so as to assure project success.

E. Project Rationale and Strategy

Among the program alternatives available for either malaria control or eradication, the present project although complex best responds to existing needs and technical and programmatic uncertainties. This project is based on the following critical assumptions:

1) Current levels of mortality due to malaria are unacceptable from a public health standpoint;

2) The foci of malaria infection are identifiable, limited in area and can be controlled by use of an appropriate mix of control interventions;

3) The relative and comparative effectiveness of the available malaria control methods under varied Haitian conditions can be determined by appropriate operational research and evaluation as these measures are selectively implemented in targeted foci with high current levels of malaria;

4) The present public health service infrastructure particularly in rural areas is not yet capable of providing an acceptable level of malaria detection or treatment and will not have this capability within the next 4 years.

5) The cost of malaria at current levels is an unacceptable burden on current development efforts and these costs can be cost-effectively reduced.

6) The risk of malaria is an effective deterrent to the national allocation of trained Haitians needed for development activities in rural areas and small cities.

7) SNEM administrative and technical resources are capable of implementing this project but only with the technical assistance and training envisaged.

8) Financial resources actually and potentially available to SNEM are not likely to increase substantially in real terms beyond those now available and projected in this project and, thus, malaria control over the forseeable future rather than a time limited malaria eradication is indicated.

Within the parameters and limitations of these assumptions the primary project strategy is to enhance and strengthen SNEM as a malaria control agency. To accomplish this, various tactics, which are described as project activities in the Project Description Part III, will be followed to target and focus SNEM efforts on not only implementation of anti-malarial activities, e.g. spraying, larviciding, source reduction, drug distribution etc., but also development of flexible adaptable program planning and monitoring mechanisms, enhancement of epidemiological capability, implementation of practical field studies and enlargement of governmental and private support for anti-malarial activities.

In the face of the exploding numbers of malaria cases in 1977, the Strengthening Health Services II Project (SHS II) which provided $6.6 million in AID resources to SNEM over the five year period was inadequate to effectively bring malaria under control. Additionally, a number of technical and operational questions relative to the requirements and effectiveness of the various control measures have remained unresolved. Inflation over this period has undoubtedly contributed to the inadequacy of the funding. However, retrospective analysis of the AID contribution and changes within SNEM shows clearly that the program evaluations and AID's use of carefully selected short-term consultants in combination with long-term advisors has made a significant difference in SNEM's ability to grow and develop. (See Annex E -2 for a recapitulation of SHS II funding for SNEM operations.) This lesson (the value of AID providing short-term assistance) is a significant element of the AID project strategy to promote an exchange of appropriate technology for malaria control. With these tools, i.e. appropriate skills in epidemiological surveillance, stratification of malaria foci, training, management and planning, operational research and evaluation of control measures, SNEM will be better equipped for the long process of implementing an increasingly effective malaria control effort.

As indicated earlier, USAID and the GOH are making a substantial effort to develop rural health services. Fever cases, in large measure due to malaria, and other illness in which malaria is a frequent contributory factor (malnutrition and diahrrea, for example) are swamping the curative treatment

facilites throughout the malarious areas. Albert Schweitzer Hospital in 1980 found that 20% of all outpatient visits were diagnosed malaria cases, mostly adults. Malaria among children is notoriously under reported due to the way it masquerades as other diseases (See research report in Annex C - 4). The underlying strategy of this project is to protect and enhance this health sector investment and AID's substantial other investments in Haiti.

Thus, the project will strengthen SNEM and build upon the progress made in the SHS II project; create and strengthen SNEM's capacity for epidemiological analysis and operational research; and, as a consequence, measurably reduce malaria morbidity and mortality. The project will test the hypotheses: 1) that, under Haitian conditions, targeted intradomiciliary spraying of (10% of the total houses below 500 meters in elevation) can cost effectively reduce malaria cases and gradually bring malaria under effective control; 2) that further reductions are possible and cost effective by judicious use of other control measures alone and in combination with each other and/or with spraying.

III. PROJECT DESCRIPTION

A. Project Goal and Purposes

The goal of this project is to improve the health and the social and economic welfare of Haitians, and particularly the rural poor. AID project support is aimed at achieving a substantial and sustained reduction in the incidence and prevalence of malaria in order to remove the significant financial burden of malaria treatment from the GOH health care facilities and from the population at risk. Concomitantly, worker productivity should increase and infant and child mortality and general morbidity in highly endemic malarious areas should show significant declines. Reduction of the debilitating effect of malaria which burdens the population should also have a synergistic effect in reducing some of the more indirect and less quantifiable barriers to economic development. These include irregular school attendance, low birthweight, infant mortality and fetal wastage and maternal mortality and morbidity, costs of self-treatment and impact on tourism.

To achieve this goal there will be a significantly more effective use of currently available antimalaria technology in the GOH's malaria control operations. In the process of attaining a significant decline in malaria incidence, the GOH health services will also expand their capability to carry out improved epidemiologic surveillance of all endemic diseases. This is an important element of the overall AID health sector strategy and will complement the Rural Health Services Delivery System Project which aims to increase access to basic health services, and the national integrated program of maternal and child health and family planning supported by AID and UNFPA.

The proposed AID Project complements support committed by the GOH, PAHO and the Government of Japan for malaria control. The two purposes of this five year project are:

(1) To strengthen the institutional capacity of the GOH (SNEM) to plan and implement effective malaria control activities and join with the Dominican Republic in executing a joint, island-wide anti-malaria program; and,

(2) To significantly reduce the mortality and morbidity of malaria in Haiti by targeted attacks on the geographical foci of the disease.

SNEM will be the primary implementing agency of the Haitian Government. SNEM is established by law to work toward the eradication of malaria and the project is designed to help SNEM to move closer toward this goal. Since eradication is operationally and financially not feasible at present, the project will assist SNEM to undertake an increasingly effective and technologically rational malaria control program. The selection of malaria control activities will be based on the results of applied field studies and operational research. These studies and research are aimed at resolving critical technical, environmental and operational feasibility issues and are described more fully in the Project Activities section. The relationship between project purposes and SNEM program activities is schematically presented in Chart 3-1.

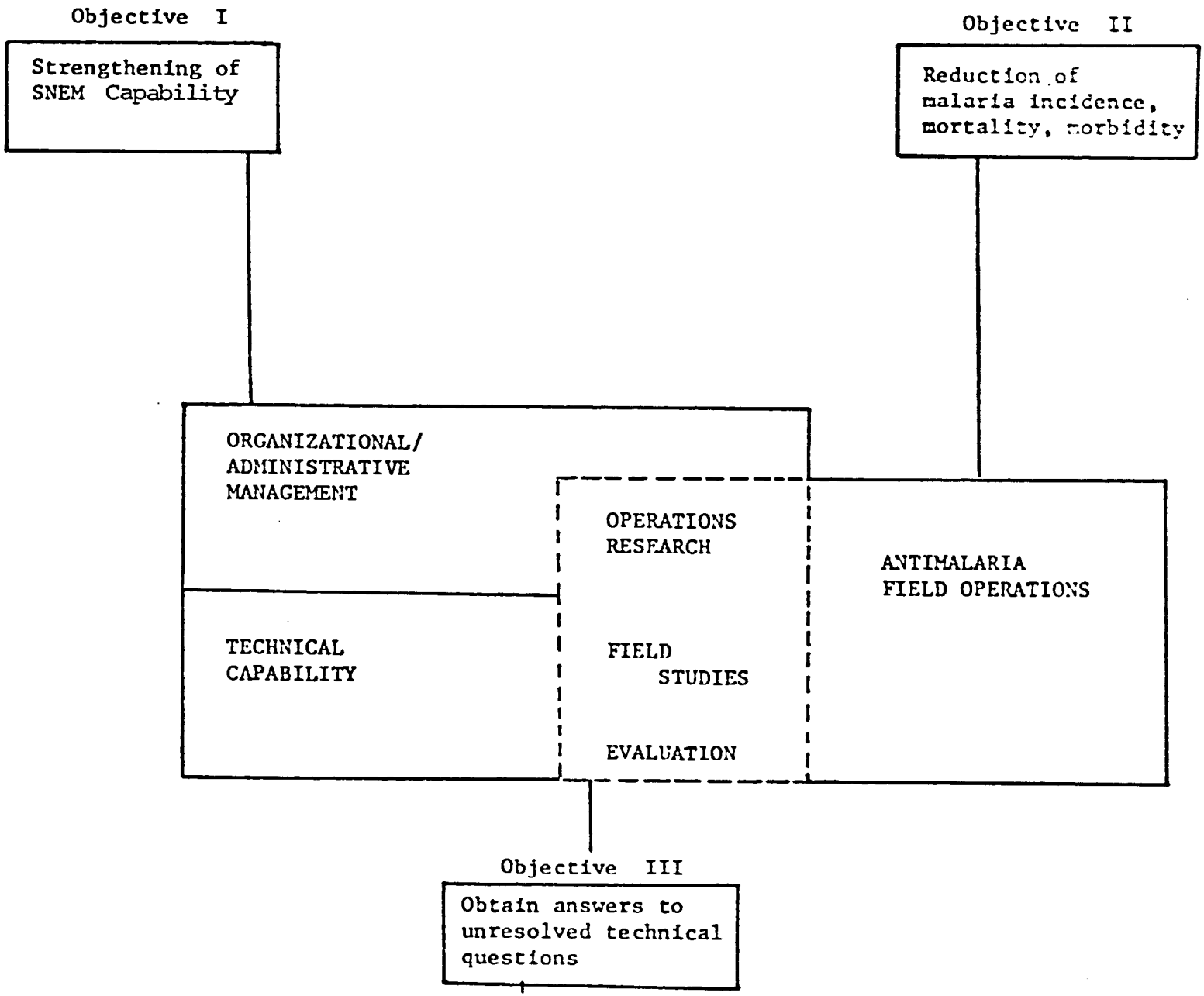
SNEM will prepare and submit annually for review and approval to the Executive Committee a Detailed Plan of Action including special field studies, research protocols and budget requirements. In addition, quarterly joint project reviews will be scheduled to monitor project implementation. Execution of an effective malaria control program with limited resources will require strong flexible program management. The management process may best be characterized as "learning by doing" to build upon the strengths of SNEM and to resolve the unanswered technical questions while carefully dealing with the program constraints. While the problems and constraints are substantial, a strong and effective malaria control program can and will be implemented through this project.

Through the substantive strengthening of its administrative and technical capacity, SNEM will be able to attract the continuing Haitian and external support necessary for achieving its ultimate goal of eradicating malaria in cooperation with the Dominican Republic.

B. End of Project Status

The project is structured to provide measurable achievements. These include: (1) the optimum timing and dosage of insecticide to be used in

CHART 3-1 OVERVIEW OF THE RELATIONSHIP BETWEEN MALARIA CONTROL AND PROJECT OBJECTIVES



intra-domiciliary spraying to cut malaria transmission under Haitian conditions; (2) a functional management information system within SNEM for the monitoring and management of their activities and budget so as to maximize impact against malaria; (3) the relative costs and benefits of larviciding, use of larvivorous fish, mass drug distribution and source reduction measures and their appropriate use in attacks on critical foci of malaria transmission; (4) SNEM capacity to gather and process relevant epidemiological, entomological, parasitological, climatological, sociological, and other data so as to design appropriate foci-specific attack measures; (5) organization and implementation of field operations so that community collaboration and participation provide positive program support and to take full advantage of the health infrastructure in place. In terms of specific malaria cases detected, it is anticipated that detected malaria cases can be reduced during the project period from the current 20 or 30 cases per 1000 population to less than 10 cases per 1000 population in high incidence areas with measurable significant reductions in infant and child mortality due to malaria. On a national basis detected malaria cases should be less than 5 cases/1000. SNEM will have developed the technical and administrative capabilities necessary to continue with near self-sufficiency the continuous control activities necessary for maintaining malaria incidence at this reduced level.

It is also anticipated that SNEM will have achieved effective coordination with other governmental sectors and agencies to minimize the potentially disastrous effects of "man-made" malaria consequent to agricultural and other development projects and unplanned urban sprawl. Through collaboration with governmental and private agencies at national, regional and local levels, SNEM will have increased the level of knowledge about prevention, symptoms and treatment of malaria among health professionals and the public.

C. Project Activities (and Outputs)

Effective implementation of this project will provide Haiti and SNEM with the basic information, field experience, operational skills and tools and management capability to carefully weigh the risks, benefits and costs involved in malaria control activities and to subsequently plan and implement

appropriate and effective measures. Each of the various activities contributes to achievement of the project purposes and will interact within the total SNEM Program to strengthen it. AID inputs and other resources for these activities are shown in Table 4-2 in Section IV.

The project activities can be functionally categorized into 4 groups to accomplish the two project purposes; these are described below.

1. Strengthen SNEM Institutional Capabilities

Effective control of malaria requires management and technical adaptability so that intervention strategies may be rapidly shifted among the foci or revised on the basis of new epidemiological information. Efficient and timely operational responses based on sound technical information and data analyses will be key factors in the success or failure of the control activities.

a. Human Resources Development

The development of SNEM's human resources immediately and over the life of project is critical to improving and strengthening SNEM's technical and administrative capacity and to the achievement of the other project purposes. This translates into a tremendous need for staff training and retraining at every organizational level. To insure appropriate adaptation to the various and changing needs of the control program as it evolves, SNEM will develop and expand its capacity for in-country basic, on-the-job and refresher training. Much of the needed training can be accomplished at the zones and sectors but some will take place at Headquarters. Carefully selected out-of-country training will involve only a few senior and middle level staff aimed at strengthening key technical activities.

As a first step toward enhancing the skills of SNEM employees, appropriately selected staff at various levels will be trained as trainers to improve and increase the effectiveness of training. This trained cadre and the HQ Training Section will assist in the planning, implementation and

evaluation of subsequent skill oriented training. With the exception of administrative employees who will receive special training in up-dated administrative techniques and procedures, all SNEM employees will undergo a technical orientation to the specific tasks and procedures required for effective malaria control operations. In addition, specific training curricula with appropriately revised technical guidelines, techniques and skill development elements will be designed for recycling and reorienting personnel in technical posts throughout the organization. Table 3-1 provides a summary of the training required during the first two project years; additional detail on management training needs is shown in Annex D-5. Special courses will be arranged for new employees and employees shifted to unrelated new technical positions.

Closely related to training is the need for improved supervision. Short courses in supervision and personnel management will be developed provided to improve supervisory effectiveness at all levels. During the first year supervisory training will focus on field operations and surveillance and stratification activities. All Volunteer Collaborators (CV's) in targeted foci will be retrained during the first year.

To facilitate the necessary training and retraining, short-term AID consultants and PAHO technical cooperation will be utilized. A PAHO sponsored course in pedagogical methods is already scheduled for early September 1982. In addition, AID will provide a short term training expert for 3-4 months to assist in further planning and organizing the training. It is planned that PAHO will assist in designing and implementing specific short courses in malaria epidemiology as it applies to control operations over the life of project. As in the past, SNEM will organize brief 1-day workshops for technical staff during the consultations of technical experts in research methodology, epidemiological surveillance techniques, protocol preparation, evaluation, etc. Planned AID TA shown on Table 3-2. Planned Technical Cooperation through PAHO is found on Table 3-3.

Table 3-1 SUMMARY OF TRAINING/RETRAINING REQUIREMENTS IN FIRST TWO PROJECT YEARS

Project Activity	Staff Categories to be Trained	PY 1 Estimated Numbers	PY 2	Total
1. Strengthening Institutional Capabilities				
a) Human Resources Development	HQ and Field Senior Administrative and Technical staff with supervisory responsibilities	60	15	75
b) Management Systems	HQ and Field Senior Staff; Technical Advisers, Field Operations Managers and Field Supervisory Personnel	30	60	90
c) Technical Capabilities	All HQ and Field Technical Staff	300	100	400
2. Mobilization of Community Resources	A. SNEM			
	Selected Field Administrative and Technical Staff; HQ and Field Health Education Personnel;	80	30	110
	Community Volunteers	1500	1500	3000
	B. OTHER			
	Public Health + Private Sector Physicians; Paramedical Personnel;	100	100	100
3. Development of Surveillance System				
a) Stratification Process	HQ and Field Epidemiologists and technicians	25	25	50
b) Information Components of Surveillance System	A. SNEM			
	Senior Technical and Administrative Staff, Field Technicians; Public Health	75	75	150
	B. OTHER			
	Private Sector Physicians and Technicians	100	100	200

PROJECT TRAINING/RETRAINING REQUIREMENTS (SUMMARY TABLE)

Project Activity	Staff Categories to be Trained	PY 1 Estimated Numbers	PY 2	Total
c) Operational Research	Senior Technical Staff, Field Technicians	10	10	20
4. Field Operations				
a) Spraying	Operations Managers; Old and New Spray Teams, Technicians	375	375	750
b) Chemotherapeutic Methods	Senior Technical Personnel; All Field Supervisory Personnel	200	200	400
	Volunteer Posts Drug Distributors	6000	6000	12000
	OTHER			
	Public Health and Private Sector Physicians; Paramedical Personnel	300	300	600
c) Other Antimalaria Operations	Senior Technical Personnel, Field Technicians; Field Administrators; Operations Supervisors Operations Personnel	60	60	120

Table 3-2 USAID TECHNICAL ASSISTANCE PLAN FOR MANAGEMENT OF MALARIA PROJECT
Year ($000)

Type/Activity Total	FY 83		FY 84		FY 85		FY 86			
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
A. Short Term										
I. Strengthen Management										
a) Over-all Management System and computer System Development	4	32	2	16	2	16	1	8	9	72
II. Operational Improvements										
a) Larvivorous Fish etc	1	8	1	8	1	8	-	-	3	24
III. Technical Studies & Reseaarch										
a) Operation Studies Protocols Chloroquine Resistance (DCT) etc.	4	32	4	32	2	16	2	16	12	96
b) Insecticide Evaluation	2	16	1	8	-	-	-	-	3	24
IV. Training and Health Education	3	24	1	8	-	-	-	-	4	32
V. Project Evaluations	-	-	3	24	-	-	3	24	6	48
VI. Consultants/Analysis	2	16	2	16	1	8	-	-	5	40
Sub-Total	16	128	14	112	6	48	6	48	42	336
B. Long-Term										
a) Malariologist	12	125	12	125	12	125	12	125	48	500
b) Epidemiologist	9	94	12	125	3	31	-	-	24	250
c) Technician (Local Hire)	9	19	12	25	12	25	12	25	45	94
Sub-Total	30	238	36	275	27	181	24	150	117	844
Totals	46	366	50	387	33	229	30	198	159	1180

Table 3-3 PAHO TECHNICAL COOPERATION PLAN FOR MALARIA CONTROL
Year ($000)

Type/Activity Total	FY 83		FY 84		FY 85		FY 86			
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
A. Short Term[1]										
I. Mobilization Of Community Procedures										
a) Training and Health Education	4	32	2	16	2	16	1	8	9	72
b) Community Organization and CV Improvement	2	16	2	16	2	16	-	-	6	48
II. Increased Epidemiological Capabilities	1	8	1	8	1	8	1	8	4	32
Sub-Total	7	56	5	40	5	40	2	16	19	152
B. Long Term										
a) Senior Malariologist-Team Leader	12	70	12	72	12	74	12	76	48	292
b) Entomologist	12	70	12	72	12	74	12	76	48	292
c) Health Educator-Trainer	12	70	12	72	-	-	-	-	24	142
d) Technical Officers	24	140	24	144	36	222	36	228	120	734
Sub-Total	60	350	60	360	60	370	60	380	240	1460
C. Training[2]										
a) Fellowhips + Travel	18	54	23	70	23	70	31	94	95	288
Totals	85	460	88	470	88	480	93	490	354	1900

1/ PAHO budgeting uses $8-10,000 per person month; however budget estimates include PAHO and WHO HQ and regional oiffice staff who will not be charged to the program, e.g. for evaluation, special seminars or in the identified technical categories.

2/ Category includes estimated value of PAHO/WHO regional or inter-country training programs not appearing in the local budget.

b. Strengthened Management Systems

Institutional strengthening of SNEM involves a variety of other activities. SNEM has already embarked upon administrative restructuring at the Zone and Sector levels to make the organization more suitable for the control design and consistent with DSPP Districts and regional boundaries. In addition, SNEM has approved the addition of an Assistant Administrator at the Headquarters level and other structural improvements are planned. Reallocation of staff and job functions is underway in the Administration, Operations, Epidemiology, and the Research, Training and Health Education Divisions.

Functional reporting with improved mechanisms for analyzing information including costs and results will be developed. A two-way radio communication system will be established to improve direct communication and information linkages among Sectors, Zones and Headquarters. Introduction of additional modern management techniques will improve use of operational information for decision-making and planning.

U.S. assistance aimed at improving organizational and program management will consist of 9 person/months of short term technical assistance, in-country management training, the provision of a mini computer and a radio-communications system. A management assessment will be carried out during the first three months of the project to determine management training requirements and develop in-country management training activities.

Improved reporting on all field operations will increase the flow of information required for semi annual reclassification of the several hundred foci. To facilitate technical decision-making and to link technical planning with operational implementation, a practical but computerized management information system will be essential. Key administrative management systems--including supply, accounting, personnel and transport are being prepared for computerization. This will enable SNEM to routinize administrative tasks and make projections. Short-term technical assistance will be required for systems analysis, MIS development, computer software design and training in computer use.

In order to prevent dislocations in on-going malaria control activities, the consolidation of administrative and operations management support systems must be carefully planned and phased. French speaking expert consultants will be employed after detailed scopes of work have been developed with SNEM.

It is anticipated that the SNEM Executive Committee will assume a stronger leadership role in the monitoring of program progress as well as in facilitating coordination with governmental and private agencies. The committee will meet quarterly or more frequently when circumstances warrant.

c. Strengthening Technical Capacity

A third component of the institutional strengthening of SNEM must focus on enhancing technical capacity to correctly identify priority operational zones based on the stratification process, to implement activities, to plan and conduct operational research and field studies etc. Based on the training described above and the utilization of technical consultants specific augmentation of existing capacity will take place as follows:

1) Epidemiology/Stratification - SNEM has recently appointed a new capable Division Chief and two Assistants. AID will provide the services of three long-term advisors--a malariologist, an epidemiologist, and a local hire technician, who will assist SNEM in stratification, statistics analysis, field research and evaluation. AID will also provide the mini-computer, previously mentioned,and basic climatological equipment and supplies for field and headquarters operations. In addition, extensive training and re-training of sector chiefs, zone supervisors, HQ inspectors and microscopists will take place. Also PAHO will provide five long-term advisors in the following areas: epidemiology, entomology, malaria training and education and field operations as well as short time consultants for the program.

SNEM will appoint a new Entomology Section Chief and increase the number of mobile entomology teams in the five Zones. The major entomological upgrading activity will be the training of 35 Squad Chiefs, Group Chiefs and

Collectors in basic entomology, collection methods and identification and vector bio-assay and sensitivity tests. The number of operational insectaries will increase to enable SNEM to better monitor vector susceptibility.

2) Operational Research - Steps to be taken to strengthen the epidemiology and stratification activities will also serve to enhance technical capacity for field research. Under the project AID will provide short-term technical assistance for design of research protocols and field studies. PAHO will provide short-term external training for three persons per year. Operations Research is discussed in greater detail in section 3.

3) Field Operations - Technical field operations for malaria control will involve the following activities in selected highly endemic foci:

(a) Targeted Intradomiciliary Spraying
(b) Chemotherapy (Mass Drug Distribution)
(c) Larviciding, Biological Control and ULV fogging
(d) Source Reduction

The primary improvement in technical capacity to implement these activities will come through training and re-training of supervisory and field staffs. In addition, for each intervention, guidelines and protocols will be developed during the first project year so that costs and effectiveness of the methods can be evaluated. The strengthening of the Epidemiology Division and the use of positive case data by foci will facilitate technical coordination and communication among technical field activities. Rapid feed-back of results will enhance the active participation of SNEM staff in planning appropriate control activities.

2. Mobilization of Community Resources

SNEM has recognized the necessity of coordination with communities, other governmental and non-governmental agencies, municipalities and the

private sector to support its malaria control activities. This is particularly important since most of the public do not yet fully understand SNEM's malaria control objectives and the ways in which their participation can accelerate achieving these objectives. Thus, since malaria is exacerbated by community ignorance of the disease, improperly planned "development" activities and popular confusion of the malaria vector with nuisance mosquitoes, the first step is to develop an educational strategy which increases awareness of malaria control objectives, provides the necessary information about malaria as a preventable disease and targets messages and educational activities for specific key groups.

To strengthen SNEM's capacity to mobilize existing community resources will require the strengthening of its health education section and the expansion of the use of effective health education and community involvement techniques at each point of interface between SNEM and potential collaborating groups.

The retraining of SNEM staff at all levels was discussed in section one above; included in this training will be skill development aimed at assisting SNEM staff in identifying local leaders and motivating them and the public to participate more fully in the program. SNEM's community mobilization strategy has two elements-community education and community action. Community education is aimed at increasing utilization of the CV post for rapid treatment of fever and increasing community awareness of other self-help (individual or community) measures to reduce the risk of malaria, e.g. rapid treatment of fever cases, reduction in mosquito breeding sites, avoidance of mosquitoes etc. Community education activities will encompass a range of carefully planned activities from radio spots and public health professional education to group meetings with community leaders in highly malarious foci, large employers, local church officials, educators, municipal leaders, local representatives of Ministries of Agriculture, Public Works Interior, Information and Health. Beyond enhancing awareness of malaria and its transmission, treatment and prevention, such meetings will be aimed at increased community action. Community support can take many forms from cash

contributions to in-kind support of volunteers and use of local buildings and equipment. The nature of the local malaria problem will determine the type of community assistance which is required. In some areas, drainage of mosquito breeding sites is indicated; in others the use of larvivorous fish and cleaning of drainage canals will help reduce the mosquito population. It is anticipated that when communities are more aware of the local problem, they will be more active in seeking solutions. When SNEM control interventions such as drug distribution or household spraying are launched, the target community leaders will be involved to facilitate complete coverage. In addition to fish culture, drainage and improved utilization of CV posts, SNEM will explore the possibility of utilizing village volunteers to monitor breeding sites and local rainfall.

Community mobilization in Haiti's municipalities is more complex, impersonal and difficult than in the villages. The problem in these towns and Port-au-Prince is complicated by diffuse responsibility for urban services and lack of communication among service agencies. In addition urbanization which concentrates poorer immigrants on the least suitable land, often poorly drained and without municipal services tends to exacerbate existing mosquito problems. There is preliminary evidence that the vector, An.albimanus, may be adapting his breeding behavior to polluted urban standing water (It normally prefers clean streams, ditches and rice fields). If this occurs malaria control, particularly in Port-au-Prince, will be far more difficult and the cost of malaria as a disease greater as the more productive urban population is affected.

The SNEM strategy for urban community action has more institutional actors then that in rural areas. As first steps the following must be informed and involved:

- the municipality
- the neighborhood associations and leaders
- the private doctors and medical laboratories
- the major employers
- the government service agencies (e.g. public works, health centers and hospitals, etc)

As indicated earlier the problem is complicated by the general association of malaria with all mosquitos, although only An. albimanus which is generally rural, transmits malaria in Haiti. Urbanites tend to want mosquito control which, while a desirable comfort goal, has little to do with malaria control. Politically, mosquito control is very attractive. However, funding for mosquito control must be found apart from the limited malaria control budget as long as malaria remains a serious public health problem. Possibilities for financing mosquito control activities include a special tax on tourists or hotels, member levies by neighborhood groups, commercial and business associations. One key issue in mosquito control is the economic trade-off between the highly visible fogging activities and the less visible larviciding. Fogging and space spraying (adulticiding) are expensive and do not resolve the problem. In contrast, properly designed drainage can provide permanent relief from the mosquito nuisance. Thus, the need for better understanding at the municipal level of malaria as contrasted with other mosquito problems. Unless local communities and municipalities assume responsibility for mosquito control, SNEM resources for the battle against malaria will be diverted. As an example of community action using multiple resources, residents in the Cité Simone slum of Port-au-Prince are participating in constructing permanent storm drains using Title II Food for Work resources provided by Catholic Relief Services. SNEM will provide technical assistance and guidance to the work teams. Similar combined community efforts are envisaged under this project on an appropriate scale throughout Haiti where a population concentration can be protected from malaria by drainage activities.

The importance of mobilization of community support cannot be over emphasized. Malaria rapidly identified and treated can be controlled. The intradomiciliary spraying and mass drug distribution by SNEM in highly infected areas is designed to reduce transmission. Ultimate elimination or eradication will depend on the communities and their active efforts to identify and obtain treatment for every suspected case while reducing potential exposure to the anopheles mosquito. SNEM health education activities will create awareness of the problem and its solutions. Epidemiologic surveillance will provide information on how will SNEM and the communities are doing in controlling malaria. The Community Volunteer will

play a large and active role at the local level in ensuring rapid treatment of suspected malaria. The interaction between the CV and the community and ways to improve the program is part of the operational research planned under this project.

SNEM has already launched an educational campaign to increase awareness among health professionals of the rationale for the malaria control activities and the responsibilities of health professionals. A first seminar is scheduled for October and others will eventually reach all DSPP and private health sector physicians and nurses during the LOP. SNEM's Urban Malaria and Epidemiologic Surveillance Unit will inventory all health service facilities and establish with each a slide-taking, reporting and resupply mechanism through which coordination with SNEM will be enhanced. A regular SNEM bulletin on malaria topics and research and regular confirmation to health facilities of positive slides are planned to reinforce this collaboration.

Greater use of community outreach and motivation techniques will include greater efforts to coordinate with municipalities to mobilize local resources for mosquito control and source reduction. (Further discussion of coordination with the DSPP and other agencies is provided in the Institutional Analysis Section IV.)

3. Development of a Malaria Surveillance System

The third set of project activities builds upon enhanced SNEM institutional capacity but goes a step further in building a malaria surveillance system capable of assimilating diverse data for planning, monitoring and evaluation of malaria control activities

Stratification of malaria is, simply stated, the determination, through whatever means available, of the relative severity of the malaria problem in population or geographic units or foci throughout the country. The basic information needed for stratification is the incidence or prevalence of malaria by locality as well as additional entomologic, ecologic, climatologic, anthropologic and sociologic information. Stratification information facilitates decisions on the type, intensity and timing of intervention measures to be utilized.

Given the highly localized character of Haiti's malaria problem and the extreme variability in transmission patterns, this stratification process must be supported by the development of a broader malaria surveillance system that is responsive to the control operations. To improve the present stratification process, which is based only on the incidence of confirmed malaria cases by locality, it is essential that additional socio-epidemiologic, climatological and entomologic studies should be undertaken to determine the major variables affecting both malaria control and transmission. From this epidemiologic information SNEM can then develop a methodology for the surveillance of the determining factors. Of particular importance are the relationships between human activities, climate, the parasite and the mosquito vector.

SNEM will broaden its surveillance activities to incorporate information on population movements, climatological data, malaria incidence from development projects in agriculture, charcoal production, industry and commerce as well as from the public and private health services facilities.

Simultaneously, a simple information system incorporating information from SNEM's operational research and field studies must be developed so that stratification can be made more precise. Ongoing evaluation of the field operations will also feed-back into the surveillance system. Selection of foci and control measures can then be made on an increasingly sound basis to maximize technical efficiency and cost-effectiveness. Development of such a surveillance system can only be accomplished gradually. The first steps to be undertaken require strengthening of the existing stratification system.

Currently available stratification is based on data tabulated to reflect the annual malaria morbidity rates by locality, summarized by section rural, commune, sector and zone. It indicates that for the years 1975-79, there are roughly 1,300 localities with a population of 312,000 with annual malaria rates in excess of 30 cases per 1,000 population. When these localities are plotted on a map, the important foci of malaria transmission become apparent; for each of these foci, an appropriate attack measure will be selected, planned and implemented and the results assessed. Current estimates suggest that a targeted attack on the focal areas which have high annual malaria rates (above 30 cases/1000 population) are within both budgetary constraints and SNEM administrative capacity but careful local planning and decisive action for timely execution will be required. See Annex C-2 and C-3 for a résumé of foci as determined by the 1975-79 stratification data and a list of Section Rurales which include foci with high and medium levels of malaria endemicity.

When parasitological data from 1980-82 are available for analysis (by October 1982), there must be a rapid review of the distribution of malaria cases so that changes in the activities plan can be made to refocus activities on foci with high transmission rates. Such flexibility must be characteristic of the program throughout its life, with the targeted attack responding as quickly as possible to significant changes in the distribution of malaria, available resources, efficacy of control measures, climatologic conditions, and ecologic and sociologic factors.

Thus, while stratification will be a continuing process, with a regular review of current malariometric data and the rapid development of a new annual plan for control activities intervention in the ensuing year, there must also be provisions for rapid response at any time to epidemic situations which arise during the year. This necessitates constant and timely review of information being collected at the sector, zone, and headquarters levels throughout the year.

The criteria to be used during the first year for selecting the appropriate type and level of control will be based on currently available

epidemiological data and program resources. (For example if resources permit it might be possible to increase the targeted initial coverage of interventions to include foci with fewer reported cases.) At any rate, each year a new level of intervention will be established, which, with the success of the prior year interventions, should be at a lower level than the previous year. During the first project year and following years additional data on climatologic, entomologic, anthropologic and sociologic factors will be combined with baseline and updated information on malaria transmission and used for subsequent planning.

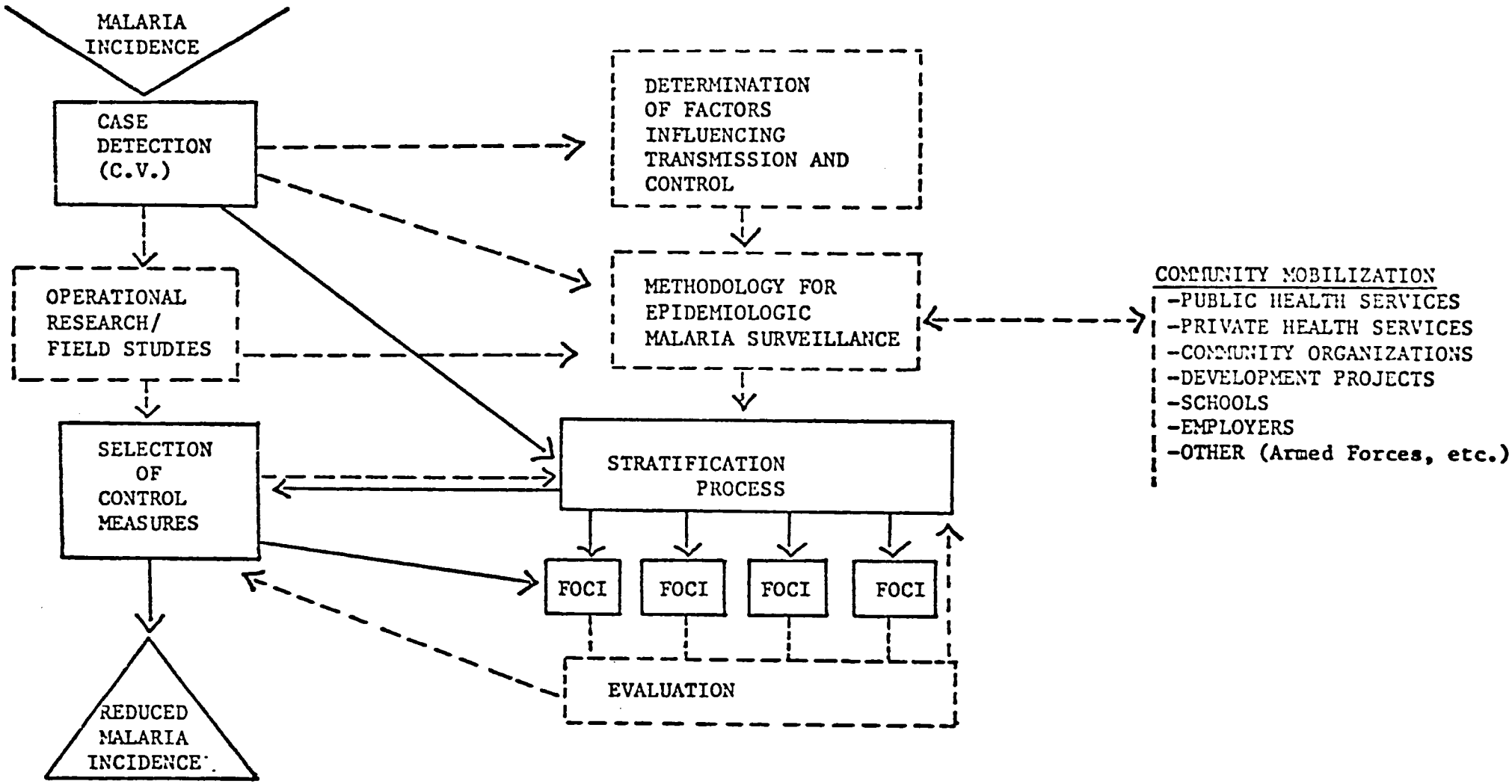
The keys to successful utilization of eco-epidemiological stratification include timely scheduled collection and analysis of data, flexibility, and decisive action toward timely intervention.

b. Components of the Surveillance System

The various existing and proposed elements required by a comprehensive malaria surveillance system are shown in Chart 3-3. Each critical component is described below.

(1) Volunteer Collaborators - The information collection base underlying all operational measures is a nationwide network of over 6,000 community volunteer collaborators (CV) who provide the primary contact for detection and treatment of malaria cases. Whatever other control measures are applied, this network will remain in place and will serve as the first-line resource for the collection of malaria case information, for the prevention of mortality and for the reduction of morbidity. The CV, after a brief training, serves as a primary contact point in his area for all persons who suspect they have malaria and present themselves at the CV post; a blood slide is taken and the person receives treatment with an antimalarial drug dosage designed to suppress the symptoms and to prevent transmission. A higher dosage is provided to young children and pregnant woman to cure the infection in these more highly susceptible patients. The blood slides taken by the CV are collected regularly and are processed and examined in Zone laboratories; the results of these slide examinations provide the basis for determining the extent of malaria in the country.

CHART 3-3 SCHEMATIC PRESENTATION OF A PROPOSED MALARIA SURVEILLANCE SYSTEM



KEY: ——— presently implemented
- - - - - to be developed

Since this passive case detection system is a keystone in the surveillance system, it is essential to monitor its population coverage and ability to reach high risk groups. Sample blood surveys in areas not reporting malaria cases will determine whether this is due to the absence of malaria or whether the population circumvents the CV post, seeking treatment elsewhere, or not at all. Social factors contributing to the non-use of CV's must be investigated, understood and accomodated to insure maximum reliability of information from the CV system. To broaden the information base of the CV system, SNEM will experiment with sentinel CV posts that will function as additional detection mechanisms. SNEM must control the quality of CV generated data and assure the reliability and quality of blood slides, the accuracy of case data collected, the regularity of slide collection and the accuracy of analysis. Efforts planned to strengthen the CV system are described further in section b. below.

(2) Epidemiology - Major general information will be generated through the epidemiological analysis of entomological, parasitological, climatological, sociological and population movement data, as well as of data reported from all control activities. Additionally, SNEM will carry out epidemiological field studies. These will include blood slide surveys to evaluate the effectiveness of treatment and spraying interventions.

A more complete range of basic entomological data from different malaria strata and transmission areas, on vector distribution, density, breeding site, resting and biting behavior collected during project implementation will substantially augment the surveillance system. Ongoing testing of vector susceptibility to fenitrothion and alternative insecticides/larvicides in relation to control operations will be incorporated in this information system.

(3) Other Information Sources - It is apparent that other public and private health care services reach large segments of the population. Major employers contract with private physicians to handle all of their employees' medical problems. This suggests that a large portion of malaria cases may not

be reported and thus are not included in the information needed for malaria stratification and control implementation, even though malaria case reporting is obligatory by law.

Some sources are now reporting malaria cases (about 4000 cases per year) to the DSPP but not to SNEM. SNEM has begun efforts, which will continue during the project to gain the cooperation of the health facilities in collecting blood slides from all fever patients, providing treatment and recording case data on forms that will be forwarded to SNEM for laboratory confirmation of all clinical cases. This cooperation will augment the needed focal information on malaria cases, and perhaps achieve some comparability in the drugs and drug dosages being used for treatment.

Additional malaria case referral and reporting should come from community organizations, schools, the Armed Forces, from agricultural and other development projects and from major industries. It would also be helpful to receive malaria surveillance data from the Dominican Republic, the Caribbean basin and from U.S. ports of entry.

To strengthen SNEM's epidemiological surveillance capability, training and technical assistance are given major emphasis in this project and are discussed in Section C-1 above.

c. Operational Research

The eventual success of the Project in achieving its goals may well depend on the operational field research designed to assure the improvement of control technology through the introduction of new methods or the more effective application of existing methods. The main control interventions will be the intradomiciliary application of insecticides and the use of drugs. Their effectiveness may at any time be lessened by pesticide resistance in the vector and parasite resistance to the drugs. Thus, research on parasite susceptibility to drugs and a system to detect and regularly monitor parasite resistance is of prime importance to the surveillance system. Other priority studies include the use of alternative drugs and

regimens; methods for drug and insecticide use which would reduce the potential for resistance; the feasibility of alternative drugs and insecticides; and alternative control measures.

Since all of the technical information needed to assure success of a control program in Haiti is not yet available, SNEM has begun a continuing investigative program to collect additional information needed on the effectiveness of every measure employed in the program.

Although not all of the required research can be implemented immediately, it will be phased in over the life of the Project, beginning with high priority research aimed at achieving project purposes. AID and PAHO willl serve as the primary resources for the acquisition of technical assistance and for the specialized technical training of SNEM staff needed to accomplish the research objectives. A detailed list of suggested field research subjects may be found in Annex C-2.

4. Implementation and Improvement of Malaria Control Field Operations

In designing an acceptable control program, three assumptions must be made:

- Resources for a full coverage program to reduce malaria throughout the country will not be available and use of available resources must be maximized;

- A certain amount of morbidity from malaria is inevitable; mortality must be considered intolerable;

- A number of control measures are available for use on a selective basis;

The various control measures are discussed below.

a. Intradomiciliary Spraying

On the basis of long term field trials the program has elected to apply only fenitrothion as a residual house spray for the control of malaria in Haiti. The high effectiveness of this compound is somewhat tempered by its higher potential toxicity to program personnel and its higher cost. Thus, within the resources available to the Project, its use will be restricted to selected areas which: (1) have high malaria prevalence and (2) are appropriate for spraying. The protection of personnel from toxic effects of excessive exposure to this compound also requires carefully planned and executed monitoring, appropriate protective equipment, and thorough training in its safe use. (See the Amended IEE in Annex A-7).

The operational spray program for the first year includes a comparative study of the use of fenitrothion at three levels of application in four Zones and the operational application of fenitrothion at 2 grams/m^2 in selected foci of the four Zones.

Each Zone will have a control area of comparable size and endemicity where no other control measures are to be applied except for drug treatment given through the CV system. Protocols will be developed for each study and included in the detailed annual plan of action. While final selection of the focal areas to be included in the several levels of application will not be solidified until later, a preliminary designation is shown in Table 3-4.

The highly endemic foci for which the operational spraying is appropriate have also been tentatively identified in this table.

The starting date for spraying operations is dependent upon the availability of insecticide, the arrival of replacement vehicles and the recruitment and training of additional entomology staff to collect baseline data and monitor the entomological situation in the study areas. Although January 15, 1983 has been targeted as the starting date for the first spray cycle, it may be necessary to delay this to March 15, 1983.

Table 3-4 TENTATIVE PLAN FOR OPERATIONAL AND COMPARATIVE INSECTICIDE DOSAGE TRIAL SPRAYING OVER EIGHTEEN MONTH PERIOD 1983-1984

A. Operational Spraying in Highly Malarious Foci with Seasonal Transmission

1. Spray Parameters

Insecticide Application Rate (g/m^2)	No of Zones	Houses per Zones	Total Houses to Spray	No. of Spray Cycles
2.0 grams	5	10,000	50,000	3

(Spray cycles to be completed before each rainy season)

2. "Sections Rurales" with Foci Meeting Criteria for Proposed Spraying

Baie de Henne, Bombardopolis, Môle St. Nicolas, La Chapelle, Verrettes
Grand Goave, Ravine Normande, Gaillard, Marigot
Petit Trou and Rivière de Nippes, Anse-à-Veau, Les Irois, Dame-Marie
Anse d'Hainault, Foci of old Sumit III, Extension areas of Sumit III
Hinche, Mirebalais

B. Comparative Insecticide Dosage Study in Highly Malarious Foci with Perennial Transmission

1. Spray Parameters

Insecticide Application Rate (g/m^2)	No of Zones	Houses per Zones	Total Houses to Spray	No. of Spray Cycles
1.0 grams	4	5,000	20,000	4
1.5 grams	4	5,000	20,000	4
2.0 grams	4	5,000	20,000	4

(Spray cycles at 90 day intervals)

2. "Sections Rurales" with Foci Meeting Criteria for Proposed Spraying

$1.0g/m^2$	$1.5g/m^2$	$2.0g/m^2$	Control
Baradère	Corail	P-Salut/P-à-Piment	Baradère
Montrouis/Délugé	Jean-Rabel	Jean-Rabel	J.R., La Coma
Limbé	Port-Margot	Fort-Liberté	Limbé
Mirebalais	Hinche	Mirebalais	Hinche
Petit-Gôave	Petit-Gôave	Leogâne	Leogâne
Jean-Rabel			

Spray operations during subsequent years of the Project will be at approximately the same level, assuming a continued availability of the insecticide. Of particular importance will be the careful evaluation by both internal and external reviews of the effectiveness of the lower levels of insecticide application (i.e. 1.0 and 1.5 g/m^2) after 6 complete spray cycles. If satisfactory results are obtained at these lower levels, the spray operations can be expanded more rapidly to additional malaria foci within the existing program resources. Of equal importance will be the careful and continuous monitoring of the sensitivity of mosquito vector populations to the insecticide to detect as early as possible the appearance of physiologic resistance to the compound. Project plans call for entomologic evaluation on a monthly schedule to monitor insecticide effectiveness and vector sensitivity. While there appears to be no resistance to fenitrothion, the program must consider it a future possibility and have the flexibility to cope with the problem if and when it arises. Sensitivity testing should precede the introduction of spraying into any new areas.

Careful entomologic and epidemiologic evaluations are required to monitor the effect of spraying on malaria transmission in comparison with unsprayed areas. At the end of a spray cycle, cases in each foci under operational spraying will be evaluated as part of the stratification process and a decision made as to the desirability of continuing to spray. During the year, if epidemic malaria occurs, the addition of mass drug administration or other measures to reduce excessive morbidity and mortality will be considered.

b. Chemotherapeutic Method

(1) The Volunteer Collaborator System - The basic plan for distribution of drugs through the volunteer collaborator network is already described above. While the CV system is reasonably effective, various improvements are needed and will be implemented over the life of the project. During the first year of the project, the system must reorganized to function more efficiently and consistently throughout all malarious area of the country. Among the improvement factors being considered are:

The selection and appropriate training of the volunteer collaborators;

The redistribution of CV posts to assure full coverage of malarious areas, to assure the availability of posts within reasonable distance of every resident and to eliminate posts which are outside of endemic areas, are non-productive, or are superfluous to the needs of an area;

The reorganization and strengthening of SNEM mechanisms for servicing and supervising the operations of the CV to assure the timely availability of supplies (drugs, slides, etc.) and retrieval of blood slides for examination.

The determination of sociologic or other factors which result in use or non-use of the CV network by the population and the design of remedial measures to assure full usage.

By the end of the second project year, a reorganized CV system should be in place. During the remaining years continuing evaluation of the effectiveness of the system will be aimed at improving its effectiveness, reliability and coverage.

In addition, SNEM will also explore the feasibility of expanding the functions of the CV in the malaria control effort. Initially one can visualize the CV providing additional health education on malaria transmission and control or facilitating community participation in malaria control measures. Any new tasks or functions for the CV must be carefully evaluated before they can be generalized throughout the country.

(2) Mass Drug Administration - Mass drug distribution in localities of high malaria incidence, selected through the malaria stratification system may be provided where other control measures are not underway. In mass drug distribution, each inhabitant of the locality is contacted and given a single dose of chloroquine or chloroquine-primaquine. Such mass treatment may be repeated. Mass drug administration will be considered as a special program only when it is epidemiologically justified, either to lower the mortality and morbidity of malaria in an epidemic outbreak or to prevent outbreaks resulting from obvious ecological changes due to hurricanes or other disasters or unusual movements of population.

Mass drug administration has recently not been effective in lowering transmission. To rationalize and insure the effectiveness of this intervention, SNEM is transferring decision-making, planning and evaluation for this activity from the operational level to the Epidemiology Division with control by the SNEM Director. Research studies on timing and targeting of the mass drug administration will be used to design operational protocols and define more precisely the objectives for the activity. Protocols for mass drug administration may be aimed at one or more of the following:

(a) elimination of mortality;
(b) prevention of outbreaks; and/or
(c) reduction of morbidity.

Ongoing evaluation of the mass drug treatment is continuous through the CV post, but during the first year prior to and after the mass drug distribution mass blood surveys are planned in selected localities to evaluate impact on parasite rates.

c. Larval Mosquito Control - The control of larval populations of the mosquito vector will be carried out in selected areas through the use of petroleum products (diesel) with or without an added "spreader" (Triton X-100). Because of the risk of inducing insecticide resistance in the mosquito vector, larviciding programs will not use the same or similar insecticides (i.e. organophosphates) as those used in house spraying programs.

Larviciding is particularly useful in urban and suburban areas during the dry season, where permanent breeding sites are limited and accessible. In such areas the cost-effectiveness and cost-benefits of the measure may be favorable. In some non-urban malaria affected areas where breeding situations are limited and identifiable, larviciding may also be a method of control. It is also a method which may lend itself to community action.

Criteria for larviciding will be developed from the malaria stratification in association with other available ecologic, economic and environmental information and will be reviewed on an annual basis. During the first year of

the Project, larviciding for malaria control may be considered for the protection of larger populations such as Port-au-Prince, Cap-Haitien, Jacmel, Cayes, and certain tourist areas, such as Délugé, Montrouis, Carries and Port-Salut.

Newer larvicides and larvicidal methods now under development may prove useful in Haiti during later years of the Project. If such materials become available, studies on their applicability in Haiti would be done prior to adoption for use. These potential larvicides include monolayer films and synthetic pyrethroids.

Whenever larvicides are used, baseline study together with a continuing entomologic evaluation will be used to provide insofar as possible, an epidemiologic evaluation of their effect on malaria transmission.

d. Area Spraying

The use of ultra low volume (ULV) spraying to reduce adult mosquito populations is an expensive measure with limited applicability. The principal value is the rapid control of epidemic occurences of fever cases in relatively densely populated urban and suburban areas, especially when vector densities increase after heavy rainfall. This method will be used sparingly, usually in association with urban larvicidal programs when malaria transmission is of epidemic proportions.

While the most cost-effective insecticides used in ULV spraying are organophosphates such as Malathion, their use may increase the risk of cross-resistance in the mosquito vector to the fenitrothion which is being used for intradomiciliary spraying. Thus, use of ULV will be limited.

e. Source Reduction

Source reduction has been useful in many countries, including the U.S., and should be combined with other measures in an integrated control approach. Malaria risk can be permanently reduced by elimination of mosquito

breeding sources by drainage, filling, canalization, and other such methods. Such programs will be actively sought and instituted wherever cost-effectiveness can be demonstrated. These areas will usually be densely habited or where a minimal effort would eliminate a significant mosquito source in a non-urban situation. Minor source reduction efforts may be effected through increased community participation; these would include ditching or filling to eliminate water collection or to allow for more rapid rainfall run-off, cleaning of vegetation and debris from existing drainage ditches, and similar small scale efforts.

SNEM has only limited equipment for source reduction projects. This equipment will be used principally to assist community groups initiate action to reduce mosquito breeding sources. SNEM Headquarters engineering personnel will also attempt to identify situations where major source reduction efforts would be appropriate in coordination and cooperation with municipality officials, other responsible government agencies and private voluntary organizations.

The prevention of a "man-made malaria" will require a continuing effort by SNEM to identify and, working with other governmental agencies, to rectify or prevent situations which provide new or expanded mosquito breeding sites. The expansion of agricultural irrigation systems poses a particular threat in creating additional mosquito breeding areas accompanied by an influx of Haitians to exploit these more productive agricultural lands. The proper design and maintenance of such systems can minimize the threat of expanded malaria transmission. SNEM will increase its efforts to prevent this expansion of mosquito breeding sites.

f. Biological Control

On a modest scale, SNEM has introduced the use of larvivorous fish for larval control of the mosquito vector. Breeding tanks for the common guppy (*Poecilia reticulata*) have been installed at all Zones and guppies have been distributed to appropriate larval habitats. The results of this intervention will be evaluated during the project period. Other studies will determine the usefulness of additional species of larvivorous fish, including those found locally, for possible inclusion in the program.

If the results of the studies and evaluations are favorable, expansion of fish breeding facilities and of fish distribution will be undertaken. Efforts will be made to determine the feasibility of fish culture and distribution as community supported measure which can contribute to malaria control.

To generate renewed interest in the use of larvivorous fish and other biological control interventions, SNEM with expert consultants will hold a workshop for senior technical staff to discuss the effectiveness of this intervention in other areas and to determine criteria for expanded use in the control program. The workshop will focus on development of plans to increase use of biological information and interest into the field, and will designate responsibility at Sector, Zone and HQ levels for this measure. A protocol will be developed for this activity, with evaluation by the entomological section.

IV. PROJECT ANALYSES

A. Technical Analysis

This project is designed to incorporate a wide variety of malaria control measures which will enhance the program's operational impact and efficiency. However, while philosophically malaria control is far more complex than malaria eradication, the tools of malaria control are much the same as those used in eradication programs. The difference is in how these tools are used to guide and evaluate operations. There is an emphasis in this project on more data analysis to provide the basis for implementation of alternative measures and to support operational decisions on the part of the program director and his senior staff. Project operations will rely on (1) continual stratification of the malaria program using a range of epidemiologic, entomologic and other data and (2) the application of a variety of control measures as dictated by the stratification and the resources available. The discussion below describes the technical and operational feasibility of applying the various malaria control techniques and methodologies in the Haitian SNEM program.

1. Stratification of Malaria

The concept of stratification is a time-tested field principle and is a necessary planning activity in the establishment of rational country malaria control program. The level of malaria control targeted in this program is within the available human and fiscal resources provided under this project. The Haitian malaria control organization (SNEM) understands and endorses the stratification concept and has demonstrated this understanding in its preparation of the new Plan of Operations. SNEM is committed to updating the stratification before the Project begins and to annual re-stratification over LOP to improve program quality and impact, with expanded and improved data collection on entomologic, ecologic, climatologic, anthropologic and sociologic factors: By the end of the first year a more precise stratification of malaria areas will be possible. With the planned reorganization of SNEM personnel, management procedures and epidemiological systems, the project

provides technically feasible and cost effective assistance to SNEM and the GOH. In order to insure progress in the program's development, an internal review of the stratification effort is planned at the completion of the sixth round of spray application or approximately eighteen months after the initiation of the project. This evaluation will provide mid-course corrections in program directions and assist SNEM in future planning.

2. Volunteer Collaborators

The use of volunteer collaborators (CV) for collection of epidemiologic information and treatment of suspect malaria cases is a proven and effective system which has been used with success in Haiti and elsewhere in the Americas for many years. The project is aimed at strengthening and renovating this system in Haiti during the first years to provide (1) consistent and meaningful coverage of the malarious areas; (2) reliable servicing and supervision by SNEM; and (3) enhanced utilization of the CV network by the population. The system is technically sound and operationally feasible in its present mode and will become increasingly more effective as the management and field support capabilities of SNEM are increased and strengthened through the planned training and technical assistance efforts of the project.

The proposed strengthening of the CV network through training and operational research aimed at increasing coverage of malaria cases and reliability of data is sound and feasible, within SNEM organizational and technical capabilities. Furthermore, the CV system will contribute to the objectives of enlarging coverage and providing basic primary health care services. The distribution of CVs by zone is shown in Table 4-1.

In addition, the Project support for training and re-training of a broad range of public health and medical personnel who interface with the malaria control effort will strengthen the primary health care capabilities of the health services and lead towards more malaria control activities being integrated into the existing health infrastructure.

Table 4-1 DISTRIBUTION OF SNEM VOLUNTEER COLLABORATOR POSTS BY ZONE AND TYPE, 1982

	Number of Posts	
	Paramedical	Civil Posts
Zone I	101	1965
Zone II	116	2809
Zone III	75	1632
Total	292	6406
	4.4%	96.6%

3. Intradomiciliary Spraying

There has been more experience in Haiti with residual intradomiciliary spraying than with any other malaria control intervention. Such operations have, in the past, been well planned, organized and implemented. While evaluation of results has not always been complete or done on a timely basis, good evaluation is within the capabilities of the program. Residual spraying is to be used selectively in the project with fenitrothion as the insecticide of choice. Recent field studies in Haiti have demonstrated that intradomiciliary spraying with fenitrothion will reduce malaria incidence significantly. The use of this measure is considered technically sound and feasible, provided that:

(1) the behavior pattern of the vector will be such that intradomiciliary insecticide residues will interfere to a significant degree with the transmission of malaria;

(2) safe application and handling practices are employed with the insecticide so that there are no significant problems of pesticide toxicity in program personnel nor in recipient populations, as determined by carefully organized and effective monitoring; and,

(3) there is frequent--preferably monthly--entomologic evaluation of the efficacy of the spraying and of the sensitivity of anopheline populations to the insecticide.

The determination and assurance of these qualifications are within the technical and administrative capabilities of the SNEM organization, but will require additional staff training, the establishment of one or more insectaries to provide test mosquitoes, and increased professional supervision. The project is designed to meet these requirements and to insure that a continually improved spray operation is being implemented. SNEM will carefully monitor the mosquito population to identify the emergence of resistance to the insecticide in the vector or any significant alteration in its behavior patterns. The planned SNEM mechanism for this monitoring is considered technically sound and should detect early changes in vector behavior or response to insecticides.

One of the priority operational research efforts the Project will support is the determination of the lowest effective dosage of fenitrothion for acceptable control. Demonstration of the efficacy of Fenitrothion at a lower rate of application would permit adoption of this rate operationally and effect significant savings to the program. Operational research to determine behavior patterns of the anopheline mosquito vector, Anopheles albimanus, in the variety of ecologic situations throughout Haiti and to determine throughout Haiti any emerging patterns of mosquito resistance to fenitrothion and the two other insecticides widely used for residual application, malathion and DDT, are essential and can be conducted by SNEM, with the assistance of AID and PAHO advisors, and short term technical assistance.

4. Larviciding

This method is to be used in urban, sub-urban and other selected situations to achieve reduction in vector mosquito populations. Only petroleum products are being presently considered for this purpose, avoiding the use of insecticides which might induce resistance in the anopheline populations and negate the effectiveness of these compounds for use in intradomiciliary spraying. Provided this principle is followed, and that each larviciding project is evaluated for effectiveness, the measure is considered sound and feasible for application by SNEM. The conduct and evaluation of operational field studies on the effectiveness of various larvicidal methods are within the capacity of SNEM from both a technical and managerial point of view.

5. Area Spraying (Adulticides)

The use of Ultra Low Volume (ULV) and fogging applications for control of adult vector mosquitos is sound and feasible if used specifically for control of localized epidemics, if suitable insecticides are used, and if the equipment used in the applications are correctly adjusted and operated. If this technique is to be used, there is a need for retraining of personnel in the correct use of the method. The project includes training in spray operations and, if carried out as planned, this malaria control intervention could be selectively applied on a technically sound basis.

6. Source Reduction

Source reduction (environmental modification) methods are considered technically sound contributors to malaria control programs, particularly if they provide for a permanent reduction in mosquito breeding sources. The feasibility of inclusion of these measures in the SNEM program demand specific efforts by the program to seek, assess and correct situations which are suitable for this type of intervention. With reorganization and retraining of personnel as planned during the project, it will be feasible to include a limited amount of source reduction in the program. The project plans to encourage community participation in minor source reduction actions; this is technically sound provided guidance is provided by SNEM personnel to direct and supervise community efforts.

7. Biological Control

There are a number of biological control methodologies being tested world-wide including the use of bacteria, viruses, and nematodes. Scientists working in the field of genetics are also attempting to discover mechanisms for the control of mosquitoes. However, in this project, it is not planned to operationally apply any biological control except larvivorous fish. The use of larvivorous fish appears to be an inexpensive, effective, and potentially community-based measure for reduction of mosquito populations in permanent breeding areas and rice paddies. It is a sound, time-tested measure and further exploitation of the method is feasible for SNEM. SNEM has had considerable successful experience in this methodology in the past and it is already an established control tool in the program. Additional fish breeding facilities, methods of distribution, and field studies evaluating the effectiveness in a variety of habitats will be needed and are designed in the Project. It is considered feasible for SNEM to implement such biological control methods. Field research in additional biological methodologies is being considered within the project. SNEM is capable of doing these studies but will require some limited technical assistance and training in planning and evaluating biological control activities.

8. Chemotherapy

There are three instances when malaria drug therapy is indicated and will be provided. The first and most important in terms of both generating local data on malaria cases and treating suspected cases is the drug an chemotherapy provided by the more than 6000 CVs and any cooperating public health facilities. A combined treatment of chloroquine and primaquine will be provided to all fever cases arriving at the CV post. Since these fevers are presumed to be malaria, the drug treatment is termed a presumptive treatment. Because of the special malaria risk to children under five and pregnant women, they will also be provided with an additional appropriate dosage of chloroquine adequate to ensure a rapid reduction/elimination of the malaria parasites; this more comprehensive drug regimen is termed radical treatment. In addition to these two specific drug regimens provided by the health posts and SNEM employees, SNEM will organize a Mass Drug Administration (MDA) in carefully delimited special circumstances to reduce malaria transmission in areas (foci) where there has been continued high transmission but where spraying is not planned. In MDA all, or as nearly as possible, residents of an area are provided with drugs.

The distribution and use of anti-malaria drugs in the volunteer collaborator system is technically sound and feasible as chloroquine and primaquine, the drugs of choice, are cheap, effective and have few side effects. The chloroquine is used to suppress symptoms and the primaquine, to reduce the possibility of transmission as it acts on the gametocyte forms of the malaria parasite. For this reason the recommended regimen includes primaquine and will be offered and available at CV posts to all fever cases, with particular care taken in providing the appropriate treatment to children under five and pregnant women.

However, the planned use of mass drug distribution requires careful planning and execution. Full coverage of malarious areas with anti-malaria drugs in selected areas will be based on malaria rates, accessibility and cost considerations in relation to other less expensive measures. This is a rational and sound approach because of the threat of parasite resistance to chloroquine. Careful, frequent and continuing evaluations of drug

effectiveness and parasite sensitivity to the drugs is planned. For these evaluations, SNEM will assign well-trained personnel for evaluation and sensitivity testing in all areas where drug distribution is used. Additional training of personnel is part of the project. External technical assistance will be used for development and monitoring of a rational evaluation program, for operational research on alternative drugs, drug combinations and methods of distribution, and for a thorough reevaluation of total antimalaria drug use in the country i.e. by public and private health facilities. The projected use of mass drug distribution and the conduct of essential field research is technically sound and is feasible within the constraints noted above. The technical assistance required is available and is incorporated into the project design.

The use of drug treatment during blood surveys and/or active case detection provides a measure which is feasible for use in relatively small foci and will, when added to the existing passive case detection/treatment posts, provide a means for reducing morbidity and mortality. Active case detection, with treatment of fever cases, will also be used in coordination with other control measures for morbidity/mortality control and, to some extent, reduction of transmission through the partial elimination of the parasite reservoir.

9. Environmental Safety Aspects

The physical, biological and chemical interventions proposed are environmentally sound provided that their implementation adheres to the recommendations set forth in the IEE and the appended paper by Dr. John W. Kleiwer, USEPA Consultant (See Appendix A-7 and D-2). In summary, conclusions reached regarding the environmental safety of the project are.

a) The environmental impact of the relatively minor quantities of pesticides used in public health programs, such as residual domiciliary spraying, is widely recognized as inconsequential in producing adverse environmental effects. For example, the possibility of fenitrothion or any insecticide entering the food chain through such usage is virtually nil. Repeated environmental

assessments in malaria programs in India, Nepal, Sri Lanka, Thailand and Pakistan have supported the conclusion that the benefits of a malaria program far outweigh the risks to the environment.

b) When managed and applied according to the labelled recommendations for households, fenitrothion has demonstrated no adverse effect on the recipients of intradomiciliary spray programs.

As an added precaution, on a random basis during the first two spray cycles SNEM will monitor blood cholinesterase in a sample of the residents whose structures have been sprayed with fenitrothion in order to determine any adverse effect on the residents. During the first two spray cycles the SNEM cholinesterase technicians will draw blood samples from younger children in at least 5 sprayed houses of randomly selected localities, 48 hours after application of the insecticide.

c) Provided that safety requirements for storage, handling and disposal of containers, bags and equipment for fenitrothion are followed according to recommendations, any possible harm to the environment would be minimal. SNEM is aware of the principles of these safety requirements and has the capacity to comply with them.

d) The methods proposed for the protection of spray personnel handling fenitrothion are widely accepted procedures and SNEM has the proven capacity for carrying them out.

e) Since the use of larvicidal oils and spreading agents is ecologically acceptable, the use of such substances as proposed by the project is environmentally and technically sound.

f) The proposed biological and physical interventions--e.g., fish, ditching, draining, etc., are widely accepted as environmentally sound.

g) Pyrethroids to reduce adult mosquito populations (area sprays, ULV fogging) have been widely applied in the U.S. and when used according to the labelled instructions are environmentally safe.

The environmental aspects of the proposed project are fully addressed in the Amended IEE and the supplementary report found in Annex D-2.

In summary, the major activities proposed by the project, to strengthen organizational management and technical capabilities; to mobilize community resources; to improve field operations; and to increase epidemiological capabilities and operational research have been considered technically and are considered sound and will lead to major improvements in the program's effectiveness in the control of malaria in Haiti.

B. Social Soundness Analysis

1. Sociodemographic Profile of the Population

a. Identification of Project Beneficiaries

An estimated 4.5 million Haitians are currently at risk of malaria infection and will benefit from increased access to malaria treatment and preventive measures. The primary beneficiaries will be three targeted priority groups: a) an estimated 5 percent of Haitian localities (i.e. 1300) suffering a burden of 30 or more malaria cases per 1,000 population; b) the infants and young children who are at greatest risk of malaria mortality and morbidity in all malarious areas, and c) pregnant women who are particularly susceptible to malaria. Project success will result in healthier infants and children, fewer malaria-induced miscarriages, a reduction in premature and low-weight births. Since there is growing evidence that malaria is frequently found in combination with diarrhea, malnutrition and other infectious diseases, the reduction in malaria risk should lead to better health and the reduction in time of convalescence from other infections. The number of infants, children and pregnant women in the latter two target groups total about 1 million persons at gravest risk from malaria.

Secondary beneficiaries will be the Voluntary Collaborators and the public and private health cadres who, as a result of training, will be better able to diagnose, treat and prevent malaria episodes in the population at risk. Through increased understanding and participation in malaria control, communities will benefit from the significantly reduced malaria burden and their own improved abilities to protect themselves from the disease. School children, teachers and agricultural workers will benefit from the malaria control activities, which will enhance their productive contributions to economic and social development. It is estimated that the average case of untreated malaria in an adult is incapacitating for 1 week, followed by two to three weeks of convalescence at less than full strength and energy. Because the seasonal malaria transmission frequently corresponds with the planting season, the loss from malaria to the agricultural income of rural families is substantial. Thus, this project will make a significant contribution to individual and community health status but, just as importantly, will significantly increase labor productivity in areas currently experiencing high rates of malaria.

b. Social Organization

Haiti is a rural, mountainous agricultural country and its people often live in isolated areas. Eighty percent of the population live scattered over the land in villages and hamlets of less than 5000 persons. Localities are frequently composed of households and groups of related families.

1) Administrative Structure and Leadership - For civil and military administration, Haiti is divided into Departments, and further divided into arrondissements and the communes or municipalities. At the municipality, there is a magistrat or mayor and an administrative council. The communes are divided into an administrative center and section rurale. On this level, the civilian and military systems merge with the military chef de section in charge of the rural area. At the village level, there may be a community council led by locally elected officers.

Since the SNEM sector chiefs and field agents (Agents de Campagne) cover broad areas, the respective chefs de section and mayors will know of their activities, and frequently aid them. Under this project, SNEM field agents will begin to work more closely with community councils to improve community participation in malaria activities. Where community councils do not exist, sector chiefs and field agents must rely on their own promotional/organizational energies to identify and work through local leaders, including local mayors and chefs de section. In addition to formal political leaders and influential persons within localities there are also informal leaders since rural Haitians tend to adhere to traditional concepts of leadership that value seniority, age and experience. Thus, young unmarried adults, irrespective of literacy or skill, are not usually afforded much respect in the community. By working more closely with Community Councils in the selection of volunteer collaborators SNEM will attempt to increase the effectiveness of the malaria surveillance system and control activities.

2) Family Structure - Common-law unions dominate the variety of conjugal relationships in rural areas and marriage rates are low. Since men frequently maintain multiple relationships with other women and migrate for seasonal work, many households are comprised of single or abandoned women and children. Older children often live and work in other households, thus leaving younger siblings unattended. Working patterns that take parents away from home may adversely affect the choice and timing of the health care for sick children as guardians may through ignorance or neglect, choose inadequate care. In the absence of a male head of household, older women tend to make family decisions including those for illness. Traditionalism of older persons in the household or community may adversely affect malaria treatment of children and pregnant women. Where the nuclear family is intact, traditional male/female roles tend to overlap to care for an ill child although little is known about the family decision-process in seeking or giving treatment to either children or pregnant women. Since children are highly valued and are seen as old age social insurance, parents, thus, will go to great lengths to protect their children through traditional as well as modern methods.

Because of the imbalance between the sexes--more women than men in the under 40 age groups--older women actively seek financial independence, and there is an inherent instability in marital relationships which increases both female mobility and authority within the family.

In order to more effectively prevent and treat malaria in young children and pregnant women SNEM will attempt to focus community attention on the particular malaria danger to these groups. Informal women's groups, which frequently care for small children when mothers are absent, are prime targets for education about malaria in children and its proper treatment.

3) Housing Patterns - Rural compounds generally contain one or more 2-room houses, storage areas, and perhaps a latrine and a family crypt. Since kitchens are usually separate, insecticide spraying of living quarters for malaria control does not pose a direct hazard to food preparation. During early evening hours considerable socializing is carried on outside of the house which is shut tightly for sleeping. Since the malarious mosquito bites both outdoors in the evening and indoors during early morning hours, more investigations must be carried out to better determine the relationships between rural life styles and the mosquito vector.

The substandard housing of the crowded urban areas and the peripheral slum settlements' lack of drainage, sewage and garbage disposal exacerbates mosquito and insect problems. Slums in low lying areas periodically flood during heavy rains and become vast breeding grounds for the malaria vector and nuisance mosquitoes. In these areas, several families frequently share the same small house and many people actually live and sleep outdoors which create ideal conditions for malaria transmission.

c. Economic Activities

About 85 percent of the population is involved in farming. Traditional subsistance agriculture has given way to the production of cash crops. Even though most of the people own some land, these holdings are tiny and dispersed, so that a family will frequently sharecrop on nearby land, rent

out far away parcels and till some of their land themselves. Travel between land parcels probably consumes 10-20% of the time allocated for tending field crops. Many farmers now also engage in migrant labor for a part of the year. On irrigated agricultural land, seasonal movement on and off the land appears frequent as workers come searching for temporary employment. When the work season is finished, they usually return to their family holding to plant traditional food crops of corn, beans and rice. Depending on the ever precarious rains, vegetables and melons may be grown for home consumption, exchange or for sale in the towns or to itinerant buyers and vendors from the towns. Women handle most of the family marketing of produce and may travel away from home for up to several weeks at a time, whereas men are more tied to the land and seldom engage in commerce.

With growing population pressure on the land and family resources, Haiti is now undergoing profound social and economic changes. Cultivation of land more appropriate for pasture or forests is creating massive losses of topsoil and blocking natural drainage systems.

d. Education

While French is the official language used by the small educated elite, Creole is the vernacular language. Less than 25% of the total population is considered literate; of the population over 15, 90% are illiterate. The drop-out rate is high in the rural schools with only 6 percent of students reaching sixth grade. The Department of Education has developed an ambitious plan for increasing literacy through Creole for both adults and children. The spread of protestantism has encouraged and promoted literacy in Creole in rural areas, still there is much to be done to improve educational status.

e. Religious Practice and Health Behavior

Eighty five percent of the Haitian population is Catholic with increasing influence of Protestant mission groups. At least 60% of Haitians are also involved in voodooism, an animistic ancestor worship, that combines African religious tradition with Catholic beliefs and practices. Voodooism

comprises an elaborate traditional belief system about the nature and causes of illness, appropriate diagnoses and treatments. A variety of traditional healers fulfill these functions, following a "division of labor" in accordance with the presumed etiology of the illness. Of particular importance to malaria control are the traditional specialists for child illness and the traditional midwives who strongly influence the health behavior of pregnant women. As in most traditional societies, illness is still a family affair.

Because of their traditional isolation, rural families tend to be conservative and fatalistic. Voodooism fits well into this tradition. Solutions to current problems are sought through consultation with the hougan or voodoo priest who acts as a conduit for messages from the spirit world. In obvious illness that does not respond to home treatment, the houngan or other traditional healers are frequently consulted before the health center doctor or dispensary nurse. Multiple treatments for an illness are common. Delay in seeking effective medical treatment increases the chances of malaria deaths in young children and increases malaria transmission.

In rural areas the social class differences between a doctor or even a paramedical and the rural peasants are pronounced. Like peasants everywhere, the Haitian has a healthy skepticism of outsiders and easy panaceas for his problems. SNEM Volunteer Collaborators, as community members are much closer to the traditional world of the peasant. If properly selected and trained they may successfully bridge the cultural gap between modern medical practice and traditional health behavior. It is worth noting that SNEM through its more than 6000 volunteer collaborators reaches more people than the existing health services structure.

f. Population Movement and Malaria

Since the mid-seventies government activities in building roads, schools, dispensaries and in establishing services in regional centers have accelerated and are creating an awareness of the outside world and the hope of a better life. Young people from rural areas are opting for this vision and

are migrating to Port-au-Prince at a rate of over 6% a year in search of employment. However, often the movement into the towns and Port-au-Prince is only temporary and there is a smaller continuing out flow of people back to the rural areas.

The extensive population mobility contributes to the complexity of the malaria problem in Haiti in several ways. Seasonal and circular migration flows undoubtedly serve to facilitate transmission among geographically distant localities. The extent to which population mobility patterns affect malaria transmission and control will be addressed in proposed operational research studies. (See Appendix D-1). The major migration flows are described below.

1) Migrant Agricultural Labor - Workers from the poorer montainous areas migrate to the coastal, irrigated rice fields where malaria is endemic to sharecrop for a portion of the year. Haitian laborers also go to the Dominican Republic to cut sugar cane where crowded living conditions and ecological conditions favoring malaria transmission, often result in Haitians returning to their own localities infected with the parasite. Haitian laborers and semi-skilled workers also work abroad in other Caribbean and Central American countries and return periodically for holidays. The flow to and from Guyana, for example could potentially introduce chloroquine resistant malaria parasites into Haiti.

2) Market Women - With increasing economic pressure to supplement family income through marketing, many rural Haitian women travel regularly to market areas in larger coastal population centers where malaria incidence is often high. If infected there and untreated, they will bring the infection back to their own localities and obviously the reverse situation is also possible.

3) School Children - The lack of schools in rural areas results in children and youths often living away from home to attend school. Almost all secondary school students from rural areas and between 10 and 20 percent of primary school children are sent to coastal and potentially malarious areas

for this schooling. They return home at Christmas and for the summer, possibly infected with malaria or perhaps an untreated child infects his classmates.

4) Rural-Urban Migration - In Port-au-Prince and other urban areas rural-urban migration brings malaria carriers into crowded slum conditions that facilitate malaria transmission if the vector is present.

An effective malaria surveillance system must consider these mobility patterns in detecting and preventing malaria transmission. Since population groups are mobile, localized blood surveys may miss the absent malaria carriers. The absence of parents may pose problems in obtaining permission to draw blood samples from young children. Similar problems are encountered in malaria control treatment activities. SNEM will address these issues through operational research activities and adapt its control strategies accordingly.

2. The Socio-cultural Acceptability of Planned Control Interventions

SNEM's work in the rural areas of Haiti for over 20 years has created high visibility and recognition from the population. SNEM activities are known throughout Haiti and the methods are generally acceptable.

1) Spraying - Spraying is the most widely recognized and welcome SNEM activity. Instructions given by spray teams to the inhabitants of houses sprayed are followed, though the explanations for safety precautions after spraying should be elaborated. Two practices may interfere with program effectiveness:

(a) People generally replaster, paint and repair houses after the rainy season which reduces the residual effect of the insecticide applied earlier. To avoid this problem the SNEM dialogue with the communities can identify means to coordinate seasonal home improvement activities, so they do not impair insecticide effectiveness.

(b) Families may sometimes resist spraying for fear that it will mar their freshly painted walls.

2) Drug Distribution/Case Detection - Haitians are flexible and practical and evaluate cures on the basis of their ability to relieve symptoms. There are at least three traditional beliefs/habits which may pose barriers to malaria control activities. SNEM must recognize these and address them through appropriate community education. These include:

People tend to delay seeking medical care if a fever is thought to have supernatural causes, particularly in children;

There is a widespread belief that chloroquine induces abortions in pregnant women; and

There is a fear that blood taken from children may weaken or harm them.

3) Biological Methods - For several years SNEM has attempted to expand the use of larvivorous fish for mosquito control which would appear to be culturally quite acceptable. However, since most communities have little experience with fish culture, SNEM will need to utilize agricultural extension agents and community action programs to generate local interest and experimentation with this method.

4) Source Reduction Methods - Drainage and filling to remove stagnant water is generally acceptable and many community councils are now planning drainage activities in conjunction with Food-For-Work (FFW) projects. Two social factors may interfere with drainage projects. In certain localities lakes and pools are believed to be inhabited by voodoo spirits and communities may resist any efforts to interfere with these sites. Since standing water near habitation sites is used for washing and bathing SNEM must be sensitive to the water needs of the population and be willing to explore alternative means of mosquito source reduction. SNEM plans to increase community participation in solving local mosquito problems. Community problem solving can be a sound method to identify such issues and find acceptable alternative methods for mosquito control.

3. Financial Incentives

Because of rural unemployment, inflation and general poverty, rural people are eager to supplement incomes. Since medicine is valued by its cost and SNEM is seeking means of financing its activities, a small scale trial of the sale of chloroquine at a nominal, controlled price by Volunteer Collaborators, community pharmacies and health facilities could determine the utility and feasibility of such an approach. However, the sale of chloroquine could reduce coverage by the CV system and its surveillance function and reduce the public health and economic benefit accruing from reduced cures. Certain services provided by SNEM such as fogging in tourist areas or urban areas may be more amenable to self-financing mechanisms.

4. Health Education and Community Involvement Strategies

To increase the acceptability of SNEM's interventions, new methods and approaches in health education and community participation will be implemented in this four year plan. Careful evaluation of their effectiveness may lead to successful program planning, implementation and replanning. Implementation of priority social research studies (See Appendix D - 1) is the first step in increasing acceptability of interventions and should be carried out during the first and second years of the project.

A key new approach will be the definition and testing of critical malaria mass media and educational messages. SNEM field workers will be trained to use community organization techniques to increase program support. Better utilization of the face to face contact during field activities will be explored and evaluated. SNEM will distribute materials containing the tested messages to other service providers and community organizations. As the CV system is strengthened, defined and targeted health education responsibilities may also be added.

For the CV case detection and treatment system to work properly, the CV must be acceptable to the community and someone whom persons with fever will visit and take their children to. The trade-off between literacy and

community leadership should be studied. SNEM should show recognition to CV service by maintaining a record of good work, providing certificates of recognition or awards or by including the CV in other SNEM activities, and by approaching the community through the CV in order to reinforce his status.

5. Benefit Incidence/Spread Effect

Because the malaria control project will strengthen SNEM's capability to implement cost effective malaria control activities, benefit incidence must be viewed qualitatively as well as quantitatively. A substantially larger population will be protected from the possible risk of contracting malaria. Since malaria transmission extends from perennial foci in ever lessening numbers of cases, as the level of malaria in the foci diminish so too will the cases in the peripheral area. This potential benefit is lessened by migration into and out of the malarious foci. Project technical assistance will help develop a strong cadre of trained epidemiologists and introduce methodological innovations. These trained Haitians will represent a pool of epidemiological skills which can be applied to the control of other diseases as well. The extensive continuing education and training of SNEM and health services personnel will result in better diagnosis and treatment of malaria cases. Through increased community participation and targeted health education strategies, there will be a substantial increase in public knowledge about malaria prevention and treatment.

6. Participation of and the Impact on Women

Women who are 15-45 years old and pregnant or approaching motherhood will be primary project beneficiaries along with infants and children. The reduction in infant and child deaths due to malaria and fetal wastage and abortions due to malaria will affect fertility by reducing the need for additional children to ensure the survival of two to three. Given existing maternal mortality (the proportion due to malaria as a complicating or primary factor is not known), the reduced risk of malaria during pregnancy will directly and indirectly improve women's health status. The reduction in productive work time lost to malaria, to caring for those ill and convalescent as well as in seeking treatment will benefit women more than men because of

women's traditional role in caring for the sick. The mobility of market women provides an opportunity as well as a challenge to the program. Since market women may be both a source of malaria infection and its victim, SNEM must search for effective methods to protect them. This may not be easy as efforts to involve them in family planning have not been successful.

SNEM employs women in responsible positions in its technical divisions and clerical administrative tasks and as microscopists. Only a few women are employed in the sector offices and field operations. Women should not be used in spraying operations because of the toxicity hazard to a pregnant or nursing mother. Since the field agent post requires extensive travel women have not sought these jobs. Most Volunteer Collaborators are men, but since the target groups are women and children SNEM will be investigating the comparative desirability of recruiting more women CV's. If this proves feasible, it would seem logical for many of the field agents who interact with the CV's to be women. Certainly, SNEM's current employment policies serve as a means of providing opportunities for women and as the CV system is examined may contribute even more.

7. Summary

The potential benefits of malaria control for Haiti and Haitians are extensive. Haitians themselves are demanding the economic as well as personal benefits deriving from decreased malaria incidence. The potential socio-cultural barriers to effective malaria implementation will be addressed by SNEM through improvements in the CV system, greater community participation in control activities and by more appropriate and expanded health education activities. The Management of Malaria Project appears to address the major social and traditional impediments found in Haitian society which could negatively affect project success.

Collaboration with a broad variety of agencies will serve to increase SNEM visibility at all levels of Haitian society as well as to expand the resource base. As a significantly strengthened organization, SNEM will be able to provide the leadership for a national program that will involve increasingly larger segments of society in the antimalarial effort and thus be able to sustain itself.

C. Institutional Analysis

1. SNEM

a. Mandate and Organizational Structure

The SNEM is a semi-autonomous, vertical agency of the GOH Ministry of Health and Population (DSPP) responsible for the control and eventual eradication of malaria in Haiti. It was established by Presidential Decree in 1958. Subsequent modification of the mandate has broadened the agency's responsibilities to include the control of the other major endemic diseases. Major responsibility for malaria control rests with SNEM, though malaria treatment activities are included in the DSPP's health services delivery system.

SNEM is headed by a Director who is responsible to and acts as Secretary of an Executive Committee, chaired by the Minister of Health (DSPP) or his representative, of which the AID Director and the PAHO Country Representative, or their representatives, are members. The Executive Committee is to meet quarterly to determine SNEM policies, to participate in the budget planning process and to approve organizational changes and procedures. It has responsibility for overseeing program operations, for facilitating coordination among the participating organizations and for supporting contact with other governmental agencies whose programs may affect the control of malaria in Haiti.

Within SNEM, a Planning Committee composed of the Division Chiefs and chaired by the Director of SNEM has been established to define antimalarial strategies and coordinate the action plans developed by the divisions. Members of the Planning Committee may be called into the Executive Committee to provide information and describe plans and strategies.

Until recently SNEM's organizational structure remained essentially as it was when designed to carry out an eradication campaign. Over the past year a number of organizational changes have been made to better adapt the agency to the operational requirements of a more complex malaria control program.

There are currently four SNEM Divisions-Administration, Operations, Epidemiology, and Training, Research and Health Education. At present field operations are carried out through three geographic Zones, each under the direction of a Zone Administrator. Together, the zones are subdivided into 22 Sectors, each headed by a Sector Chief responsible to a Zone Administrator.

b. SNEM Reorganization

SNEM has recognized that active collaboration with district and regional public health providers, interagency cooperation and the involvement of the local communities in the antimalaria program are crucial for the effective control of malaria. However, the current SNEM organization, developed for an eradication program, does not facilitate liaison with DSPP Health Districts and Regions nor with the political subdivisions of the country. Hence, with a view toward increasing coordination and cooperation, SNEM plans to reorganize its field operations in 1983 and to create additional Zones of operation to correspond eventually to the six DSPP health regions. Chart 4 -1 shows the SNEM organization with the proposed expansion to five Zones. Concurrently, SNEM will decentralize field operations and planning to gain operational flexibility in program design and execution. Restructuring, expansion and decentralization will require enhanced training and supervision of all field personnel by Headquarters and Zone staff. Chart 4-2 provides a summary of SNEM's organization for field activities.

c. Physical Facilities

SNEM Headquarters and the Zone II office are located on Government owned property at Chancerelles in Port-au-Prince. Twenty-two (22) rural sector bases and office space for Zones I and III in Gonaives and Les Cayes are located in rented buildings.

Central office employees are housed in a large one-story prefabricated metal structure at Chancerelles. This air-conditioned building includes two rooms for training and conferences. Headquarters and the existing Zone Offices have sufficient space, furniture and basic equipment to carry out their administrative functions; only minimal additional upgrading and replacement are anticipated.

CHART 4-1 SNEM ORGANIZATION CHART

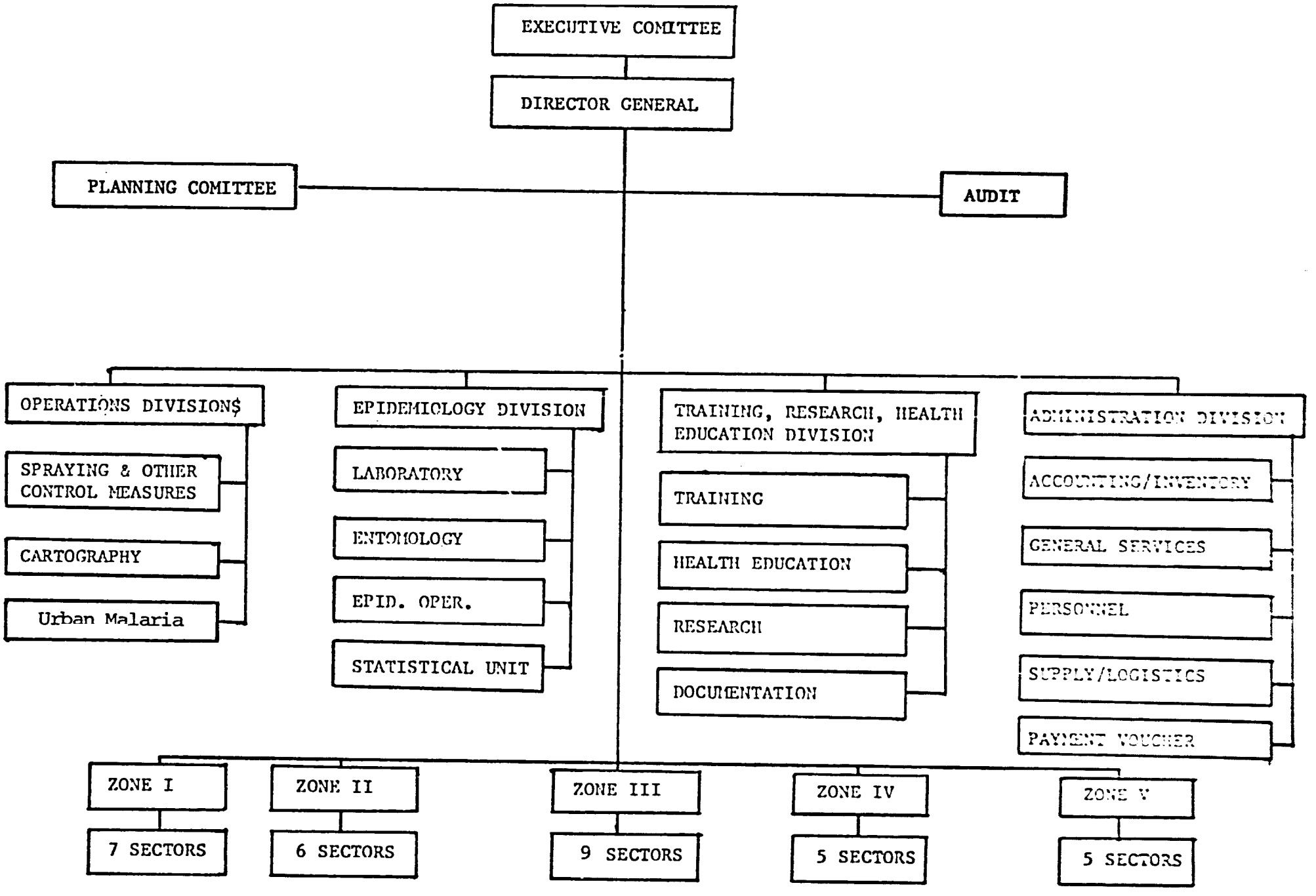


CHART 4-2 ORGANIZATIONAL STRUCTURE OF SNEM FIELD OPERATIONS

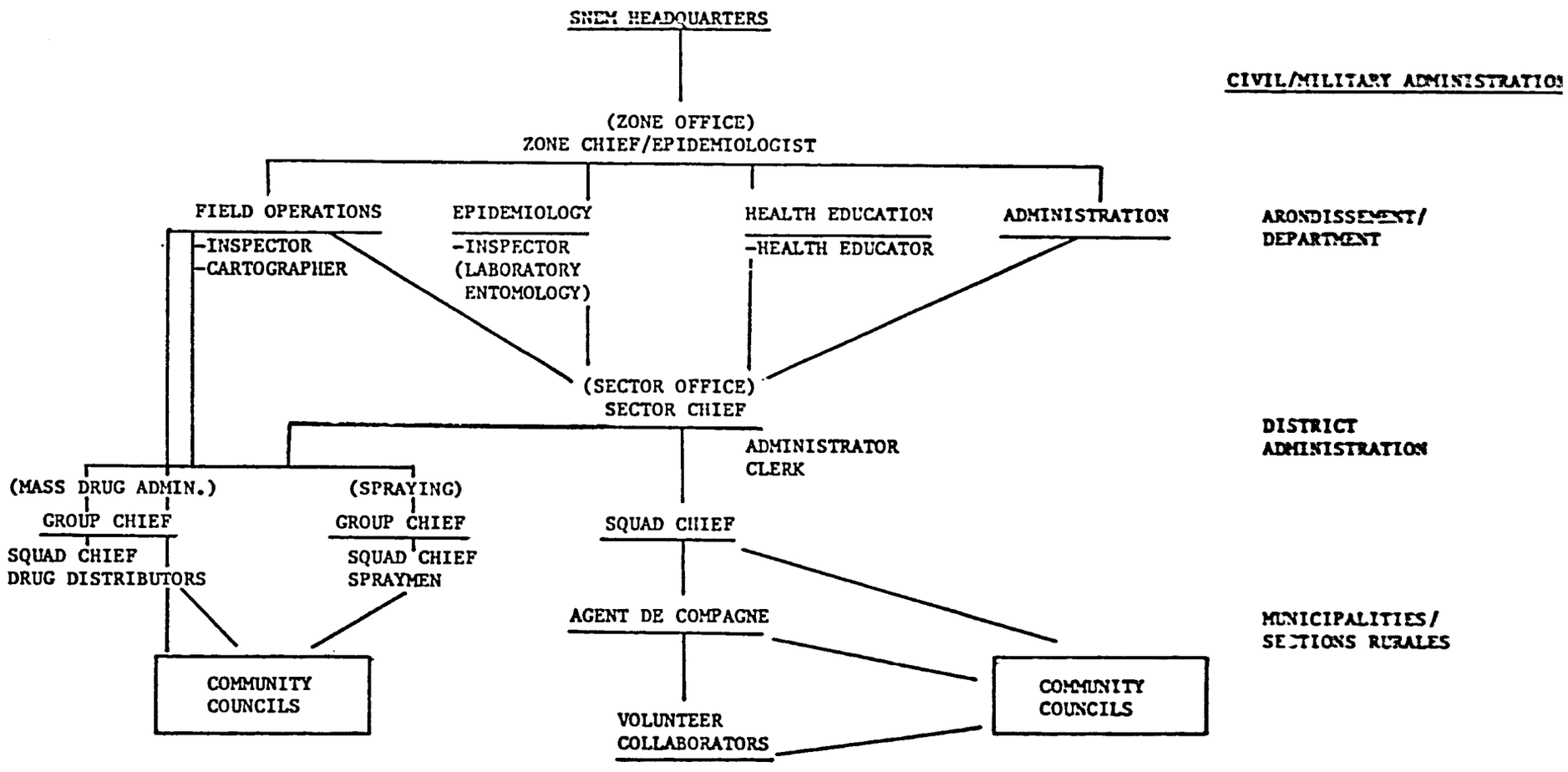
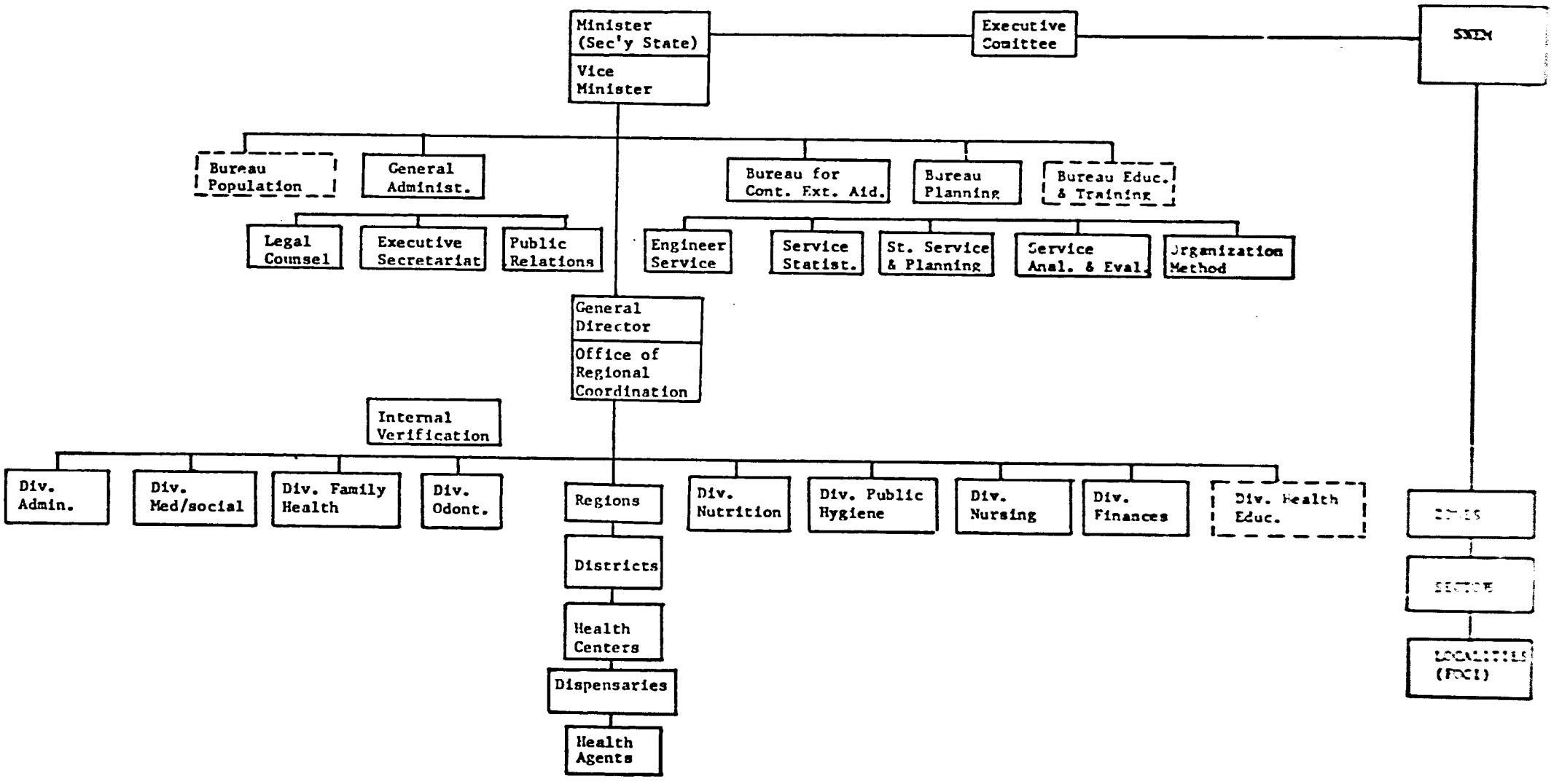


CHART 4-3

DEPARTMENT (MINISTRY) OF PUBLIC HEALTH AND POPULATION (DSPP)/SNEM



The general supply warehouse, which encompasses 225 square meters and the vehicle spare parts storage depot at Headquarters have ample shelf and bulk storage space. Storage space for general supplies, vehicle spare parts and insecticide for operations is available at all Sector and Zone Offices. Additional storage space, if needed for temporary storage of large amounts of insecticides, has been offered to SNEM at no cost. Existing space in the Sector and Zone offices also appears adequate for the storage of insecticides necessary for the program.

Vehicle maintenance and repair facilities are presently available in the SNEM Compound and in two of the three Zone offices. The DSPP is in the process of constructing several new garage facilities throughout the country, and these will be made available for SNEM use. The greatly expanded DSPP repair facilities adjacent to SNEM Headquarters will be available to SNEM by the end of 1982.

In 1980, the Japanese Government provided SNEM with sophisticated laboratory equipment, including immuno-fluorescent microscopes, deep freezes, etc., for malaria serological research. Part of this equipment is presently used in the research laboratory at Headquarters and the remainder is in storage until technicians can be trained to use this equipment for specific planned operational research studies.

SNEM's scheduled reorganization and expansion into five Zones will require GOH expenditures for additional rental of office space. The addition of basic office equipment, furniture and essential laboratory equipment--i.e. tables, sinks, lamps, storage cabinets, etc. will be supported under the proposed AID grant and, where feasible, SNEM zone and sector offices will be located adjacent to or in close proximity to existing DSPP administrative offices.

With the addition of these facilities to existing premises, the SNEM physical capacity will be adequate to implement this malaria control program.

d. Staffing

The SNEM Director is assisted by the four Divisional Chiefs and three geographical Zone Chiefs. PAHO and AID together provide six technical advisors to SNEM. There are 855 SNEM permanent employees; the professional staff include 15 medical officers, 5 engineers and 1 sociologist (including some with specialized malaria training). SNEM employees are not considered civil servants and are not covered by a retirement system. The employees are currently distributed as follows:

	HQ	Zone I	Zone II	Zone III
Administration	91	13	8	14
Field Operations	11	157	162	269
Epidemiology	43	23	33	24
Training, Research and Health Education	7	-	-	-

Proposed staffing under the project is detailed in Annex D-3 and the financial implications of this staffing is discussed in Part IV. D, Financial Analysis and Plan.

e. SNEM Financing

GOH financial contributions to SNEM flow through the DSPP on a monthly basis. The level of support is determined by the Ministries of Finance and Plan consistent with the Development Plan and health sector allocations. During the 1960's, the GOH financial contribution to SNEM for the eradication campaign was minimal. However, since 1973 Government support has increased significantly to the point that the current GOH contribution to SNEM represents almost one tenth of the GOH health budget.

USAID funds under the SHS II Project (521-0086) and other external assistance funds flow directly to SNEM. USAID support for the malaria program has declined steadily since 1978 as the GOH contribution has proportionately increased. Whereas in 1975, the USAID contribution provided nearly three fourths of SNEM's operating budget, FY 1982 USAID support (excluding technical assistance and training) for operating costs and working capital was only about 30 percent. However, inflation over the past 5 years has substantially eroded the real value of the GOH and donor contribution to the program.

The increasing level of GOH financial support has been used for commodities and local costs, while USAID has provided financing for recurrent local costs. Because of foreign exchange difficulties encountered by SNEM, USAID agreed in 1982 to finance the procurement of vehicles and pesticide valued at $305,000 in lieu of local cost support; the dollar value of the GOH and AID contributions remained the same. In order to make SNEM into a more viable organization, it is essential that this support pattern, of which the major portion is salaries, be reversed. GOH should assume local recurrent costs within its contribution, with USAID and other donor funds supporting capital costs, technical assistance and commodities. This would help eliminate the foreign exchange problems for the procurement of commodities that have been experienced recently by SNEM.

f. Technical Capacity and Resources

Two evaluations of the SNEM program activities (1979, 1981) and program planning efforts during the past year indicate that SNEM requires continuing technical assistance for the operational and technical aspects of malaria control. The malaria program is hampered by an inadequate evaluation of the effectiveness of the various anti-malaria control activities employed. Additional entomological information is necessary; the effectiveness of biological and source reduction control measures must be evaluated; and the efficacy of the mass drug distribution to reduce malaria prevalence requires investigation. These investigations and other technical activities are planned and require an enhancement of SNEM's technical capacity.

Operational personnel at present appear to be sufficiently trained for their tasks but need continuing refresher training and more effective supervision. While SNEM has established acceptable systems for quantification of activities and work output, there is not yet adequate emphasis on quality assurance for all of the technical and field operations. Upgraded systems must also include qualitative control of both supervision and training as well as field tasks.

Two technical activities essential for program success are being satisfactorily implemented: the conduct of blood cholinesterase testing for insecticide safety control seems well done and reliable and the staining and microscopic examination of blood films is average or better in quantity and quality than in many antimalaria programs. Equipment for operational and slide examination and for parasitologic research appears to be modern, in good condition and in adequate supply. SNEM has experienced difficulty in maintaining colonies of the mosquito vector in the insectary which seriously limits entomological studies and research.

SNEM training capacity for most field operational activities and supervision tasks is augmented by the AID and PAHO resident technical advisers and appears satisfactory. There is a need, however, to train a cadre of SNEM trainers for the continuous training and retraining required for the planned activities especially in epidemiology and operational research.

The evaluation of traditional health education and the efforts to involve communities and the at-risk population in anti-malarial activities have been neglected in malaria eradication programs. SNEM is aware of the current inadequacies in its community health education activities and has developed an ambitious program to train field agents (agents de campagne) in community education and community involvement techniques. SNEM has recently begun to publish an advisory for physicians and has assigned two senior physicians to plan and coordinate better relationships with municipalities, community groups and the medical faculty. Continued collaboration with other Haitian agencies involved in community outreach and training will substantially augment SNEM's health education capacity. Further enhancement of training and community education through the employment of a staff social scientist and involvement of local Haitian social researchers is under discussion. Strengthening such linkages to existing resources will be important to project success.

A variety of technical weaknesses have been identified. Because of the overall complexity of malaria control it is particularly important to be aware of the technical shortcomings of the implementing organization and to adequately and systematically strengthen and develop its technical capacity.

From PAHO and AID additional carefully selected short and long term technical expertise will be essential in the areas of epidemiology; entomology; statistics; systems analysis; and computer software design for processing management and epidemiological data. For SNEM it is not the absence of technical capacity per se that has impeded effective epidemiological stratification, program planning, field operations and evaluation efforts, but rather the combination of organizational and human factors that inhibit utilization of existing technical capabilities and resources. Institutional changes made or in process combined with the accelerating awareness of the potential of this project are creating a positive environment in which to strengthen technical capacity.

g. Administration and Management

Despite new SNEM leadership in late 1979, SNEM has had difficulty in changing the outmoded and ineffectual management and operational techriques and habits with which the anti-malarial program became encumbered during the 1970's. Although important problems remain, the current young leadership of SNEM is rapidly preparing the organization to confront the varied tasks that lie ahead.

During the past 18 months substantial strengthening of the Administrative Division has been accomplished through the assistance of an Administrative Management Adviser provided to SNEM under the current AID SHS II Project 521-0086 and plans for further systems improvement have been completed. When implemented, these will insure the essential structural systems capacity of SNEM to administer the proposed technical control activities programs.

(1) Accounting/Financial Management - In the past year, SNEM has instituted improved control procedures which include (1) monthly cumulative analysis of expenditures against Budget forecasts by line items and activities; (2) monthly financial reporting of obligations, disbursements and financial status; (3) daily cumulative reporting of obligations against planned obligations; (4) quarterly JPIP reporting/reviews. Financial reporting to AID under the current project has been satisfactory. A 1978 audit certified the

viability of SNEM accounting procedures. The accounting system is, thus, relatively developed and able to provide adequate management control of current and projected project funds.

(2) Personnel Management - A complete Personnel Management Plan has now been completed and will be implemented and updated in relation to the proposed Malaria Control Program. It emphasizes accurate and functional job descriptions clearly defining job responsiblities, supervision given or received, qualifying educational and language requirements. This system includes standards and procedures for performance evaluation, efficiency ratings, employee discipline, employee recognition, incentive and rewards, as well as policy and procedures for selection, promotion and transfer of employees; all aimed at enhancing the productivity and morale of SNEM employees.

(3) Supply Management and Logistics - Major improvements in storage and handling methods used by SNEM have been upgraded to create a more responsive supply management and logistics support system. Order processing, stock record controls, stock replenishment and a physical inventory process have been streamlined through the development of simplified, functional forms and procedures. As an example, the time required for the actual annual inventory count has been reduced to two days.

To fully implement the improved supply management system through SNEM, a separate Supply Section will be created. With this system in place, the Supply Section Chief will be able to make frequent and realistic forecasts of demand, review draw down of critical and fast-moving items and establish realistic minimum stock levels and cost-effectiveness resupply criteria. Given adequate budget and reasonable lead time, these mechanisms, combined with proper materials handling, storage and requisition, will result in the more responsive supply system required by the malaria control program.

Closer cooperation between the Administrative and Operational Divisions will facilitate timely forecast and scheduling of shipments of critical operational supplies before and during periods of use. To insure

timely distribution, decentralized storage depots have been established in strategic areas and further points will be established as necessary to ensure adequate working inventories are available to each of the sectors.

(4) Transport - SNEM's capability to support countrywide activities in 5 Zones and 33 Sectors requires the upgrading of the vehicle fleet. Current transport capacity for operations, supply and supervision consists of 117 vehicles and 9 motorcycles for all headquarters zone, and sector requirements. More than half of the current vehicle fleet are over 5 years old. Vehicle status at the beginning of FY 1982 was as follows:

Condition	In Service	Non Operat.	Total	
Good	28	6	34	(29%)
Fair	24	11	35	(29%)
Bad	23	25	48	(41%)
	75	42	117	
	(64%)	(36%)		

Since only about one third of SNEM's vehicles are in "good" condition at present, an effective preventive maintenance system is essential. Three mobile repair units operate to service vehicle problems in isolated localities on a scheduled basis. As field operations are expanded, these units should be upgraded. To keep the fleet running closer supervision of routine maintenance and field repairs will be required to ensure that the vehicle fleet provides dependable transport.

To successfully implement this project, the existing SNEM vehicle fleet capacity must be upgraded by the phased replacement of non-operational and aged vehicles and the addition of motorcycles, which will be utilized for supervisory visits, sectors and CV resupply.

(5) Communications/Information Flow - Management decisions are currently based on inadequate and somewhat subjective data provided by Sector and Zone Chiefs to Headquarters at irregular intervals. Poor information flow between sectors and zones and between Zones and Headquarters is one of the fundamental impediments to effective field operations. There is an immediate need for

simplified, standardized and regular reporting on all program activities, including vehicle maintenance. Feedback mechanisms are equally inadequate.

(6) Budgeting/Planning Process - Budgetary planning has been tied to the rigidly structured requirements of malaria eradication activities. In order to meet the requirements of a flexible control program based on shifting foci and control strategies, a more flexible budgeting/planning approach must be developed.

Summary

While the structural and administrative capacities are sufficiently in place to carry out the proposed program, effective implementation will require continued strengthening of SNEM operations. Inadequate management and supervision of field operations and two-way information flow between Sector, Zone and Headquarters are the most serious administrative weaknesses that require immediate attention. Since decision-making is highly centralized, SNEM has been reviewing mechanisms to extend supervision more effectively into the field. In conjunction with the establishment of the management systems, the responsibilities of the Administrator are undergoing re-definition. Recommendations for the addition of an Assistant Administrator to assume responsibility for overseeing day-to-day support activities should be implemented. Feasibility studies for a radio-communications system and application of mini computer technology to facilitate information flow and processing for improved technical and administrative management have been initiated.

In addition to these management problems there are a range of broader administrative constraints with which SNEM must somehow cope. During the 1960's SNEM employees were the elite of the health corps; over the years their comparative salary advantage has disappeared. In the shift from eradication to "routine" control, SNEM personnel have lost their motivation and drive to implement the revised goal and purpose of their organization. Refresher training and skill upgrading are needed to reorient staff to the continuing importance of their functions and the timely execution of their tasks.

Under the SHS II project, AID funds were used almost exclusively for local cost expenditures and GOH funds were used for offshore procurement of operational supplies and equipment. Because GOH contributions were made on a monthly rather than annual basis, annual procurements could not be financed and therefore smaller more frequent procurements were inefficiently executed at non-competitive prices. This and current constraints on foreign exchange availability in Haiti necessitate a reassessment of the use of AID project funds.

2. Department of Health and Population (DSPP)

a. DSPP/SNEM ORGANIZATIONAL EVOLUTION

Under the new mandate for malaria control, increasing coordination and collaboration between SNEM and the DSPP will be initiated in training health personnel, organization of community health education activities and in the prevention and treatment of malaria.

Although GOH long range plans anticipate eventual integration of SNEM activities into the DSPP, SNEM will continue to function as a semi-autonomous unit for the next few years. SNEM has been able, with substantial foreign assistance, to develop a relatively solid infrastructure and operational capacity to carry out antimalaria activities. The bulk of USAID health assistance until the initiation of Rural Health Delivery Systems (RHDS) project was initiated in 1979, was initially for malaria eradication and after 1977 fo. malaria control activities.

In contrast, external finance and technical assistance to the DSPP have been unevenly distributed and channeled to reflect donor priorities such as family planning, maternal and child health and nutrition. Massive donor assistance (more than 90% of the funds available to the Division of Family Health) has been used to organize, plan, support and manage MCH/FP activities throughout Haiti. Assistance to the Division of Public Hygiene in contrast has been limited and fragmented. Many donor financed public health projects have never generated a strong Haitian commitment and underlying health service management problems were not sufficiently addressed.

Though a fairly large percentage of the national budget is allocated to Health, the per capita funding is only about $3, including the value of donor inputs. The DSPP has been underfinanced and budget increases over the years have been barely adequate to pay minimal salaries for newly graduated doctors and nurses. Since the 1950's the Haitian health sector has been characterized by the growth of both public and private facilities and particularly those supported by foreign missionary groups. An additional influence on health sector development has been the emigration of doctors, nurses and technicians from Haiti to more lucrative posts elsewhere. These factors have shaped the organization of present health services and, as a consequence, the DSPP is still evolving a philosophy and strategy for the delivery of basic primary health care services.

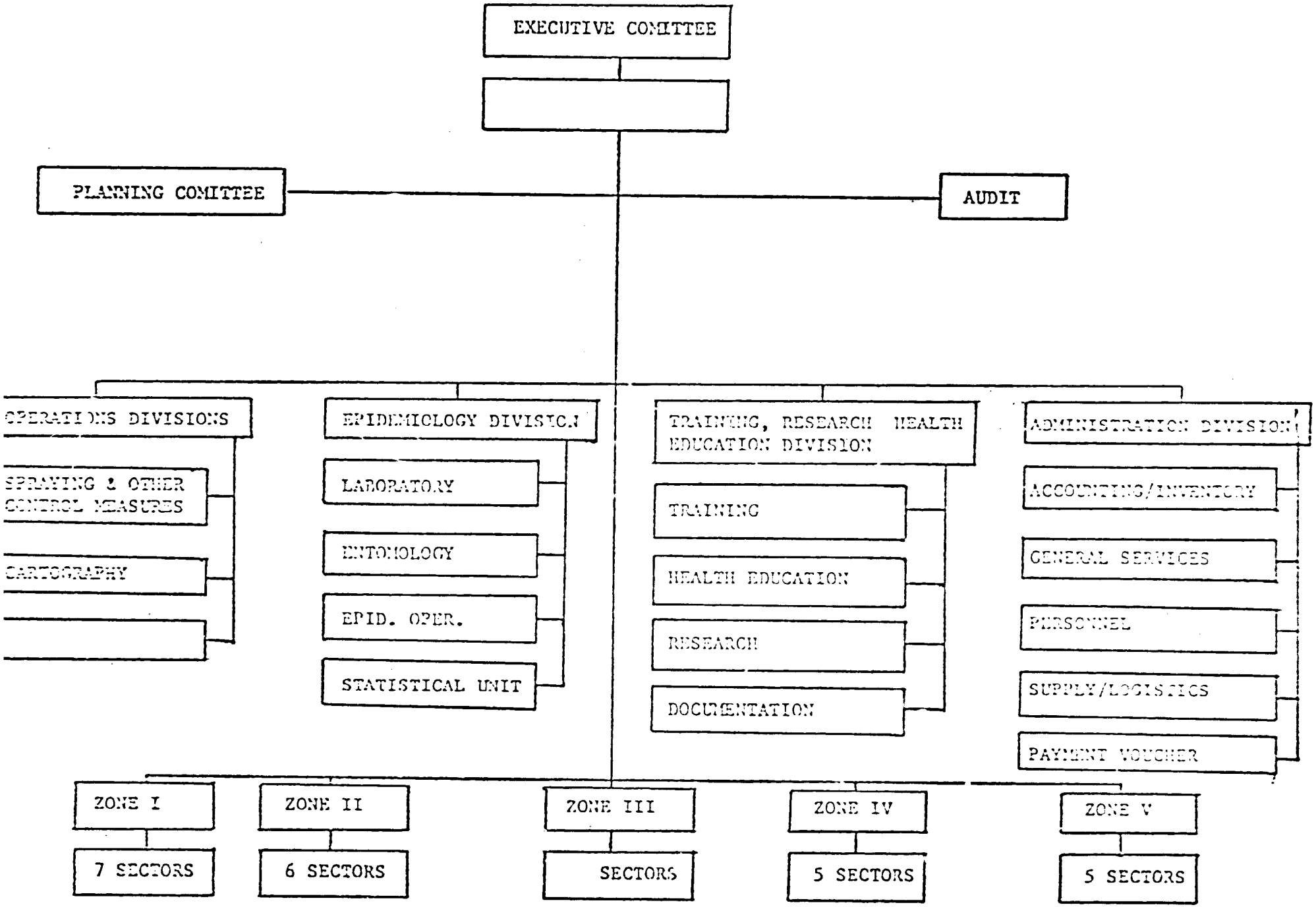
The DSPP has recognized the serious inequities in the delivery of health services. There is increasing interest in decentralization and improved health system management in which BID (the Inter-American Bank for Development) and PAHO as well as the AID RHDS project play pivotal roles. However, the changes and system modifications which will consistently improve services will require a minimum of one to three years to adapt, design, and to make operational. Thus, until the health services infrastructure is more developed, integration of SNEM activities into the DSPP is premature and should only take place as DSPP systems become functional. The operational complexity of the malaria control program mandates a continuing vertical SNEM administration and control of programs.

B. DSPP/SNEM Organizational Linkages

The Minister or Secretary of State for Health and Population is the key decision-maker on health policy and program implementation. Chart 4-3 shows the current and projected organizational structure of DSPP in relation to SNEM. As a semi-autonomous health agency, SNEM is linked directly to the Minister through the Executive Committee. Present and projected coordination between the two agencies is described below.

Three Bureaus presently support the Office of the Minister: Administrative Services, Planning and Evaluation, and Coordination of Foreign

SNEM ORGANIZATION CHART



Assistance. A Bureau of Education and Training is scheduled to become operational in FY 1983.

SNEM's annual budget is submitted by the Minister to the Bureau of Planning for inclusion in the annual allocation process that includes programming of Title I funds. Other linkages with the Bureau of Planning could include shared use of malaria service statistics, evaluation data and epidemiological studies, but is currently minimal. The Bureau of Education and Training will provide continuing education and training of professional and paraprofessional staff for the DSPP and private voluntary sector facilities. The DSPP and SNEM are collaborating to include malaria in the Bureau's training curricula including the retraining of health agents and auxiliaries under the RHDS program. Most of the Bureau's training is decentralized to use existing community training institutions. Increased coordination with SNEM is planned at all levels, where appropriately trained SNEM personnel will assist in providing the malaria content for basic health services training.

The DSPP Divisions provide technical and administrative support to the regions and districts to improve health services. SNEM's new program thrust will require increasing coordination with these Divisions.

(1) The Division of Administration controls the DSPP motor pool, garage and storage facilities. With phased sharing of these systems, a range of coordinating mechanisms between SNEM and the DSPP will be instituted.

(2) The Division of Family Health (DHF) is concerned with the development of maternal and child health and family planning services in health facilities throughout Haiti. In collaboration with the Bureau of Education and Training and SNEM, the Division will be involved in retraining to improve malaria diagnosis and treatment of infants, children and pregnant women throughout the health system. As the training curricula and mechanisms are already in place, SNEM will collaborate in this effort on a priority basis. The DHF also has a cadre of urban community agents who could eventually participate in urban malaria control activities.

(3) The Division of Public Hygiene with approximately 200 sanitarians is primarily involved in urban sanitation and food handling surveillance. In coordination with SNEM these workers could eventually assume responsibilities in urban malaria control and in special municipal mosquito abatement programs.

(4) The Division of Nursing is primarily engaged with the Bureau of Education and Training in the continuing training of nurses and auxiliaries and their supervision. SNEM liason with this Bureau will facilitate the inclusion of updated management of malaria cases and treatment into the nursing curricula and supervisory responsibilities of nursing staff.

(5) The Division of Health Education when operational, will collaborate with the SNEM Health Education Unit to develop a combined resource capability to initiate more effective and expanded community involvement strategies and educational techniques.

C. Health Services Infrastructure

The Department of Public Health and Population (DSPP) was created to provide an administrative framework for Governmental health services; subsequent legislation in 1975 attempted to clarify and articulate an organizational decentralization of authority and control over peripheral services. An Office for the Regionalization of Services was created with responsibility for facilitating and overseeing the development of peripheral Public Health services delivery. Three administrative regions of the six projected have been created. Two are established and a third is currently being staffed. (See Chart 4 - 3 for a diagram of the organizational structure). Linkages among SNEM, the central DSPP, regions and districts are being worked out to achieve operational compatibility of DSPP and SNEM at the services level. Operational linkages on the community level are presently still unclear.

1. Public Health Facilities

The Public health system is composed of three separate

service delivery systems: public, private and military. The DSPP operates and maintains 75% of the hospital beds and 50% of the health centers and dispensaries scattered throughout Haiti. These facilities are administered through regional and district health officers. The service network has evolved from a combination of local, voluntary and central government initiatives to establish basic health facilities. Working conditions in these facilities are poor as they are not yet adequately supplied and equipped to provide health services. BID, PAHO and USAID currently have projects to upgrade the physical facilities as well as the organization and management of their services.

Each District has a hospital staffed by physicians and paramedical personnel supported by one or more health centers. Making referrals the health center are First Aid/Dispensary services and the newly formed cadre of polyvalent health agents. Under the RHDS project the number of health agents will increase to 1500 to provide ultimately one agent for 2-5000 people. These agents are being trained to provide malaria treatment when a chloroquine/primoquine supply system is established by the DSPP.

To relieve the inadequate drug supply system, a national generic drug formulary and a semi-autonomous drug procurement and packaging agency (AGAPCO) as well as 40 community pharmacies are being established which will be linked to the hospitals, health centers and dispensaries. The community pharmacies will eventually sell chloroquine and primoquine.

Other indirect but potentially useful community linkages may be possible between the 6700 SNEM Volunteer Collaborators and DSPP health workers. DSPP recognition and support of the SNEM CV system could enhance their roles and effectiveness in other primary health activities as well as in malaria control.

Laboratory technicians in the better equipped and staffed district hospitals could be trained by SNEM to read slides for immediate case diagnosis, with a second slide forwarded to SNEM for confirmation.

Present DSPP rural health services delivery capacity is still weak and effectively reaches only an estimated 40% of the population. Major progress is being achieved in logistics, drug supply and training through implementation of the RHDS project. SNEM/DSPP collaboration as outlined above will lay an important foundation for increasing coordination of malaria surveillance and control activities.

2. Private Health Facilities

a) Public Service and Mission Groups - While services and facilities vary among regions and districts, private health facilities supported by foreign and domestic religious, charitable and social development groups are found throughout Haiti. Roughly a fourth are non-denominational and a few are supported largely by a local community or expatriates. More than 60% of health care contacts are made through these facilities. For example, the average number of daily dispensary visits in 1979 to private facilities averaged 23 as compared with 9 to DSPP dispensaries. This is probably due to both the quality of the care provided and the availability of drugs. Fees are normally levied but Haitians seem willing to pay for the services. The DSPP and SNEM will attempt to coordinate and collaborate with these private institutions to ensure improved malaria diagnosis, standardized treatment and case reporting to SNEM and the DSPP.

b) Private Medical Practice - Strictly private practice as found in the US exists only in urban areas. Private physicians, nevertheless, set the tone of services for the paying public and influence the attitudes and behavior of DSPP health care providers. Recent professional meetings have demonstrated a trend among the conservative Haitian physicians toward the broader responsibilities of public health. Wherever doctors are in private practice, Haitians, poor and rich alike go for counseling and treatment. More can be done to upgrade private physician understanding of the occurrence of malaria in children and in the diagnosis and the treatment of the disease. Updated malariology and basic epidemiology must become part of

the curriculum of the Faculty of Medicine. With targeted effort by the DSPP and SNEM, these essential medical curriculum modifications will be undertaken shortly.

Within the corps of physicians, professional groups such as the Haitian Medical Association, the Association of Obstetrician/ Gynecologists and the Pediatric Association can facilitate improved malaria diagnosis and treatment. National seminars and workshops will provide opportunities for presenting relevant malaria research on related child and maternal health issues as well as program results.

d. Intersectoral Coordination

A number of other governmental, private, community and international resources can potentially assist SNEM in its malaria control activities. In order to create self-sustaining malaria control program, SNEM will need to gradually establish substantial modes of coordination and collaboration with key Haitian institutions. These include: the Department of Agriculture and its system of cooperatives, the Department of Public Works (TPTC), the Department of Education and its affiliated agency, ONAAC (which is involved in literacy and community action programs), the Department of Armed Forces (FADH), the Ministry of Information, the radio communications infrastructure, the municipalities, local private voluntary organizations and religious groups, and major employers. In addition, there are a host of donors who annually demonstrate their interest in Haiti and will respond to well-planned proposals and carefully documented requests for assistance. For a description of the resources of some of these organizations and types of suggested relationships, see Annex D-6.

D. Financial Analysis and Plan

A.I.D. will provide $8.0 million in grant funds to finance a portion of SNEM's malaria control activities in FY 1983-1986 through this project. Initial funding is to be authorized in FY 1982. The AID grant will help finance long and short-term technical assistance ($1.2 million) vehicles ($1.2 million), anti-malarial drugs, supplies and equipment ($2.1 million) and the local costs of field studies and operational research ($700,000) and the local costs of field operations ($2.8 million).

The Government of Haiti contribution is expected to be $8.5 million over the life of project or 32% of all costs (including technical advisory cooperation) and 65% of operational costs. Assistance from the Japanese Government estimated at $8 million, of which $2.0 million is already committed, is expected to cover the cost of the insecticide. PAHO will provide technical cooperation valued at approximately $1.9 million over the life of project.

1. Project Cost Options

The total cost of activities to be financed under this project are presented at two fundings levels, $26.5 million and $23.1 million. As discussed in the issues section in Part I there are three critical funding issues:

(1) the level of initial investment required to begin the project in a timely and adequate fashion;

(2) the overall level of AID's contribution; and,

(3) the anticipated contribution of commodities by the Japanese Government.

In order for the importance of these issues to be more fully understood an analysis of SNEM's financial requirements are presented. Table 4-2 provides a breakdown of vehicles, supplies, equipment, local costs and

Table 4 - 2

ALLOCATION OF PROPOSED LOP INPUTS FOR MANAGEMENT OF MALARIA PROJECT (521-0143)

	FY 83	FY 84	FY 85	FY 86	Total
1. Insecticides					
a) Fenitrothion	2000	2000	2000	2000	8000
b) Pyrethrum	50	55	60	65	230
Sub-Total	2050	2055	2060	2065	8230
2. Spraying Equipment - Supplies					
a) Sprayers and Parts	20	10	12	13	55
b) Protective Equipment	57	60	84	87	288
c) Field Spray Supplies	43	47	51	55	196
d) Tintometic Kit Supplies	5	5	7	6	23
Sub-Total	125	122	154	161	562
3. Vehicles and Parts	390	413	274	105	1182
4. Gasoline	185	234	245	252	916
5. Epidemiology Supplies					
a) Laboratory (					
b) Slides & Supplies (	130	150	150	135	565
c) CV Posts (					
d) Stratification (					
e) Entomology (					
6. Drugs (Chloroquine-Primaquine)	120	84	78	69	351
7. Communications					
a) Mini-Computer + Services	15	5	5	5	30
b) Radio System	-	200	12	12	224
Sub-Total	15	205	17	17	254
8. Office					
a) Supplies	20	40	44	48	152
b) Equipment	15	27	23	2	67
Sub-Total	35	67	67	50	219
9. Local Costs					
a) Vehicle Maintenance	54	60	60	60	234
b) Rents and Utilities	60	72	77	72	281
c) Training & Health Ed. Expenses	70	50	50	50	220
d) Personnel Costs (All inclusive)	2260	2486	2486	2486	9718
Sub-Total	2444	2668	2673	2668	10453
Total Operational Costs	5494	5998	5718	5522	22732
Plus Technical Assistance (AID)	356	387	229	198	1170
Technical Assistance (PAID)	460	470	480	490	1900
Total Estimated Project Costs	6310	6855	6427	6210	25802
Contingency Reserve	-	50	191	442	683
Total Expected Contributions	6310	6905	6618	6652	26485
Total	6310	6905	6618	6652	26485

technical assistance. Table 4-3 shows the breakout of anticipated personnel in both permanent staff and temporary operational staff.

In FY 1983 the funds available for operational field expenses and necessary procurements is $3,494,000 as compared with $2,353,076 in FY 82. The major cost differences between 1982 and 1983 are due to increased requirements beginning in FY 1983 for vehicles and supplies, entomology field workers, spray personnel and personnel for drug distribution. There is a 27% increase over FY 82 levels in the cost of personnel because of increased training field activities and operational research.

2. AID First Year Funding

The planned allocation of the first year of AID project funds is as follows:

Operational supplies and research materials	$ 415
Replacement vehicles	390
Technical assistance	356
Local cost salaries	625
Other local costs including training	214
Total	$2,000

This is, in fact, the minimum necessary to implement the project consistent with the planned operational and research activities required.

First year project funding is critical in a number of respects. The timely availability of AID technical assistance depends on the amount of FY 82 obligation. Replacement vehicles and supplies needed for field activities and research which are scheduled to begin in March 1983 require that procurements be initiated as soon as possible. Fifty eight percent of first year funds are allocated for this technical assistance and commodity support.

Not only does inadequate initial year funding delay the start up of the project it may also witness the departure of key AID technical contractors and SNEM staff and, thus, jeopardize project success. The Japanese

Table 4-3 SUMMARY OF PLANNED SNEM STAFFING LEVELS 1982-86
(Number of Employees)

A. Full time

	82 (actual)	83	84	85	86
1. Headquarters	249	194	194	190	190
2. Zones	447	516	558	500	500

B. Part time

Lab	-	6	6	6	6
Drug Distribution	96	188	188	188	188
Spray	192	480	480	648	648
Sub-total	288	674	674	842	842
Totals	884	1384	1426	1532	1532

contribution in insecticide and commodities is likely to parallel the U.S. contribution. The substantial planned increase in the GOH contribution, also roughly equivalent to the planned U.S. contribution, may not materialize in the face of current GOH financial problems unless there is a substantial initial U.S. commitment.

As noted earlier one of the advantages achieved under the SHS II (521-0086) project was the assurance of adequate funding over the LOP. This project with its planned incremental funding introduces again the uncertainty of funding. If funding increments based on performance and results can be built into the obligation process, this will facilitate project success.

3. Subsequent Year AID Funding

Planned activities each year will reflect funding availabilities and the amount of supplies and vehicles required. The schedule of planned obligations is shown on Table 4-4. In the second project year, it is planned to procure the balance of vehicles needed for the field operations. Vehicles procured in the 3rd and 4th project year will be replacements for older vehicles which wear out during the first two years. In FY 84 personnel costs increase as an additional zone office and eleven sector offices are established to supervise and implement the field activities more closely. At the completion of the comparative dosage field trials in FY 84 and the subsequent evaluation more temporary spraying personnel will be utilized to inctease the coverage of foci with high rates of malaria. However, the number of entomology squads and special evaluation teams will be reduced somewhat as the evaluation and field monitoring requirements become more routine. It is hoped that the increased emphasis in the final two years on field implementation will drastically reduce malaria transmission and make it possible for the local communities to assume real responsibility fo identifying new cases and reducing sources of infection in cooperation with SNEM.

Throughout project implementation adequate funding is required to monitor insecticide and drug effectiveness throughout the country. Additional blood surveys in areas where spraying has occured as well as in non spray

TABLE 4-4

PLANNED ALLOCATION OF USAID GRANT CONTRIBUTIONS TO MANAGEMENT OF MALARIA PROJECT 521-0143, 1982-86
($000)

	1982-83	1984	1985	1986	Total
A. Commodities/Supplies					
1. Sprayers, Parts/Supplies, Protective Equipment	125	122	154	161	562
2. Epidemiology supplies	130	150	150	135	565
3. Drugs, (Chloroquine/Primaquine)	120	84	78	69	357
4. Vehicles/Spare Parts	390	413	274	105	1182
5. Communications - Radio/computer	15	205	17	17	254
6. Office Furniture/Equipment	25	67	67	50	209
Sub-Total	805	1041	740	537	3123
B. Local Cost Support					
1. Salaries	625	662	646	645	2578
2. Vehicle Maintenance	54	60	60	60	234
3. Petroleum Products (Gasoline)	90	200	175	210	675
4. Training/Health Education	70	50	50	50	220
Sub-Total	839	972	931	965	3707
C. Technical Assistance					
1. Long-Term Consultants					
(a) Senior Malaria Advisor	115	125	125	125	490
(b) Epidemiologist	94	125	31	-	250
(c) Technician/Assistant (Local)	19	25	25	25	94
2. Short-Term Consultants					
(a) Management System/ Computer Development	32	16	16	8	72
(b) Research	72	64	32	16	184
(c) Training/Health Education	24	8	-	-	32
(d) Project Evaluation	-	24	-	24	48
Sub-Total Technical Assistance	356	387	229	198	1170
Total US Contribution	2000	2400	1900	1700	8000

areas are needed to verify the numbers of cases and the effect of the various methods.

Short and long term technical assistance requirements are outlined in Table 3-2. The key to project success will be the appropriate use of skilled short term experts. These requirements are discussed in the Project Description section which discusses improving SNEM technical and management capacity, pp. 28 - 36.

The GOH contribution will cover primarily local salary costs, rents, utilities and activities involved in urban malaria control. Because of financial constraints faced by the GOH, the Public Treasury/National Budget contribution ($4.5 million over the LOP) is augmented by a substantial PL 480, Title I allocation ($4.0 million). The Public Treasury contribution reflects a 10 percent increase per annum, allowing for inflation and to provide for an increasing real GOH commitment over the LOP. If this increase is not possible, the Title I allocation will be adjusted upward.

4. Other Donor Support

The project involves a substantial commitment from (1) the Government of Japan (GOJ), i.e. $8 million over the LOP for insecticides etc. and (2) the Pan American Health Organization (PAHO) for $1.9 million in technical cooperation and training fellowships. As discussed earlier, PAHO has supported SNEM activities since 1958 and will continue to do so for the forseeable future or as long as malaria persists as a serious public health problem in Haiti. The GOJ has indicated informally its interest in continuing to support the anti-malaria effort in Haiti.

TABLE 4

A. Projected Availability of Funds and Resources for Management of Malaria Project, FY 1982 - 1986

(000's)

	FY 82/83	FY 84	FY 85	FY 86	LOP
USAID	2,000	2,400	1,900	1,700	8,000
GOH					
Budgetary	850	1035	1,240	1,460	4,585
Title I	1,000	1,000	1,000	1,000	4,000
PAHO	460	470	480	490	1,900
Other Donors (GOJ)	2,000	2,000	2,000	2,000	8,000
	6,310	6,905	6,618	6,652	26,485

E. Economic Analysis

1. Introduction

Malaria in Haiti continues to represent a major public health problem and a serious drain on national economic resources, both for the public and the government. Current efforts appear to have stabilized malaria at a 4-5 percent incidence or an estimated 200,000 cases. Confirmed positive cases by SNEM account for only about 25 percent of this figure. The costs of technical assistance and SNEM expenditures in 1982 are approximately $2.5 million. Without this level of effort by SNEM, malaria rates would rapidly rise to affect 25-30 percent of the at-risk population or roughly 1.3 million annual cases. The additional current annual costs of malaria to Haiti which are shown in Table 4-6 are estimated at $1.3 million. These include costs of self treatment, costs to health facilities for hospitalization and outpatient treatment, cost of wages lost and cost of additional caloric required by the existing numbers of cases. Other costs are less easily quantified. This project anticipates a substantial increase in malaria control activities and a consequent reduction in actual malaria cases and thus in the annual costs of malaria to Haiti. The discussion which follows indicates that, barring natural disasters, and implemented as planned, the project will generate benefits in excess of costs during the LOP.

The economic analysis of this project proceeds with a discussion of the following: (1) non-quantifiable project benefits; (2) the analytic framework; (3) alternative malaria coantrol program costs; (4) quantifiable project benefits; and (5) the cost-benefit analysis. The analysis finds that the proposed project has benefits sufficiently in excess of costs to be justifiable as an economic investment.

2. Non-Quantifiable Project Benefits

Throughout this document various positive benefits of the project have been mentioned. These can be categorized in three areas which are discussed in the subsections which follow: (1) benefits of a stronger malaria control agency, (2) benefits resulting from the adapted technology and operational research studies, and (3) benefits of reduced malaria morbidity and mortality.

Table 4-6 Estimated 1982 Costs of Current Levels of Malaria

Cost Element	Value
Costs for Self Treatment	$ 128,000
Costs for Outpatient Treatment	40,000
Costs for Hospitalization	100,000
SNEM Program Costs	2,300,000
Costs of Required Additional Food Resulting from Malaria	40,000
Costs of Wages Lost	932,744
Estimated Child Deaths 1400	Unquantified
Estimated Adult Deaths 600	Unquantified

Assumptions:

a) Number of Actual Malaria Cases is 200,000

b) Forty percent of all cases seek self treatment from local pharmacy, traditional healer, hougan or private physician at $1.60 per case.

c) Twenty percent of all cases are treated in outpatient health facilities at a cost of $1.00/case.

d) Approximately 2.5 percent of all cases require hospitalization for 5 days at $10/day to health facilities.

e) Each malaria episode consumes an additional kilo of calories (carbohydrate) valued at $.20/kilo.

f) Wages lost are calculated from a formula explained in Section 6.

a. Benefits arising from the Institutional Strengthening of SNEM

Malaria was in 1968 practically eradicated in Haiti. If the GOH had had a stronger more adaptable anti-malaria agency, the malaria picture today might be quite different. (However, it should be noted that the Haitian experience in this respect is paralleled by many countries as noted by the GAO in the 1982 report to the Congress and the AID Administrator). With this project, a strong flexible malaria control agency will be created by which Haiti will be able to bring a major health hazard under control. Since the epidemiologic skills and techniques employed in malaria control are essentially the same as required in the surveillance, control and/or eradication of other endemic and communicable diseases, these skills and the organizational experience of SNEM will be available to the health sector. Since the complete eradication of malaria is not anticipated in this project (and even with eradication a continuous and effective epidemiological vigilance would be required as long as malaria exists in the world), the investment to create a strong, flexible Haitian organization to maintain this surveillance will provide long term health sector and development benefits which cannot be readily quantified. As planned in this project, a stronger, more effective SNEM will be less dependent on both Haitian budgetary support and foreign donor grants, although some continued support will be necessary for many years (not necessarily from AID).

b. Benefits Resulting from Adapted Technology and Operational Research Studies

Although malaria eradication efforts have not succeeded in many countries throughout the world, few countries (or donor agencies, for that matter) have adequately faced up to the long-term country-specific requirements for continuous comprehensive malaria control efforts. For this reason, there are few definitive studies on the cost effectiveness of malaria control measures or the conditions under which the various methods can complement and reinforce each other. The viability of limited targeted spraying in high incidence foci in effectively reducing malaria prevalence has rarely been adequately

documented although it potentially offers substantial cost savings to malaria control programs. In fact, Haiti has for years attempted to implement a comprehensive anti-malaria program involving a variety of methods. The inclusion of community mobilization activities in this project offers an added dimension to reinforce and extend the cost effectiveness of SNEM activities.

Thus, for the Haitian anti-malarial effort, the adapted technology and operational research studies which are planned will improve and strengthen efficiency, cost control and the quality and quantity of results attained and attainable, i.e. reductions in malaria. While such benefits are extremely difficult to measure, they are, nonetheless, important anticipated intermediate project outcomes contributing to the project purposes and goals. The value of this knowledge for Haiti and other countries with similar malaria problems cannot be quantified.

c. Benefits from Reduced Malaria Mortality and Morbidity

As discussed earlier, the malaria parasite found in Haiti is virulent and more frequently kills his human host than other malaria parasites. Thus, from a humanitarian standpoint, the reduction in illness, suffering and death from malaria directly and indirectly (from its contributions to other diseases) will be a positive benefit. From an economic point of view, some of these benefits can be quantified while others remain intangible. The benefits of reduced malaria which can readily be quantified include the savings that result to the public as a result of avoiding needed medical expenses and lost earnings. These are quantified in the cost-benefit analysis that follows. However, the non-quantifiable benefits that accrue to society because of reduced incidence of malaria are probably larger than those that are quantified. They include the following:

1) The risk of malaria acts as a deterrent to the inflow of tourist dollars, now estimated to be $60 million annually. If malaria were allowed to get out of control, much of this needed foreign exchange earnings could be lost. The current high incidence of malaria in Haiti probably even now deters a significant number of tourists. While it is impossible to quantify this effect, it is certain that it is of major importance.

2) There would appear to be substantial savings to the Haitian public from a reduction in mortality due to malaria. Burial costs alone can be substantial, and the lost earnings from the death of an adult worker can be an economic disaster for a family. It is also probable that malaria related infant and child mortality tends to increase fertility and family size and, thus, perpetuate the poverty cycle.

3) Reduced malaria would avoid losses of income to persons providing home care to malaria victims. When family members are unable to work because they are providing care to malaria victims, other productive work is foregone.

4) Malaria caused absences from school by pupils and teachers have direct negative impacts on the amount and quality of education. The impact of learning postponed or foregone may not readily be quantified, but the loss is real, and the educational gains derived from reduced malaria are equally real.

5) Malaria produced debility leads to an increased susceptibility to other diseases. Malnutrition frequently has its origins in the inability of families to provide the required additional calories to malaria victims.

3. Analytical Framework

Assessing the economic soundness of the proposed project requires a comparison of project costs with expected benefits. For purposes of this analysis a low funding option is also included which presents a smaller overall project and AID funding at only $6.5 million over the life of project. Because there is this low AID funding option, the analysis must be carried forth for both alternatives. These alternatives are compared with a no project alternative to generate net project costs and quantifiable benefits. The analysis will begin with a discussion of alternative program costs and sources of funding. Quantifiable project benefits, which consist of savings that the project will generate, include the avoidance of malaria caused medical expenses, excess caloric consumption, and lost wages. To estimate these benefits, projections of the number of malaria cases with and without the project are required. While this cannot be done with great precision, projections have been developed so that a plausable cost-benefit analysis may be carried fourth.

While the life of the project is only four years, a ten year period is used to analyze the project in the economic analysis. Many of the project's benefits accrue after the initial four year LOP, as a result of increased SNEM program efficiency.

4. Alternative Malaria Control Program Costs

Table 4-7 compares the malaria control program costs of the three alternative programs: a program with no AID supoort, a low option AID assisted program, and the proposed AID assisted program. (See discussion of Program alternatives in Part II-D). The four year LOP cost of the program without AID support is estimated to be almost $12 million. It is nearly $35 million over the full ten years. Further assumptions for the no AID project alternative are: (1) that the GOH would continue through necessity to support both SNEM and its current rural health program, (2) that PAHO would continue to provide a limited technical assistance to SNEM but on a more limited scale than is envisaged under the project; (3) that the Government of Japan would follow the USAID lead and not provide further assistance after delivery of its current commitment of $2 million for insecticide in 1983.

The total program cost of the low option over the 4 year LOP is nearly $23 million. The ten year cost is $55.8 million. The low option funding assumes that a lower level of AID grant assistance would be available,i.e. $6.5 million, and that FY 82/83 funding would not exceed $1.3 million. Additional increments of $1.9 million in FY 1984, $1.7 million in FY 1985, and $1.6 million in FY 86 would be available. Total GOH assistance would be equivalent to $6.0 million. From 1987-1992 the following assumptions are made: (1) no further AID assistance, (2) PAHO assistance increases with inflation at 10 percent annually, (3) GOH support also increasing 10 percent annually, (4) local or other donor support begins in 1987 at $1 million and increases 10 percent annually thereafter.

It is assumed that over the life of the proposed project $26.5 million will be available to SNEM. Total 10 year costs of an increasingly effective and efficient malaria control program are estimated at $54.7 million,

Table 4-7 SOURCE OF FUNDS WITH NO PROJECT, LOW OPTION, AND PROPOSED PROJECT ($000's)

	No Project				Low Option						Proposed Project					
Year	GOH	PAHO	JAPAN	TOTAL	GOH	PAHO	JAPAN	AID	Local and Other	Total	GOH	PAHO	JAPAN	AID	Local and Other	Total
1983	1850	350	2000	4200	1850	460	2000	1300	-	5610	1850	460	2000	2000	-	6310
84	2035	350	-	2385	2035	470	1500	1900	-	5905	2035	470	2000	2400	-	6905
85	2235	350	-	2589	2239	480	1500	1700	-	5919	2239	480	2000	1900	-	6619
86	2462	350	-	2812	2462	490	1000	1600	-	5552	2462	490	2000	1700	-	6652
87	2708	350	-	3058	2703	539	-	-	1000	4247	2585	490	-	-	1000	4075
88	2979	350	-	3329	2979	593	-	-	1100	4672	2714	490	-	-	1100	4304
89	3277	350	-	3627	3277	652	-	-	1210	5139	2850	490	-	-	1210	4550
90	3604	350	-	3954	3604	717	-	-	1331	5652	2993	490	-	-	1331	4814
91	3964	350	-	4314	3964	789	-	-	1464	6217	3142	490	-	-	1464	5096
92	4360	350		4710	4360	868			1611	6839	3299	490			1611	5400
Total	29478	3500	2000	34978	29478	6058	6000	6500	7716	55752	26169	4840	8000	8000	7716	54725

including a total AID contribution of $8.0 million over FY 82/83-FY 86. Because of the increased efficiency of the SNEM Program after the LOP, it is assumed that SNEM costs need to be increased at a rate of only 5 percent per year and that PAHO contributions remain constant. It is further assumed that local community costs and other donor support increase at a rate consistent with inflation, i.e. 10 percent. It is noteworthy that after the LOP, GOH costs for SNEM and total program costs are actually lower than the low option program costs. In other words, recurrent GOH expenses are reduced by the proposed project.

When SNEM 10-year program costs are stated in constant 1982 dollars, the costs are $20.8 million with no project, $34.0 million with the low option, and nearly $34.7 million with the proposed project (see Table 4-8). Hence, the real net cost of the low option is almost $13.3 million, while the proposed project net costs is almost $14 million. These financial costs are judged to be an economic costs ,i.e. financial costs and opportunity costs are equal. This is based upon the assumption that cost increases that result from applying a shadow price for foreign exchange to project imports would be approximately offset by the reduced costs obtained by applying a shadow wage to labor inputs.

5. Quantifiable Project Benefits

As explained earlier, to estimate quantifiable project benefits, it is necessary to project the number of malaria cases under alternative program assumptions. Projections of the total number of malaria cases and the cases avoided as a result of the two project options are displayed in Table 4-9. For all the projections, actual number of malaria cases in 1982 is estimated to be 200,000. The 1982 population at risk is 4.5 million. The population is assumed to increase at 1.9 percent annually from 1983 to 1987 and 1.7 percent annually thereafter. With the resources available to SNEM under the three project alternatives, different levels of activity are possible and, thus, a variable impact on malaria case rates can be estimated. Under the no project alternative, once the insecticide available from the GOJ in 1983 was used, SNEM would be forced into a very limited and ineffectual control program. Malaria prevalence would rapidly rise to 25 percent of the at-risk population despite

Table 4- 8 Costs of Malaria Control with No Project, Low Option and Proposed Project (in Constant 1982 000's)

Year	Total Cost No Project	Total Cost Low-Option	Total Cost Proposed Project	Net Cost Low Option	Net Cost Proposed Project
1983	3818	5099	5736	1281	1918
84	1970	4878	5704	2908	3734
85	1944	4445	4971	2501	3027
86	1921	3792	4543	1871	2622
87	1899	2637	2531	738	632
88	1878	2635	2427	757	549
89	1861	2636	2334	775	473
90	1847	2639	2248	792	401
91	1829	2636	2161	807	332
92	1818	2639	2084	821	266

the 10 percent (nominal) annual increase in the GOH contribution to SNEM. Under the three alternatives it is assumed that GOH program funding for SNEM over the period 1983-86 will be $8.6 million. PAHO will continue to provide assistance but in varying amounts as explained below. At this low level of funding, SNEM would lose key staff and be unable to operate because of lack of vehicles drugs, equipment, funds for salaries, etc.

Malaria cases under the low option AID support are generously assumed to decline substantially with the additional support and technical assistance provided. However, because of the lower initial AID funding in FY 1982/83 and the resultant lack of supplies and vehicles, operational activities in FY 1983 would be very limited. Tight budgets throughout the LOP are further assumed to limit training and retraining of SNEM staff and the slow start up is never entirely overcome.

Under the proposed project, assuming funding is available as projected, there would be major organizational restructuring within SNEM, early SNEM equipment replacement and major program expansions. Operational research and priority field studies could begin in FY 1983. Targeted control measures would get underway by March 1983. It is further assumed that by the end of FY 1984 comparative insecticide field tests with 1.0 gr/m^2 of fenitrothion have proved this level adequate to interrupt malaria transmission and operational spraying with 1.0 g/m^2 will be possible on an expanded scale in FY 1985 and 1986. Operational research and evaluation of other malaria control measures likewise demonstrates the ways in which these methods can be more effectively used. Community involvement methods and techniques are developed and used to reinforce SNEM's technical interventions. As a consequence of these efforts malaria is rapidly brought under control and cases decline substantially.

The benefits of malaria control of Haiti may be estimated in terms of (a) savings of additional caloric consumption required during malaria and its convalescent period; (b) estimated commercial and private self-treatment costs avoided; (c) expenses avoided of out-patient treatment of malaria at dispensaries, health centers and hospitals expenses avoided; (d) avoided hospitalization costs, and; (e) savings of foregone earnings. The projected

Table 4-9 Projected Malaria Cases Under No Project, Low Option and Proposed Project Funding Levels (000's)

Year	Cases without Project	Cases with Low Option	Cases with Proposed Project	Cases Avoided Low Option	Cases Avoided Proposed Project
1983	280	195	150	85	130
84	400	166	90	234	310
85	800	116	45	684	755
86	970	81	23	889	947
87	1190	65	16	1125	1174
88	1245	58	11	1187	1234
89	1278	53	8	1225	1270
90	1300	49	5	1251	1295
91	1322	46	4	1276	1318
92	1345	42	3	1303	1342
Total	10130	871	335	9259	9775

TABLE 4-10 BENEFITS OF LOW OPTION AND PROPOSED PROJECT (1982 $000's)

	LOW OPTION							PROPOSED PROJECT						
Year	Cases Avoided	Self Treatment	Health Services	Hospital-ization	Excess Cal. Consumption	Wage Loss Savings	Total Savings	Cases Avoided	Self Treatment	Health Services	Hospital-zation	Excess Cal. Consump.	Wage Loss Savings	Total Savings
1983	85	54	17	106	17	397	592.	130	83	26	163	26	607	905
84	234	150	47	298	47	1093	1629	310	198	62	388	62	1448	2158
85	684	438	137	855	137	3194	4761	755	483	151	944	151	3526	5255
86	889	569	178	1111	178	4152	6187	947	606	189	1184	189	4422	6591
87	1125	720	225	1406	225	5254	7830	1174	751	229	1468	229	5483	8171
88	1187	760	237	1484	237	5543	8262	1234	790	247	1543	247	5763	8589
89	1225	784	245	1531	245	5721	8526	1270	813	250	1588	250	5931	8839
90	1251	801	250	1564	250	5842	8707	1295	829	259	1619	259	6048	9013
91	1276	817	255	1595	255	5959	8881	1318	844	264	1642	264	6155	9173
92	1303	834	261	1629	261	6085	9069	1342	859	268	1678	268	6267	9340
Total	9259	5926	1852	11574	1852	43240	64444	9775	6256	1995	12219	1995	45649	68034

number of malaria cases avoided times estimates of the per case value of specific benefits is used to derive the project benefits. For each benefit element a series of assumptions have been made.

For an individual with a febrile disease such as malaria, there is an additional requirement for calories equivalent to an average of 1 kilogram of carbohydrate for each malaria case. At a cost of $0.20 per kilo of carbohydrate, the savings that result from the two project options is shown in Table 4-10. Over the 10 year period these savings amount to $1.9 million in the low option project and $2.0 million in the proposed project.

The estimated cost of private treatment of malaria through traditional medicine, pharmacies, private practitioners, etc. is $1.60 per case. It is estimated that 40 percent of cases will be self-treated in one way or another. The savings of these costs is a project benefit. The total value of these benefits over the ten year period is estimated to be $5.9 million with the low option and $6.3 million with the proposed project.

It is estimated that the DSPP and rural health facilities would only be able to treat one fifth of all malaria cases annually. At a cost of $1.00 per malaria case treated in public health facilities, the savings during the 10 year period would be $1.9 million with the low option and $2.0 million with the proposed project.

Additional costs to public health facilities are incurred in the hospitalization of malaria victims whether diagnosed as malaria or not. For purposes of this analysis it is estimated that 2 1/2 percent of all malaria cases are hospitalized for 5 days at a cost of $10/day. The savings that results over the 10 years is $11.6 for the low option and $12.2 million for the proposed project.

Most complicated, and by all means the largest of the benefits to be derived from any malaria control program, is the avoidance of wage losses on the part of individuals who would otherwise have been unable to work by reason

of malaria illness. The wage savings is calculated by multiplying the number of avoided malaria cases by all of the following:

1. The average rural wage per adult male, estimated to be $1.40 per day in 1982*.

2. Days lost per malaria illness (18 days);

3. Percentage of the rural population economically active (54.4 percent);

4. Average wage of all workers compared to that of adult males (81 percent);

5. Probability that a worker would have been employed during his illness (42 percent).

The ten year earnings benefit associated with the low option is $43.2 million and $45.6 million for the proposed project.

Comparisons of the benefits of the proposed project with the low option can also be made for the 4 year LOP using Table 4-10. For example, the LOP savings in health service costs with the proposed project is $428 thousand, while the low option only provides $379 thousand in savings. The net difference of $49 thousand is a LOP savings to the GOH. Similarly, LOP

* The estimated average wage was derived from consultations with AID agricultural sector project managers and consultants. The percentage of economic activity among rural population, worker productivity and employment probability derived from Land Tenure, Income and Employment in Haiti, Clarence Zuvekas, Jr., March 1978 (revised). Estimated worker incapacity per malaria attack reflects observations over a four year period in Nepal, a country with similar conditions of rural living, especially in the malarious areas. Figures for Haiti not available; but believed by several sources consulted to be comparable to Nepal data. The wage loss formulae appears in Albert E. Farwell, "Haiti Malaria Control Program: Economic Analysis", AID Contract No. AID/LAC-C-138, May 1979.

hospitalization expenses saved under the proposed project are $2.7 million. Under the low option, these saving are only $2.4 million. Hence, the net effect is a $.3 million hospitalization expense savings for the GOH over the LOP.

6. Cost-Benefit Analysis

The costs and benefits in 1982 dollars of the two project alternatives over ten years are displayed in Table 4-11. Costs less benefits generate net project benefits. Discounting by ten percent, the estimated opportunity cost of capital*, yields the net present value of the alternative projects.

When considering two mutually exclusive project options, the correct criterion for deciding which is better is the net present value rule. Since only one of the project alternatives can be implemented, it makes sense to go with the one promising the greatest net present value. The present value or worth of the proposed project, $26.9 million, is over $1 million greater than the low funded option. If due consideration were given to the non-quantified benefits, the advantage of the proposed $8 million dollar AID project would become even more pronounced. Consideration of these additional benefits should also overcome any real concern that might result from with the limited precision of benefit estimates. Hence, it would appear that a sound economic case may be made for the proposed project.

In an attempt to focus more clearly on the economic soundness of the proposed project as compared to the low option, one may consider only the differential costs and benefits. The differential or incremental costs and benefits of the proposed project over the low option are shown in Table 4-12. In the early years the proposed project has costs in excess of the low option, but after the initial four year LOP the proposed project has lower costs.

* World Bank, Haiti: Economic Memorandum Report No. 3079-HA, February 1981.

Table 4-11 Cost-Benefit Analysis (1982 $000's)

	LOW OPTION				PROPOSED PROJECT			
Year	Costs	Benefits	Net Benefits	Net Present Value at 10%	Costs	Benefits	Net Benefits	Net Present Value at 10%
1983	1281	592	(689)	(626)	1918	905	(1013)	(921)
84	2908	1629	(1279)	(1056)	3734	2158	(1576)	(1302)
85	2501	4761	2260	1697	3027	5255	(1576)	(1302)
86	1871	6187	4316	2948	2622	6591	3969	2711
87	738	7830	7092	4404	632	8171	7539	4683
88	757	8262	7505	4233	549	8589	8040	4535
89	775	8526	7751	3976	473	8839	8366	4292
90	792	8707	7915	3696	401	9013	8612	4022
91	807	8881	8074	3423	332	9173	8612	3749
92	821	9069	8248	3184	266	9340	9074	3503
Total	13251	14	51193	25879	13954	68034	54080	26944

This results from the increased efficiency of SNEM brought on by the project's cost effectiveness research, organizational restructuring, and the resultant lower incidence of malaria under the project. The differential or incremental benefits of the proposed project over the low option are based upon an estimated 516,000 additional cases of malaria avoided over the ten year period. Subtracting the differential costs from the differential benefits yields the net benefits of the proposed project over the low option. The net present value of this differential is over $1 million dollars. In other words, the proposed project increases the economic net benefits to the Haitian society by over $1 million dollars, after the opportunity cost and capital has been accounted for. The internal rate of return of the differential is almost 30 percent, implying the proposed extra funding is a very sound investment. This would, of course, be significantly larger if the non-quantified benefits were included.

The validity of the foregoing analysis, of course, hangs on the reliability of the malaria cases avoided projections since these are used to estimate the benefits. Sensitivity analysis was conducted to determine how alternative projections would affect the net present value estimates. The net present value of the proposed project remains positive even if actual cases avoided were only 1/3 of those projected. The differential present value (of the proposed project over the low option) could withstand approximately a 50 percent error in the projection of additional cases averted and still remain positive. Hence, the basic economic soundness of the proposed project would not be reversed by a broad range of alternative cases averted projections.

Based on the foregoing analysis, we may conclude that the proposed project is a very sound economic investment. It reduces both the incidence of malaria in Haiti and recurrent GOH expenditures for malaria control. The proposed project, as compared to the low option, has incremental benefits well is excess of incremental costs. Inclusion in the analysis of the non-quantifiable benefits derived from the lowered incidence of malaria futher strengthens the already strong case for the proposed project.

Table 4-12 DIFFERENTIAL COST-BENEFIT ANALYSIS (1982 $000's)

Year	Differential Cost	Differential Benefits	Differential Net Benefits	Net Present Value at 10%
1983	637	313	(324)	(295)
84	826	529	(297)	(245)
85	526	494	(32)	(24)
86	751	404	(347)	(237)
87	(106)	341	447	278
88	(208)	327	535	302
89	(302)	313	615	315
90	(391)	306	697	325
91	(475	292	767	325
92	(555)	271	826	319
Total	703	3590	2887	1063

V. PROJECT IMPLEMENTATION

A. Implementation Plan

The project is scheduled for FY 1982 authorization with an initial A.I.D. obligation of $ 500,000. These funds will be obligated in a September 1982 agreement with the Government of Haiti. Further A.I.D. funding will be made available in annual increments. A first quarter FY 1983 obligation will facilitate orderly project implementation. Table 5-1 shows critical project milestones in project implementation.

Annual project cycles have been designed to coincide with the budget year of both the GOH and A.I.D. This should assist in monitoring host government contributions and plans and facilitate the USAID scheduling of project obligations early in the fiscal year to avoid the problems of late FY obligations and ensure the availability of project funded commodities for planned field activities.

Each year SNEM will prepare its annual plan of action and budget and submit them to the Executive Commitee for approval so that as each new fiscal year begins there will be no delays in project implementation.

B. Disbursement Procedures

USAID will utilize the following for the disbursement of project funds:

1. Direct Reimbursement - For Local Support Costs: SNEM will be required to submit detailed annual budgets and work plans for review and approval. Based upon these plans, USAID/Haiti will establish a revolving fund which will be periodically reimbursed. Detailed procedures governing the revolving fund will be spelled out in Project Implementation Letters (PILs)

2. Direct Letters of Commitment to Suppliers or Contractors - For Goods and Services to be Procured by SNEM: Detailed procedures will again be spelled out in PILs.

TABLE 5 - 1 - MAJOR MILESTONES

	Responsible Agency	FY 82 Quarter Pre-Program IV	FY 83 I	FY 83 II	FY 83 III	FY 83 IV	FY 84 I	FY 84 II	FY 84 III	FY 84 IV	FY 85 I	FY 85 II	FY 85 III	FY 85 IV	FY 86 I	FY 86 II	FY 86 III	FY 86 IV
A. Project Documentation Schedule																		
Completion of PP, AID approval, Obligation of Funds	AID/GOH	*																
Completion of Detailed Annual Plan (Budget, Personnel, Control Activities, Training)	GOH	*				*				*				*				*
Approval of Budget for 83 and subsequent years	AID/GOH	*				*				*				*				*
Completion of Plan of Operations 1983-1986	GOH	*																
Request for GOJ Assistance	GOH		*				*				*				*			
Fulfillment of Conditions Precedent to Disbursements	GOH	*				*				*				*				*
GOH/GOJ Agreement signed	GOH	*				*				*				*				*
Documentation for other donor assistance completed	GOH	*				*				*				*				*
JPIP is developed	AID/GOH	*																
B. Project Implementation Cycle																		
Commodity Requirements Defined	GOH	*				*				*				*				*
Vehicle and Supply Procurement Documents submitted	GOH/AID		*				*				*				*			
Commodities Procurement Documents submitted	GOH/AID		*				*				*				*			
Quarterly Report on Commodity and Supply distribution/utilization	GOH		*															*
Quarterly Activities + Financial Reports	GOH		*															*
Implementation Documents (Pio/Cs Prepared)	AID		*				*				*				*			
(Pio/Ts ")	AID	*	*	*		*			*	*				*	*		*	
GOJ Commodities Received	GOH		*	*			*	*			*	*			*	*		
USAID Commodities Received	AID/GOH		*	*			*	*			*	*			*	*		
USAID vehicles and Supplies Received	AID/GOH				*				*				*				*	
Annual Review of Accomplishments	AID/PAHO/GOH			*				*				*				*		
Semi-Annual Technical Review of Accomplishments	AID/PAHO/GOH			*		*		*		*		*		*		*		*

MISSING PAGE

NO. 125 - 126

TABLE 5 - 1 - MAJOR MILESTONES

	Responsible Agency	FY 82 Quarter Pre-Program IV	FY 83 I	FY 83 II	FY 83 III	FY 83 IV	FY 84 I	FY 84 II	FY 84 III	FY 84 IV	FY 85 I	FY 85 II	FY 85 III	FY 85 IV	FY 86 I	FY 86 II	FY 86 III	FY 86 IV
C. Critical Project Milestones																		
Documentation																		
Initial Obligation of Funds	AID	*																
Satisfaction of Initial Conditions Precedent	AID		*				*				*				*			
Quarterly Executive Committee Review	GOH	*	*	*	—	—	—	—	—	—	—	—	—	—	—	—	*	*
Approval of 1983 Funds	AID/GOH		*															
Obligation of 1983 Funds	AID/GOH		*															
Program Activities																		
Completion of Priority O.R./ Fiel Studies Protocols	GOH	*				*				*				*				*
Completion of SNEM Organizational Restructuring	"									*								
Completion of SNEM Core Personnel Retraining	"									*								
Computerizatio Management Info. System	"			*	—	—	—	—	—	—	—	—	—	—	—	—	—	*
Community Resorces Mobilization Plan	"					*												
SNEM/DSPP Health Professionals Retrng Plan	"			*														
SNEM/DSPP Standardized Malaria treatment Protocol	"			*														
SNEM Multisectoral Coordination Plan	"				*													
Evaluation of Dosage Trials	"									*								
Completion of Priority Field Studies	"									*								*
Key Elements of Expanded Surveillance System in place	"							*										
Joint Evaluation of Project	AID/GOH/PAHO								*									*
Completion of Annual Stratification	GOH					*				*				*				*

3. Direct Payments - For Goods and Services to be Procured by USAID/Haiti: For these items, USAID will issue PIOs, Purchase Orders, etc.

C. Procurement and Contracting Procedures

In accordance with the decision made by the AID Administrator on July 14, 1977, all goods and services for this project will be procured from countries in AID Geographic Code 941 and the Host Country. It is AID's policy, however, that the eligible source for all pharmaceuticals (finished and unfinished) shall be the United States (Code 000). Therefore, unless waivers are issued from AID/W, this policy will be complied with. Technical assistance contracts will be procured through competitive negotiation in accordance with AID Standard Regulations.

Short-term technical assistance will be obtained either through IQC contractors or through competitive negotiation in accordance with U.S. contracting procedures.

D. USAID Monitoring Requirements

The USAID Project committee will monitor this Project and will have the following responsibilities:

1. Project Management and Monitoring

The Project Manager will be the Malaria Officer assigned from the Mission's Population and Health Office. The Malaria Officer will work closely with the SNEM Director and staff, representatives of other participating agencies, and long and short-term consultants to ensure that the provisions of the AID Project Agreement and Implementation Letters are met. The Malaria Officer will be assisted by the Mission Project Committee and will work closely with the Project Manager of a the Rural Health Delivery Systems Project and the Project Manager of the FP Outreach Project so as to assure complimentary implementation and close coordination of these Mission-funded projects.

The Mission's Development Resources and Evaluation Office (DRE) will monitor project implementation and ensure that adequate control and management methods are being used. DRE will also prepare and negotiate the Project Agreement, draft Implementation Letters, and will review all materials submitted to satisfy CP's.

2. Joint Reviews

Joint reviews, undertaken by AID, the GOH/DSPP, SNEM and PAHO representatives, will be held quarterly and will be an essential feature of project implementation.

3. Evaluation

The Mission's Malaria Officer working with the Mission's Evaluation Office will coordinate periodic evaluations.

4. Disbursement

The Mission Controller will review disbursement requests and disbursements to ensure conformity with AID regulations and adequate financial control.

5. Contracting

The Regional Contract Officer will work with the Project Manager and the SNEM in the procurement of technical assistance, vehicles, drugs, and other commodities.

6. Additional Mission Support

SNEM will submit to AID the following reports to assist the Mission in monitoring the project:

a) A quarterly JPIP report of completed activities and project expenditures as well as expenditure projections for the following quarter.

b) An annual Plan of Action describing in detail the results from the prior year and planned project activities for the coming year, including planned operational studies, location of planned field operations, most recent epidemiological data on malaria incidence, results of studies completed, organizational and management changes planned and effected, a staffing plan and an annual budget showing GOH counterpart allocations and AID local currency requirements as well as a time table of activities and responsible officers.

c) Quarterly reports on commodity and supplies received, distributed and used.

E. Evaluation Plan

In addition to normal project monitoring and the preparation of quarterly JPIP reports developed by SNEM and the USAID Malaria Officer and the quarterly Executive Committee program reviews with all donors , two major joint evaluations will be undertaken: (1) the first evaluation will be in the 4th quarter of FY 84 and (2) the second in the second quarter of FY 1986.

Three broad areas will constitute the focus of evaluation activities: a) improvements in the efficiency of SNEM administration and operations; b) cost and effectiveness of anti-malarial measures singly and in combination; and, c) participation and support by non-SNEM agencies in malaria control activities.

1. FY 84 Evaluation

Project antimalarial activities including operational research on insecticide dosage, case reporting the epidemiological stratification process, training, etc., will be examined: a) to determine whether purposes and outputs are being met and are on schedule; and, b) to identify and, to suggest ways in which field operations, SNEM management, operations research, malaria surveillance and community mobilization and support can be improved. A

critical aspect of this evaluation will be an assessment of the efficacy of reduced intradomiciliary applications of insecticide on malaria transmission under Haitian conditions.

2. FY 86 Evaluation

A second evaluation, in the middle of the final project year will focus on the project impact to determine progress in attaining project purposes, i.e. strengthening the institutional capacity of SNEM, significantly reducing malaria morbidity and mortality and resolving key technical questions.

For each evaluation, AID and SNEM collaborating with the Executive Committee will define the evaluation protocol and recruit a team of multidisciplinary expert consultants to undertake the required assessments. In order to ensure that the evaluation process contributes to the overall achievement of health sector goals, the DSPP will nominate a representative to work with the evaluation team. It is also expected that PAHO and other donors will also provide support and expert consultants to assist in the evaluations.

F. Conditions Precedent, Covenants and Special Provisions

To facilitate planned, orderly project implementation the conditions precedent to grant disbursements, proposed covenants to be included in the Grant Agreement and special provisions for waivers are included in Annex A, Exhibit 3.

Table 5-2 PROPOSED AID OBLIGATION SCHEDULE AND PROJECTED EXPENDITURES

Project 521-0143*

($000)

	FY 82	FY 83	FY 84	FY 85	FY 86	LOP
A. Obligations Including Contingency						
Technical Assistance	150	206	387	229	198	-
Commodities, Supplies, Vehicles	250	555	1,041	740	537	-
Local Costs	-	839	972	931	965	-
Total Obligation	400	1,600	2,400	1,900	1,700	8,000
B. Planned Expenditure	-	1,800	2,400	1,900	1,700	8,000
Estimated Pipeline	400	200	0	0	0	0

* Early FY Obligations will reduce pipeline which includes procurements in process.