



Belize Health Sector Assessment

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BELIZE HEALTH SECTOR ASSESSMENT
(A WORKING DOCUMENT)

Report of a visit to Belize
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TABLE OF CONTENTS

Summary

I. Introduction

1. Background, aims, calendar of events
2. Annotated bibliography -- available data based upon previous reports
3. Outline of report

II. Health plan of Belize, 1982

1. Overview
 - Background
 - Health status
 - Health services
 - Programs
 - Health support services
2. Note on environmental health

III. Health sector performance

1. Resources
2. Private expenditures on health
3. Personnel
4. Administration and management
5. General environment
6. Specific activities
 - A. Health data
 1. General demographic characteristics
 2. Major health problems
 3. Surveillance and reporting
 - a. Malaria
 - b. Gastroenteritis
 - c. Vaccine preventable diseases
 1. Measles
 2. Pertussis
 3. Tetanus
 4. Tuberculosis
 5. Poliomyelitis
 6. Diphtheria
 - d. Typhoid fever
 - e. Sexually transmitted diseases

TABLE OF CONTENTS (continued)

- f. Hepatitis
- g. Dengue
- h. Other

- 4. Nutritional status
- 5. Dental health

B. Existing programs

- 1. Maternal and child health
- 2. Food and nutrition
- 3. Immunization
- 4. Diarrheal disease control
- 5. Family planning
- 6. Dental health
- 7. Environmental health
- 8. Primary health care

IV. Position papers/Project proposals

- 1. The Belize City Hospital
- 2. A network of district hospitals
- 3. Malaria/Aedes control
- 4. Primary health care infrastructure development
- 5. Rural water supply and sanitation

V. Comments

VI. Appendices

Not attached. They are available through the Pan American Health Organization, Washington, D.C. and the Latin America and Caribbean Bureau of the Agency for International Development, Washington, D.C.

SUMMARY

A team of four health workers -- a planner, an epidemiologist, an economist, and an engineer, sponsored by US/AID and PAHO, conducted a 2-3 week assessment of the health sector in Belize, C.A. The country was celebrating its first anniversary of independence. During the past year, government health workers have been preparing a plan describing health problems and proposed solutions as a basis for setting priorities. Published reports are available which deal with health status, programs, facilities, manpower and support services based on studies by PAHO and other consultants in recent years. The 1982 World Bank study, for example, catalogs 4 health issues -- emphasis on primary care, desire to build a new Belize City Hospital, manpower shortages, and need for a population policy. A list of projects includes, in addition, the need for equipment for regional hospitals, renovation of health centers, and sanitation projects. These issues and projects are similar to those identified by the present team. Most proposed projects require foreign assistance.

The national health plan is in draft form and subject to revision. A small relatively underpopulated largely agricultural country is described. Half of the population is $\bar{<}$ 15 years of age. There are diverse ethnic groups distributed mostly in a few large towns, smaller settlements, and isolated villages. Northern communities are linked to the capitol, to the major population center, and to nearby Mexico by satisfactory roads. However, surface links to the south are barely adequate and occasionally cut by untoward weather conditions.

Government-sponsored services provide nearly all medical care in hospitals. The extent to which private practitioners provide medical attention is not documented. Physicians may supplement their government salaries by private practice. Most nurses, however, are employed by the government. Advantages and disadvantages of current spending for medical care are discussed. Charges for hospitalization, for example, might be revised in a more equitable manner.

Medical manpower is not trained in the country. However, a local stepwise or "ladder" system of nursing education has been developed which prepares practical nurses, midwives, and professional nurses. Some nurses take postgraduate training programs, particularly in community health nursing, in other english-speaking Caribbean schools. However, a substantial proportion of these well-trained health professionals leave Belize after a few years to work mostly in the U.S. Young physicians who staff district hospitals face a variety of demanding tasks for which few physicians are trained, such as, management of a network of health centers and clinics and public health programs. A recurrent well-recognized problem is lack of infrastructure necessary to support health programs.

Environmental health services are poorly developed: water quality control is inadequate, liquid waste disposal below par, and solid waste disposal almost non-existent. Mosquito-borne illnesses, such as, malaria are frequent. Food sanitation is deficient. Housing conditions are unhealthful. The need for an occupational health and safety program has been pointed out in a previous study. It is axiomatic that improved

health levels in contemporary society are not the result of improved personal health services — bigger and better facilities or increased access to modern surgical procedures, but to ample working conditions, homes, and nutrition. To accomplish change, it will be necessary to increase the number of trained personnel, to institute modern standards and legal codes, and to enlist the cooperation of high risk groups.

A major effort is being made to increase immunizations particularly among pre-school children, to treat dehydration and electrolyte depletion due to acute diarrheal disease promptly and adequately on an ambulatory basis, and to extend MCH services. There is little or no attempt to limit family size.

Efforts at primary care are in progress in the Toledo district. Much remains to be learned about how best to recruit, retain, and supervise indigenous health aides; how to achieve optimal compliance with a variety of interventions; and how to evaluate the impact of the program.

Finally, what proposals for assistance have Belizean health authorities put forward? First and foremost is a plan for a new Belize City Hospital, for at least one structurally sound well-equipped referral facility. Next, is an improved network of district hospitals and clinics. However, a number of difficult questions related to such a network remain unanswered. Some of these deal with optimal patterns of referral, staffing, management, transportation, maintenance, and

financing. Development of primary health care infrastructure would appear critical. An efficient reorganized mosquito-borne disease control program is another high priority proposal and offers economic as well as health benefits. The same can be said of a proposed rural water and sanitation program.

The present study is intended as a working document upon which to build for planning. It lacks, for example, inputs from other related sectors and coordinating agencies.

I. INTRODUCTION ↵

I. Introduction

1. Background, preparation, and calendar of events

A collaborative USAID-PAHO team was formed to perform a health sector assessment in Belize, C.A. The team included a team leader/health manpower and facilities planner, R. Oseasohn/Consultant; an epidemiologist/planner, M. Pollack/Consultant; a health economist, P. Musgrove/PAHO; and an engineer advisor, R. Williams/PAHO. The purpose of the assessment was to assist Belize health authorities in identifying priority health problem areas to be addressed in the first Belize Health Policy Paper now being prepared.

The assessment activity began with a meeting in Washington on 23 August attended by USAID and PAHO representatives and team members with the exception of Mr. Williams who joined the group subsequently in Kingston. Two days were spent there meeting with Dr. G. Monekasso (CR/PAHO) and his staff and reviewing documents dealing with the health sector in Belize. There are a substantial number of informative reports available in the PAHO Jamaica office which describe visits by PAHO staff and consultants. These documents summarize many aspects of the setting, health status, health services, projects, and the need for further activities in Belize. A few selected documents are appended to this report and provided a useful starting point for the present survey (see attached appendices). Other papers were reviewed which may be of a special interest. These included PAHO staff trip reports, one by Dr. Monekasso in 1982 to explore the role of development arrangements with neighboring countries and another by Ms. P. Thompson (PAHO/Jamaica) in 1981 concerned with plans for primary health care and collection of health data; and visits by consultants,

one on water quality control problems and industrial pollution in 1981, another concerned with developing a proposal for a program in occupational health in 1980, another on the rural well-drilling program in 1979, another on the development of mental health services in 1979, and, lastly, a report dealing with psychiatric nursing in 1981. This is only a partial list of recent reports on health issues in Belize.

The Belizean economy was quite thoroughly studied last year by a World Bank mission, whose Economic Memorandum¹ is the most recent and complete source of information both on the structure of the economy and on the development plans of the government for the period to 1985. In the latter respect it is considerably more helpful than the official, national Economic Plan² published two years earlier. The Plan includes a list of development investment projects for the period 1980-83, but there is little description of the economic situation of the country nor an evaluation of the projects listed.

The World Bank study concentrates on the "productive sectors" of the economy, and particularly on agriculture. This sector provides nearly one-fourth of GDP, probably a larger share of employment, and almost three-quarters of the country's exports; it also appears to have potential for much more development. Health is discussed in less than one page, with a brief mention of four issues: the government's emphasis on primary

¹Latin American and Caribbean Regional Office, the World Bank, *Economic Memorandum on Belize*, Report No. 3823-BEL. (Washington, D.C., 5 April 1982. Restricted distribution)

²Central Planning Unit, Government of Belize, *Economic Plan of Belize, 1980-1983* (Belmopan, April 1980).

care, the desire to build a new hospital for Belize City, the shortage of staff, some of which is due to emigration, and the need for a population policy. The 1982-85 project list includes seven projects: a hospital, equipment for regional hospitals, renovation of health centers, acquisition of vehicles, and three water and sewerage projects. In most respects the situation seen by the team differs little from that reported by the Bank, except that more can be said about the particular economic problems and policy choices faced by the Ministry of Health. These are discussed in more detail later in this report.

By way of introduction, several features of the Belizean economy and of the state of knowledge about it should be mentioned.

- a) The economy is extraordinarily open. There is free convertibility with the U.S. dollar at a fixed rate, and trade is essentially unrestricted. Imports are equal to about 90 percent of GDP and exports to about 80 percent. Import duties constitute some 36 percent of total central government revenues, or about 15 percent of the value of imports. This openness of the economy is probably responsible for two other features of interest, namely,
 - b) prices are largely determined outside the country, which means that the rate of inflation does not differ very much from that prevailing in the United States. In the absence of a consumer or retail price index, nothing is known exactly about inflation; and
 - c) there is no reason to suspect gross economic inefficiency caused by distortions of relative prices, protection of inefficient domestic industries, failure to practice comparative advantage, etc. This

also means, of course, that there is no simple adjustment or rationalization of the economy that would yield large gains. It does not necessarily mean that within the government and particularly within the health sector, all prices are correct and resources efficiently used.

- d) there are substantial inequalities in income, associated in part with geography (the northern part of the country being richer than the south) and with the degree of integration into the market. (Commercial agricultural incomes appear to be substantially higher than those obtained in subsistence farming). However, there is no detailed knowledge of income distribution, and it is not possible to say whether public sector salaries are notably high or low with respect to private employment.
- e) both the birth rate (36.8 per thousand) and the dependency ratio (55 percent of the population under 15 or over 60) are quite high. These features limit the economy's ability to save, and require a fairly high rate of investment (probably of the order of five percent of GDP) just to keep up with population growth. Whether the situation is made easier or harder by the large number of Belizeans living abroad and the continued emigration especially to the U.S., depends on whether on average they send home remittances equal to what they would have produced by staying in Belize, and there is no information on which to base such an estimate.
- f) because of the limited capacity to finance investment from domestic resources, and the colonial history of dependence on aid for capital products, Belize's capital development plan is essentially a shopping

list for foreign assistance. All large public sector projects are intended to be foreign financed, with limited domestic contributions; the government essentially counts on the private sector for small scale investment in productive activities, and concerns itself with meeting the recurrent costs of existing and projected social capital. This situation characterizes the health sector as much as any other sector.

The team arrived in Belize City on the night of 26 August and met with Dr. A. Casas, Chief Medical Officer (CMO) the next day. Dr. Casas provided us with draft copies of the first Belize Health Plan. On 30 August, a meeting was held with the Minister of Health (A. Shoman), the Permanent Secretary (D. Gibson), the Deputy Minister (G. Usher), and the CMO. Objectives of the visit were reviewed and a scope of work was outlined. That afternoon, visits included the district hospital at Belmopan, the capitol, and a trip to a new farming settlement for refugees from Salvador under the joint sponsorship of the government of Belize, the U.N., and a church group.

On 31 August and 1 September, the team met with program managers - Mr. Fred Smith (environmental health), Dr. Gladys Hoy (communicable diseases), Dr. William Hawley (MCH and PHC), and Ms. D. Goff (nursing). 2 September was spent at the Belize City Hospital and the proposed site for a new hospital to replace it.

On 3 September, Mr. Williams returned to Barbados. Remaining members of the team and Dr. Casas visited health facilities in the towns of Orange Walk and Corozal. Dr. Musgrove returned to Washington on 4 September. Drs. Pollack and Oseasohn spent the morning with

Mrs. G. Collymore (Public Health Nursing Supervisor) and Dr. Hawley discussing control programs.

On 6 and 7 September, a field trip was arranged to visit Punta Gorda and a few nearby villages in the southernmost Toledo district. Team members were met and hosted by Dr. Row, District Medical Officer, and visited the district hospital, village clinics, and a few small communities within a 25-mile radius of Punta Gorda.

September 8, Mr. Shoman, Dr. Casas, and Mr. Smith met with Drs. Pollack and Oseasohn to present several proposals and to indicate priorities in the health sector.

The report leans heavily on previously published reports and information obtained in discussions with health personnel in Belize -- a relatively small number of busy professionals who patiently gave us their time in an effort to give us a clear picture of the Belize health scene.

2. Annotated bibliography

Report of a mission to advise the government of Belize on the planning of a new Belize City Hospital, August 1979.
E.H. Riley et al.

- (i) This document is the report of a visit to Belize carried out from 13-17 August by a 4-man team comprising an architect, a medical advisor, a hospital administrator and an economist, and mounted with the following terms of reference:

"To advise the Government of Belize on the planning of a new Belize City Hospital taking into account:

- (1) The existing medical facilities in Belize
- (2) The probable demand for facilities over the next 20 years
- (3) The manpower and financial resources expected to be available to run the new hospital.
- (4) The likely availability of finance from EDF or elsewhere to cover the capital cost.

The team's report should include an assessment of possible alternatives to building a new hospital: estimated costings and economic appraisal of the facilities it recommends: and TORs for any further studies considered necessary"

- (ii) The report is set out in two parts, Part I contains the economic appraisal of the project, and discussion of the cost-effectiveness of the project compared with alternative ways of meeting the same objective. Detailed recommendations on the planning of a new hospital are contained in Part II, which is intended to serve as the basis for an architect's brief.

Belize 1980 Population Census, Summary Tables, Bulletin 1 (Population, Race, Religion, Language, Marital status) May, 1982 and 2 (Employment, Industrial and Occupational groups) July, 1982. Statistical Office, Central Planning Unit, Belmopan.

Brief report on the management system for the district health services, Ministry of Home Affairs and Health, Belize, 7 August 1979, P.R. Carr

This study is a follow-up of a previous study done in November 1978 on the Management System for Health Care Delivery in Belize, which placed the management problems in a broad conceptual framework focussing on

the Belize City Hospital and the Head Office of the Medical Department. The objective of this present study is to provide a broad analysis of the management problems faced by the District Health Services, and make proposals for overcoming these problems by improving the efficiency and effectiveness of these services.

Health profile of Belize, 1982. Ministry of Health, Housing and Cooperatives (supplied by Dr. A. Casas, Chief Medical Officer).

A draft including background (geography, demography, economy, political system, and educational system); health status (mortality, morbidity, nutrition, environmental health); health services (organization, facilities, and programs); and health support services (information system, education, and administration).

Primary health care services - Belize, C.A., Profile and Analysis, 1979, H.C. Dyer.

a) Overall Objective

The overall objective is to bring about improvement in the health of the residents of Toledo District through the implementation of an integrated Primary Care Project.

b) Long-term Objective

1. To increase the level of health awareness in Toledo and to promote the development of healthy practices.
2. To bring about change in those attitudes which militate against healthy habits.
3. To achieve a significant reduction in the occurrence of intestinal parasitic infestations.
4. To develop the mechanisms to facilitate the delivery of Primary Health Care to the Toledo District.
5. To liaise with other agencies delivering services to Toledo District in order to integrate Primary Health Care Services with the other community services.
6. To develop a model of Primary Health Care which can be used in other rural areas of Belize, and as field training experience for Primary Care students in the health field.

3. Outline of report

The report itself follows. Central to it is 1) the current draft of the *Health Plan of Belize* prepared by Belize health workers, followed by a description of 2) *the performance of the health sector* collected by the assessment team, 3) *position papers* on high priority projects provided by Belize health workers, 4) *comments* on these projects by the team, and 5) relevant *supporting documents*.

II. HEALTH PLAN OF BELIZE, 1982

II. Health plan of Belize, August, 1982

1. An Overview

A copy of a current draft of the plan itself is appended and represents a major step by Belize health authorities. The document describes several aspects of the country — its geography, people, economy, and political and educational systems; the health status of the population -- the frequency and courses of death and illness, nutritional status, and environmental health conditions; the health services -- organization, primary facilities (health centers and clinics), secondary facilities (the Belize City Hospital and the network of 6 district hospitals), ancillary services including laboratories and pharmacies, special institutions, and private facilities; health programs -- maternal and child health, food and nutrition, environmental surveillance, malaria/Aedes eradication, tuberculosis control, sexually transmitted diseases control, mental health, dental health, and primary care project; and health support systems -- concerned with information, education, and administration. The appended draft is subject to further changes by health workers and health ministry staff.

The description of the land, its people, and their institutions is that of a small tropical country, largely agricultural, sparsely populated by diverse ethnic groups, and short on trained manpower with which to operate curative and preventive services. The bulk of the population of Belize has ready access to urban health facilities while a substantial number in small towns and villages, particularly in the

south, are many hours from definitive health services and, occasionally, cut off from them by poor roads made worse by bad weather. Some medical attention is available in nearby countries; however, its extent and quality are not documented. The present plan calls for regionalization of services starting at the village level with referral to small hospital units in district towns and to Belize City when necessary. A wide variety of programs is described with emphasis on health maintenance and disease prevention. The need for support systems is recognized.

The health plan is developing to a point where proposals to deal with specific needs are being developed and some of them already implemented. Five proposals were prepared by health authorities and are included in this report (see section IV). A primary health care project in the Toledo district has been the subject of considerable planning and parts of the program are already in progress. This project stresses the availability of multiple services and health education by indigenous health workers at the village level. One of the appended background papers (see section VI) on primary care by Dyer deals with the background of this project.

A note on environmental health aspects of the health plan follows.

2. *Note on Environmental Health*

With respect to the Environmental Health component of the Health Plan, two important conditions should be pointed out as follows:

The statements and data included in the present draft of the "Health Profile of Belize 1982" concerning environmental health are being reviewed by the environmental health planning cell and are likely to go further revision.

The environmental health program is still being drafted and it will therefore be weeks, or months, before it is finalized for inclusion in the Plan.

(a) Policy

Among the health policies of government is the "provision of an adequate and safe water supply and basic sanitation", which was discussed with environmental health personnel in terms of the protection of the total environment of all inhabitants at home, in school, at the workplace, in the community, and in recreational areas. It should be understood that environmental, health and development policies should be interdependent and inherent in the constitution and life of the nation.

(b) Priorities

The priorities of the government in environmental health are:

- The prevention of disease by employing environmental control measures, with the education of the public to participate fully.
- Attention to the poor and underprivileged, to persons in

underserved areas, and to high risk groups:

- The development of managerial skills among workers, including the desire and ability to function as part of the overall health team.

Among environmental control measures, priority attention will be given to:

- water supply, adequacy and potability.
- sanitary waste disposal, solid and liquid.
- food sanitation
- vector control

(c) Strategies

In the context of government decentralization and regionalization, and as part of the commitment to Primary Health Care, the environmental health strategies being discussed are:

- Improved program design by more detailed planning of surveillance and control activities within fixed time frames.

- Improved program implementation and management, including monitoring and evaluation by:

- Manpower training and development,
- Increased work supervision,
- Utilizing the primary health care principles of community education and participation, inter-sectoral and intra-sectoral coordination, and use of appropriate technology,
- Updating and expanding environmental health legislation,
- Reviewing the collection and usage of environmental health information.

- Reorganization of environmental health services (by absorbing anti-Aedes aegypti inspectors, changing the official postings of Public Health Inspector to Environmental Health Officer, etc.)

(d) General components

Manpower development:

The main objective is to increase the present cadre of Environmental Health Officers and Assistants by local training to meet the growing demands throughout the country for better environmental surveillance. For the Officers, a new one year course will be developed in the Belize College of Arts and Science, and for the Assistants an annual 4-6 week training program (initiated in 1982) will be continued with PAHO assistance. Assistants will be shared among the districts and supervised by officers who will enjoy a continuing education program as follows:

- 1 EHO for degree training in U.S.A. for January 1983
- 1 EHO for the Tutor Training Program (PAHO) in Barbados from August 1983
- EHOs for short training courses in U.S.A. in Water Quality Control, Vector Control, Solid Waste Management and General Environmental Health from 1983 to 1988.

Legislation:

The objective is the provision of modern environmental health legislation and standards to permit the inspectorate to enforce environmental control measures in all areas of human activity - home, school, work, community and recreational areas. A committee will be appointed

to review existing environmental health legislation in Belize and elsewhere in the Caribbean; and with the assistance of a PAHO health law consultant, will draft new laws and standards (by June 1983) for the Solicitor General to formalize and present to parliament in January 1984.

Community education and participation:

The objective is to get all communities to participate directly in preventing and controlling environmental health hazards and problems. It is proposed to study the mechanisms and procedures by which citizens, families, school bodies, employers in general, and community organizations can share in the routine environmental surveillance of the inspectorate (e.g. water quality, street litter, home inspection, etc.); and to introduce feasible solutions on a pilot basis in one section of Belize City, or in any other urban community.

Information system:

The objective of a review of the present environmental health information system is to ensure that the most useful information is available for the management of environmental health programs. A study of the present system will be carried out and recommendations made by June 1983.

Program design and management:

The objective of developing within the inspectorate greater expertise in program design and management is to permit better monitoring and evaluation of inspectors' work programs and a more effective supervision of their field activities, all for more cost-effective

environmental health programs in the future. This development will be an integral part of the training of Primary Health Care teams which can only be estimated to be within an 1983-85 timeframe.

Inter-sectoral coordination:

The objective of increasing inter-sectoral coordination is to ensure that environmental health considerations are included in the management of all communities and in the development programs of the country. In order to achieve this certain coordinating mechanisms at the national level need to be established along lines of a National Environmental Council. In the absence of this, the inspectorate plans to step-up its efforts with all government agencies (e.g. WASA) by mid-1983 to achieve continuous inter-agency consultation.

(e) Water supply

The main objectives are to ensure that all water provided for human use is safe and wholesome and supplied in adequate quantities and on premises or within easy access of every household, even though water supply in urban areas is the responsibility of WASA. Water supplied to all communities, especially from surface sources will be adequately treated so as to meet the approved standards for drinking water (e.g. WHO International Standards for Drinking Water) and an effective water quality control program will be developed. The program in rural areas will include:

- A comprehensive village-to-village survey of water demand and supply to develop cost-benefit criteria for action.

- A rationalization of rural water supply activities between WASA and the Ministry of Health.

- The integration of the activities into the Primary Health Care program with the accent on joint health education programming.

Attempts will be made to win inter-ministerial attention for the International Drinking Water and Sanitation Decade (1981-90) and to develop programs and projects for external funding (see IV-5) for basic data on a proposed Toledo Rural Water Supply Project.

(f) Liquid waste disposal

The objective is to encourage WASA to develop communal sewerage systems for the remaining 5 district capitals, to promote the complete use of water closets and septic tanks in all communities with a pipe-borne water supply, and to assist all other areas with the installation of a pit latrine for each house.

In the rural areas the inspectorate will conduct surveys of all communities in order to develop a rural sanitation program to meet the needs for excreta disposal facilities within the foreseeable future.

The monitoring of industrial effluents and the assessment of wastewater disposal by new industries will also be carried out in conjunction with the development of water pollution control legislation and standards.

(g) Solid waste management

The objective of the inspectorate's solid waste management program is to improve and expand the solid waste collection and disposal services in all urban communities, and especially in Belize City. For this it is proposed to:

- Reactivate the Board of Health to allow health personnel to participate more in solid waste management in Belize City and elsewhere.
- Update solid waste management legislation.
- Develop stronger ties with all municipalities.
- Carry out periodic evaluation of such services.
- Encourage the coordination of all agencies concerned (e.g. municipalities, social service, police, agriculture, etc.).
- Undertake public education and in-service training of all sanitation workers.

(h) Food sanitation

The main objective is to ensure that all foods intended for human consumption are unadulterated, sound, wholesome and fit for use. Specifically, 95% of food handlers are to be trained, registered and kept under surveillance; 90% of imported foods and 75% of locally prepared or processed foods to be examined by public health inspectors; and 90% of meat produced locally to be slaughtered in approved places.

For these objectives to be realized an increase in the inspection of food establishments will be necessary, accompanied by a program for grading establishments, thereby inviting the interest and participation of the public. Food sanitation legislation will be reviewed and revised with detailed requirements and stiffer penalties. Efforts will be made to improve the testing, certification and control of all food handlers. Additionally, food sanitation will have a prominent place in the health education of the public.

(i) Vector control

The main objective is to ensure that disease vectors (e.g.

mosquitoes and rodents) and domestic pests are reduced to negligible levels (or eradicated) and to prevent the introduction of others.

The anti-malaria and anti-Aedes aegypti program is reported elsewhere, but the rodent control program will incorporate the following activities:

- Survey and control of the rat population.
- Re-assessment of homes and yards with a view to preventing the breeding and movement of rats.
- Health education of the public at large.

It is recognized that improved storage, collection, and disposal of solid waste will assist greatly in the prevention of rat breeding, especially in Belize City.

(j) Housing and institutional sanitation

The objective is to ensure that all families, school children and institutional residents enjoy an acceptable level of environmental conditions. For this it will be essential that the inspectorate should play a greater role in approving building plans and a more active role in building (or premises) surveillance. This will depend on a revision of the relevant legislation, an increase in the inspectorate manpower, and more consultation by the Housing Department.

(k) Other technical components

To complete the inspectorate's efforts in the control of the total environment of the people of Belize, the following actions are proposed:

- Present services will be continued and intensified as new staff come on stream in: Quarantine, Occupational Health and Safety, and in Nuisance Abatement.

- In the fields of Noise Control, Air Pollution Control, Accident Prevention and the Sanitation of Recreational Areas, appropriate action will be taken if significant problems arise or are forecasted.

- In Disaster Sanitation, in order to minimize the environmental impact of natural disasters and to reduce the post-disaster threat to community environments, special emphasis will be payed to the training of the inspectorate in emergency health management and the development of emergency action plans in water supply and in environmental health.

III. HEALTH SECTOR PERFORMANCE

III. Health sector performance

1. Resources

According to the central government budget³, in 1982-83 the Ministry of Health, Housing and Cooperatives is expected to spend 8.425 million Belizean dollars (excluding housing, fisheries and cooperatives but including all of the ministry's central administration). This total does not include expenditure on water and sanitation services provided by the Water and Sewerage Authority, or refuse collection services of the town governments. This would amount to just under nine percent of total domestically-financed government spending, or to 4.6 percent of total GDP. Capital expenditures included in the budget total another 10.3 million dollars, of which nearly 90 percent represents requests for external assistance. However, this figure includes 8.9 million for a new hospital for Belize City, for which funds have not been obtained and even the decisions as to size and services to be offered are not final. Even the recurrent budget should not be regarded as definitive; as the Ministry has itself pointed out in a thorough review of the country's health status and services⁴, in recent years it has been common to spend on health 40 to 50 percent more than was budgeted. Assuming such an excess for the current year, and including in capital spending only the domestic contribution, would yield a total of about 13 to 14 million dollars, which is still only about 14 percent of the budget or

³Government of Belize, *Estimates of Revenue and Expenditures for the year 1982-83* (Belmopan, March 1982).

⁴Ministry of Health, Belize (in collaboration with PAHO/WHO, Jamaica), *Health and Health Status: Belize* (Belmopan, April 1982, p. 65, processed).

7.5 percent of GDP. These figures are not extraordinarily high, but they clearly suggest the difficulty of any expansion of resources for the health sector at current levels of total revenue.

The Ministry is almost entirely financed out of general revenue. There are not taxes dedicated specifically to pay for health expenditures, and the only source of revenue which is related to use of facilities is the charge for hospitalization. The fee schedule distinguishes five categories of patients: the poorest pay nothing, while the wealthiest still pay only five dollars per day. There are also relatively low fees for some diagnostic and surgical procedures. All together, these fees are expected to raise 150,000 dollars in 1982-83, which (on a total of 381 hospital beds) implies a revenue of one dollar per bed per day. Assuming half the patients to be treated free of charge, and a 65 percent occupancy rate, the fees would still bring in only 3.32 dollars per bed per day for those patients paying something. (Most of the remainder of the total of 544 beds in the country are in the mental hospital, whose inmates presumably do not pay.)

The 8.425 million dollars are divided by type of expenditure as follows:

personal emoluments	5.041	(60%)
travel expenses	0.122	(1.5%)
supplies and materials	1.329	(16%)
other operating and maintenance	1.369	(16%)
public utility services	0.312	(3.7%)
equipment	0.135	(1.6%)
grants and contributions	0.117	(1.4%)

When the budget is exceeded, of course, it is the categories of supplies and materials and other operating and maintenance costs which are most likely to increase; so the share devoted to wages, salaries and benefits typically runs somewhat below 60 percent. The expected distribution of expenses does not show any obvious imbalance. Problems in staffing, in provision of supplies and in maintenance, discussed below might however require that the structure of spending be changed slightly.

2. Private expenditures on health

The budget discussed above covers all public health measures in Belize and essentially all the hospital care provided in the country, as well as some care provided out of the country for patients who are transported at public expense to hospitals in neighboring countries (especially Mexico). It does not cover private spending by Belizeans on hospital care in other countries, or doctors' services provided privately in the country, or expenditures at private pharmacies. Doctors (specialists) employed by the Ministry are allowed to practice privately outside their regular hours; outside of Belize City, non-specialists may also take private patients. In addition there are between 20 and 30 full-time private practitioners in the country, of whom about ten are in Belize City. A 16-bed private clinic has just opened there, and there are a few privately-supported clinic beds in other towns. It is clear that most private health care expenditure in the country is for doctors' consultations and drugs; private patients requiring hospitalization are nearly always sent to the public hospitals. Assuming that there are the equivalent of 36 full-time private doctors in the country, that

each one employs a nurse full-time, and that private practice pays one and half times as well as government service, expenditure on these services would be about 1.6 million dollars per year; with allowances for office supplies and equipment and possible other staff, perhaps as much as 2.5 million. These figures are only rough estimates, made in the absence of any data from family budget studies, from insurance firms, or from the practitioners themselves. What they suggest is that private health care spending may be about one-fourth to one-third of what is spent through the public system. Almost all doctor's fees collected privately must come from higher-income patients; all but the very poorest may however frequent pharmacies and buy drugs and supplies.

Seen in terms both of social equity and of economic efficiency, this dual system has one definitive advantage and one equally clear disadvantage. The first is that price discrimination is possible for doctors' consultations, with the well-to-do paying more and allowing the poor access to subsidized care. The fact that public employees can practice privately means that medical profession is not dichotomized, and provides an escape from the low public sector salaries. The disadvantage is that this duality does not extend to hospitals (with the exception of relatively few patients), and in consequence, also does not extend to nurses, most of whom are employed in the hospitals or other public health posts. The poor end up subsidizing the rich for nursing and hospital services, and low pay for nurses has more effect on staffing than does relatively low pay for doctors.

3. Personnel

The government has vacancies, for which funds are budgeted, for both MDs and nurses (staff for non-medical posts do not appear to present a problem). Low pay is regarded as the chief difficulty in recruiting and retaining people for both jobs: doctors can make only from about 16,000 to 20,000 dollars per year, and nurses from just over 13,000 (for a nurse practitioner) down to as little as 5,220 for a rural health nurse. Members of both professions readily emigrate, especially to the United States; the nursing school routinely lost, in recent years, most of its graduates this way. The problem is more serious for nurses than for MDs, for three reasons. First, no public training is provided for doctors, whereas nurses are trained at public expense. Second, doctors -- but not nurses -- can increase their incomes by private practice. Third, Belize is able to attract some foreign doctors, but few if any foreign nurses, to work in the country. These are likely to come from either neighboring Latin America or Caribbean countries, or from the Indian subcontinent.*

Recently the government has begun to require nurses trained at public expense to work for the Ministry at least a year or two in return, and this appears to raise their retention; but the cost of their training

*One of the reasons offered for the visit to Belize by the authors of this report, was that the country had the opportunity to employ doctors from Costa Rica who had been let go by that country's health ministry or social security system. It was suggested that PAHO would be asked to provide a supplement to Belizean salaries to attract such people. Aside from the fact that a supplement to foreign doctors' pay might possibly be as well or better spent to attract Belizean doctors into public service or keep them from emigrating, it is curious that this issue was not raised in any discussions with Ministry officials in Belize. Only once was it observed, casually, that the current economic crisis in both Costa Rica and Mexico might make some short-term "bargains" available to Belize.

is still largely wasted if many leave as soon as their indenture is over. Raising nurses' pay seems to be a necessary part of any solution to the sector's staffing problems.

If a rise in nurses' salaries were to lead to demand for higher pay by doctors so as to maintain pay differentials (whether absolute or relative), there would a large deadweight loss involved. There are no estimates of how important such an effect might be, but those officials asked about it generally did not expect that doctors would insist on a parallel increase, so the deadweight loss would be small. Changing the relative pay of doctors and nurses might also be easier for the Ministry to bear if somewhat more responsibility were shifted to nurses in the hospitals, reducing the demands on doctors' time.

4. Administration and management

From an economic viewpoint, there appear to be three significant problems. All three, it should be said, are recognized within the Ministry, and in two cases it is relatively clear what should be done for a solution. The first and probably the simplest problem is one of inventory control, especially for drugs: hospitals and dispensaries carry small stocks; re-order times are too long; and shortages are frequent. (The problem does not seem to affect vaccines, perhaps because demand for them is more predictable or perhaps because the requirements of the cold chain cause more care to be exercised.) Apart from the need to reduce re-stocking time, the chief need is for a one-time effort to build up inventories and, where necessary, to add to and improve storage space⁴, p.46. The cost of this effort would be small compared to

the costs borne by patients who fail to get the drugs or other supplies they need.

The second problem is one of maintenance, especially of vehicles. The Belizean health sector is not short of physical capital, in relation to the country's income level, but it is short of the services of much of the capital because of breakdowns and inadequate maintenance. This is most true of vehicles; a summary⁴, p.43 shows seven vehicles out of 30 out of service at once. The resulting shortages lead to ambulances being used as trucks, which is wasteful as well as dangerous. The exact size and composition of the fleet the Ministry should maintain depends on the use to be made of the district hospitals, and thus on the referral system, which is still under discussion. What is clear, however, is the need for better maintenance of the existing stock; part of the solution, as with drugs and supplies, may be a one-time stocking of spare parts.

The third problem is the most complex; it concerns the balance of use of doctors, nurses and physical plant, and so is involved with staffing and pay questions. District hospitals are underutilized, because of the relative ease of reaching Belize City, the lack of an incentive system to promote their use, and -- sometimes -- the fact that the absence of a single MD practically closes down the hospital. If the district hospitals were more fully used, a new or repaired Belize City hospital might be smaller than the current 174 beds, allowing for some capital saving. To achieve that will require fuller coverage by doctors in the districts, and possibly a fee system which penalizes people for bypassing their local hospital unnecessarily. The other part

of this resource-balance problem is the shortage of nurses, which precludes letting nurses take more responsibilities in the hospitals. Even with some reduction in the physical plant of the health sector, an increase in staff may be necessary.

5. The General Environment

The environmental health conditions in the country are not developed. Although environmental diseases (except malaria) do not abound, they are a permanent threat in all communities, especially where infrastructural works and services are underdeveloped.

(a) Water

The main towns of Belize, Belmopan, and Orange Walk enjoy communal water supply systems (from surface sources) with chlorination facilities that guarantee potability on a relatively constant basis to over 90% of urban dwellers (EH Table 1). But in rural areas only 40% of the people have house connections or easy access to a water supply (usually wells). Others must rely on raw river water, hence the location of many villages, especially in the north-west, on river and other water bodies. As discussed later, water quality control is incomplete.

(b) Liquid wastes

In urban areas only 6% of the people live in houses connected to communal sewage systems. Belmopan is fully served. However, in Belize City a sewer system is still being completed and 132 connections have already been made for treatment by sewage lagoons in the south which outlet to a coastal waterway. A large percentage of all urban dwellers still rely on septic tanks and latrines; and in some cases in Belize City the use of buckets and the dumping of faecal matter into city drains are reported. In rural areas there are few connections to communal sewerage systems and 89% (see EH Table 1) of the people rely on septic tanks or latrines. Failure of coverage (or latrine usage) is related

to the high prevalence of intestinal parasites in children.

c) Solid waste

The dumping of solid wastes along city streets and in public places is common, and is linked to weaknesses in public attitude and the lack of adequate municipal collection vehicles. Additionally, disposal is by open dumping in most communities and the sanitary landfill for the largest urban community (Belize City) is generally without soil cover.

d) Disease vectors

It is not surprising that with such a large area of low swampy land and numerous waterbodies, Belize experiences a high prevalence of mosquitoes. Malaria is on the increase (discussed elsewhere) and *Aedes aegypti* control operations are constantly undertaken. Other important vectors or pests are: rodents, roaches and cockroaches. In 1981 the first human rabies case in a decade occurred in Benque Viejo Town, and dog immunization (or extermination) has been necessary. Twenty cases of human rabies were treated in 1981 and the Veterinary Laboratory confirmed 18 rabid animals in 1980 in dogs, cats and cattle.

e) Food

Although there have been no major food-borne diseases in recent years, food sanitation is deficient. Eating habits are casual; food establishments are under-inspected and un-hygienic; and food handlers are mostly untrained and uncertified. Animal slaughtering is generally carried out in municipal slaughterhouses in district capitals and in the official commercial slaughterhouse in Belize City. Outdated food sanitation legislation is reportedly not supported by

local courts.

f) Environmental pollution

Air pollution is generally not a problem with few exceptions, e.g. the area downwind of the Tower Hill Sugar Factory outside Orange Walk where bagasse particles and soot prevail during factory operations in January to June. In some communities land pollution exists, and water pollution from industrial effluents is growing, as follows:

Haulover Creek (Belize City)	- Metal plant and other industries
New River	- Sugar factory
Stann Creek River	- Citrus fruit processing

Noise pollution is not a community problem.

g) Housing environment

Except for Belmopan which is a new city, many urban houses are old and some are dilapidated and structurally unsound, especially the timber houses. In the low income group in Belize City, overcrowding is frequent and housing conditions unhealthful. In rural areas many houses are thatch-roofed and environmentally sub-standard. The increase in unplanned refugee settlements, by refugees from nearby countries mean a continuing increase in sub-standard homes without such minimum infrastructural facilities as water supply, sewerage, drainage and roads systems.

h) Working environment

A 1980 study of the conditions of work for the estimated workforce of 33,000 (65% in agricultural activities) showed occupational

hygiene and safety problems to be:

- Work injuries in sugar cane and banana cutting, and in sawmills.
- Pesticide poisoning from insecticides (e.g. malathion), herbicides (e.g. 2-4-D and paracquat) and rodenticides.
- Organic dust from handling or wind-blown dry bagasse.
- Heat exposure in farming operations.

i) Other environmental health problems

Other environmental health problems which may arise at major public fairs and entertainment occasions or in recreational areas (e.g. beaches or natural parks), are not considered of such a scale or regularity to merit identification.

6. Specific Activities

A. Health Data

1. General Demographic Characteristics

Belize, with a population of 145,353 in 1980, is the 5th largest country of the 12 Caricom member nations. With a population density of 6 per km² (or 15 per km² of arable land) it is one of the least densely populated countries in the world.

Table 1 presents a summary of basic demographic indicators for the 12 year period 1970-1981. With the exception of infant mortality, the demographic indicators have not altered significantly during this period: the crude birth rate (per 1000 population) has ranged from 37.1 in 1970 to 41.8 in 1977, with a mean of 39.8 (S.D. = 1.39); the fertility rate per 1000 females 15-44 years old has ranged from 191.6 in 1970 to 218.0 in 1980 with a mean of 207.4 (S.D. = 7.94); the crude death rate per 1000 population has ranged from 4.7 in 1981 to 6.8 in 1970 with a mean of 5.9 (S.D. = 0.66). In contrast, the infant mortality has shown a steady decline from a high of 60 per 1000 live births in 1971, to the present low of 27 per 1000 live births in 1981. During the period 1970-1980 the annual rate of growth was 1.9. Life expectancy at birth in 1977 was estimated at 67.7 years. In 1981, 1 out of 29 children born will die before reaching school age.

Within Belize, demographic characteristics vary. Appreciably among the 6 districts (Figure 1, Map of Belize by districts). Table 2 presents an analysis of district demographic estimates for 1980. Cayo District has the lowest birth rate (27.5), infant mortality (27.1) and

crude death rate (3.1) in contrast with Toledo district having the highest birth rate (51.0), infant mortality (58.3) and crude death rate (9.4).

According to the 1980 census, the population of Belize is a relatively young population, with 46.3% of the population less than 15 years of age (Figure 2).

2. Major Health Problems

This section will deal with data available at the national level on major health problems seen in the 7 hospitals of Belize and reviews of death certificates. The hospital data represent collation of information from hospital record diagnoses, analyzed by the Department of Statistics, Ministry of Health, Housing and Cooperatives. Limitations in interpretation of these data must be kept in mind as the diagnostic capabilities outside of the Belize City Hospital are limited with antiquated X-ray facilities available in Belmopan, Stann Creek, Orange Walk and Punta Gorda Hospitals, and basic laboratory services available for hemograms, blood glucose and gram stains at Belmopan, Stann Creek, and Punta Gorda Hospitals.

Mortality data are collected from reviews of death registrations. Of the 691 deaths reported in 1981, 159 (23%) had autopsies performed by the physicians at Belize City, Belmopan and Stann Creek Hospitals. There is presently no trained pathologist in the country. Deaths that occur outside of the hospitals are reported to the municipal council authority in urban areas and to village alcaldes or leaders in rural areas. Their interpretation of mortality data must be limited.

Tables 3, 4 and 5 present the leading diagnoses of hospital admissions in 1980 and 1981. Comparison of Tables 3 and 4 further illustrate problems in interpretation of data available from different documents as the data do not match, though they present the same information.

As can be seen in Tables 3, 4 and 5, intestinal infectious diseases are a leading cause of hospitalization in the country if one excludes direct obstetrical causes. In addition, respiratory conditions are a major cause of hospitalization in Belize City Hospital. The limitations in diagnostic capabilities are further illustrated by the fact that a leading cause of admission to hospitals in the country is "signs, symptoms and ill defined conditions".

Diagnostic data on outpatient visits were only available for the outpatient facilities in Belize City, and are presented in Table 6. Again, intestinal infectious diseases, ill defined conditions and respiratory disease are leading diagnoses, accounting for 41% of the total outpatient visits.

Table 7 presents the 10 leading causes of death for all age groups during 1981. As can be seen, diseases of the circulatory system account for 31.7% of all deaths. Infectious diseases were responsible for 19.2% of reported deaths and thus rank number two in causes of death.

Table 8 presents an analysis of reported causes of death in early childhood further divided into the neonatal period, 1-11 months of age and 1-4 year olds. The leading cause of death in the neonatal

period are conditions arising in the perinatal period, accounting for 70.6% of all deaths. The 2nd leading cause in this age group is pneumonia (8.2%) followed closely by intestinal infectious diseases (7.1%). Infectious diseases account for 16.5% of all deaths in this age group.

In the 1-11 month old age group, the leading cause of death is intestinal infectious diseases (22.8%), followed by bronchitis, emphysema and asthma (16.5%) and conditions arising in the perinatal period (12.7%). Infectious diseases account for 45.6% of all deaths in this age group.

In the 1-4 year old age group, the leading cause of death is pneumonia (20.8%) followed by infectious intestinal diseases (18.6%). Infectious diseases accounted for 51.2% of all deaths in this age group.

A breakdown of etiologies of infectious disease deaths in Belize during the 3 year period 1978-1980 is shown in Table 9. Gastroenteritis and pneumonia accounted for 67.8% of all infectious disease deaths.

3. National Surveillance Capacity and Reported Disease Morbidity

Surveillance of communicable diseases is under the responsibility of one of the two medical officers of health at the national level. The list of reportable diseases concurs with the recommended list by CAREC (Caribbean Epidemiologic Center) in Trinidad and Tobago.

The health care delivery network in Belize presently consists of 29 rural health centers, 7 district hospitals and mobile clinics. The designated chain of reporting of the surveillance system is health centers

report to their respective district hospitals and the district hospitals report to the Department of Statistics based in Belize City Hospital. A "coupon" book of forms to be filled in triplicate is used, with information solicited on name, address, age and diagnosis. All forms must be signed by the District Medical Officer and are required to be submitted to Belize City weekly.

Field visits revealed that reporting was incomplete, as the District Medical Officers were often too busy to fill out individual forms on all cases seen, and many of the health centers were not reporting since the cases had not been confirmed by the district medical officers.

In addition to the coupon books of surveillance forms, there are individual case investigation forms for cases of diphtheria, poliomyelitis, typhoid fever, venereal disease, dengue fever, malaria and gastroenteritis/foodborne illnesses (Appendix 1 pp 1-7).

At present there is no full time epidemiologist to conduct investigations but there is a Belizian studying for an MPH at Tulane University who is due back in September to take over the responsibility of country epidemiologist. There is also a medical officer in Costa Rica on a 6-month fellowship studying tuberculosis who is due to return in November, 1982.

Thus, the individual case investigations are the responsibility of the part-time MOH; typhoid fever, gastroenteritis/foodborne and venereal diseases are investigated with the help of the public health inspectors; and dengue fever and malaria cases are investigated by the vector control staff.

Table 10 shows the annual incidences of the 5 leading communicable diseases in Belize in 1980 and 1981 as contained in the annual statistical report. Malaria is the leading cause of morbidity, followed by gastroenteritis. Table 11 shows the annual report of diseases to CAREC for 1980, 1981 and 1982 (thru the week ending 31 August 1982). Again, problems in data collection are reflected by comparing reports of gastroenteritis, gonococcal infections and influenza in Tables 10 and 11.

Morbidity Trends

a Malaria

Table 12 shows the number of reported cases of malaria during the period 1970-1981. During the years 1970 and 1971 malaria was the sixth leading reportable disease; this increased to fourth during the years 1972-1975; and since 1977 it has been the leading reportable disease with an incidence of 141 cases per 10,000 population reported in 1981. As of 31 August 1982 there have been more cases reported for 1982 than for all of 1980. Only the Cays and Belize City proper are considered to be malaria free, with cases reported in all 6 health districts. Of note, all reported cases are based on positive thick blood film (TBF) slides from suspect fever cases, thus clinically comparable cases that do not have positive TBF's either due to poor quality of the slides or improper timing of slide preparation, are not reported, thus resulting in a probable under reporting of cases. Of interest is that there have been no deaths reported due to malaria since 1976 in spite of the increased incidence.

Of additional concern is the corresponding increase in

falciparum infections. Prior to 1978, only vivax infections were reported. In 1978 there were 2 falciparum; in 1979 - 13 falciparum; 1980 - 34 falciparum; 1981 - 41 falciparum; and, as of July 1982 - 48 falciparum.

b. Gastroenteritis

Annual data for gastroenteritis were only available for 1980-1982 (Tables 10 and 11) with rates of 61 and 60 per 10,000 population respectively. The rate of gastroenteritis for children less than 5-years old in 1981 was 201 cases per 10,000 children less than 5; and as of August 1982, 208 cases per 10,000 children less than 5.

c. Vaccine Preventable Diseases

Table 12 shows the number of reported cases of the 6 vaccine preventable diseases during the 1970-1981 interval.

1) Measles

During the period 1970-1981 measles was endemic with rates ranging from a low of 0.63 per 10,000 population in 1974 to a high of 102.4 per 10,000 population in 1976. There were epidemic increases at 4 year intervals, the most recent being 1980. Age specific data were not available, but in 1981 there were 2 measles deaths reported - both were in 1-year olds, suggesting that measles is still a disease of early childhood.

2) Pertussis

During the period 1970-1981 pertussis was endemic with rates per 10,000 population ranging from a low of 0.14 in 1979 to a high of 17.24 in 1971. Intervals between peak incidences ranged from 2-4 years. There were no reported deaths due to pertussis in 1981.

3) Tetanus

Tetanus cases were reported to occur every year except 1976 and

1977 for which there is no information available (Table 12).

In 1981 there were 2 cases of neonatal tetanus reported. It is felt that neonatal tetanus is greatly underreported especially from remote rural areas where there is an underreporting of births and early deaths, and the majority of deliveries are attended by untrained family members, often the husbands, in the Mayan villages.

4) Tuberculosis

Tuberculosis is not felt to be a major health problem with rates per 10,000 population ranging between 1.18 in 1978 to 3.59 in 1970 (Table 12).

5) Polio

During the 12 year period 1970-1981, poliomyelitis has appeared as a sporadic problem with cases reported only in 1972-1974, and 1978-1979. There were no cases reported in 7 of the 12 years (Table 12).

6) Diphtheria

During the 12 year period only 3 cases of diphtheria were reported, one case a year in 1972, 1975 and 1990 (Table 12).

In addition, there has been 4 cases reported in 1982.

d. Typhoid Fever

The reported incidence per 10,000 population of typhoid fever during the period 1970-1981 has been fairly steady ranging from a low of .07 in 1981 to a high of 0.72 in 1979 (Table 12). As of 31 August 1982, there have been no cases reported. Of note, criteria for case reporting requires laboratory confirmation.

e. Sexually Transmitted Diseases

During the period 1970-1980, after an initial increase in

incidence of gonorrhoea in 1971, there has been a steady decrease from the high of 31.25 per 10,000 population (1971) to a low of 8.32 per 10,000 population in 1980. A similar but more dramatic pattern is seen for syphilis during this period (Table 12). In 1982 as of 31 August, both diseases are showing increases (Table 11) with a 2.5-fold increase in gonorrhoea and a 3-fold increase in syphilis. As with typhoid fever, both gonorrhoea and syphilis require laboratory confirmation.

f. Hepatitis

During the period 1970-1981 hepatitis has been endemic with reported incidences ranging between a high of 6.70 per 10,000 population in 1973 to a low of 1.22 per 10,000 population in 1980 (Table 12). As of 31 August 1982, there have been 36 cases reported, representing an increase from the reported cases during the entire year 1981.

g. Dengue Fever

In 1978, Belize experienced its first outbreak of dengue fever in over 21 years. The exact number of cases reported was not available. Cases continued to be reported in 1980 (4) and 1981 (9) and, in 1982, second major epidemic occurred with 447 cases reported as of the 31 August.

h. Other Communicable Diseases

Morbidity data are not available, but it is the feeling on the part of the health authorities that additional diseases of concern in Belize are: leptospirosis, Chagas, and schistosomiasis. Of anecdotal importance is that during field visits, the team encountered a 2-year old child in the Carozal District Hospital with a classic Romanis sign

of acute Chagas' disease.

At present, leprosy has not been reported as a health problem in Belize, but with the recent influx of refugees from Guatemala, Honduras, and El Salvador where leprosy has been reported, there is concern on the part of the health authorities that leprosy may appear.

4. Nutritional Status

An assessment of the nutritional status in Belize was begun in 1977 with the assistance of the Caribbean Food and Nutrition Institute (CFNI). Data available for a sampling of 24% of the population less than 3 years of age between 1975 and 1978 showed 30% of this population to be in the Gomez I-III categories.

A review of clinic records of children less than 3 years of age seen in the Toledo District in 1976 revealed that 46% of these children were in Gomez I-III categories (Table 13).

Follow up assessment of the nutritional status of the less than 3 year old population through a review of clinic records from 8 clinics in 1981 revealed 22% to be in the Gomez I-III categories (Table 14 and Table 15). This review represented information on 30% of this age group.

Caution should be taken in interpretation of these results as they pertain to the population of children 0-3 years of age who came to the attention of the health services.

A nutritional survey was conducted in 1978 with the assistance

approximately
of the CFNI which revealed: / 33% of children < 3 years old in the
Gomez I-III categories, a prevalence of 40% anemia in the < 5 year
old population and 50% parasitic infestation in children < 5 years old.

5. Dental Health

Surveys of the dental health picture in Belize have revealed that
among school children, the proportion having dental caries in permanent
teeth ranged from 22% in 6-year olds to 91% in 15-year olds. It is
estimated that 90% of the adult population have periodontal disease.

B. *Existing Government Health Programs*

1. Maternal and Child Health (MCH)

Maternal and child health care program activities were begun in
Belize in 1974. In 1976, The Tripartite Plan of Operations for Maternal
and Child Health Services in Belize, was signed. This plan is a formal
agreement between the Government of Belize, the United Nations Children's
Fund (UNICEF) and the Pan American Health Organization/World Health
Organization (PAHO/WHO). The plan was aimed at improving MCH services in
the country setting specific targets for December 1977. (See inclosed
Document - Report on Evaluation of MCH Project - Tripartite Plan of
operations for MCH services in Belize, 1974-1977 - January 1979).

The objectives of the MCH program, as stated in the 1982 Belize
Health Profile document are:

1. To reduce maternal and child mortality and morbidity.
2. To improve the coverage and efficiency of the MCH services.
3. To provide regular comprehensive care for children under

5 years of age, with the emphasis on supervision of their physical, mental and nutritional development.

4. Promote family life education for the adolescent and adult population.

The stated strategies and criteria for achieving the objectives are:

1. The extension of prenatal care and the registration and attendance of all expectant mothers throughout the country.

2. To increase hospital deliveries to 60% of all pregnant mothers and home assistance by trained personnel to 70% of the remainder.

3. To increase the level of immunization of pregnant women against tetanus.

4. To provide health education with special emphasis on family life education to women and men of childbearing age.

5. To conduct a program of immunization of preschool children aiming at a target of 100%.

Responsibility for the stated activities related to the MCH program is within the scope of work of the public and rural health nurses based in the district hospitals, health clinics and operating the mobile clinics. Prenatal clinics are scheduled once a week in all health centers; child health clinics are scheduled once a week in all clinics; there are breast feeding clinics, and post-natal clinics, the latter aimed at the high risk infant population; in addition there are follow up clinics, home visits and school visits.

Table 16 presents an analysis of the prenatal clinic attendance

by gestational date of visit and district in Belize 1981. Using the reported number of live births in 1981 (6030) and the reported number of stillbirths in hospital in 1981 (107) and comparing the number of women seen for first visits in prenatal clinics in 1981, the estimated coverage of pregnant women with at least one visit during the first 5 months of pregnancy during 1981 was 30.6%; the estimated coverage of pregnant women with at least one visit during pregnancy was 89.1%. Caution must be taken in interpretation of these figures as the actual number of pregnancies is unknown, especially those resulting in late spontaneous abortions and stillbirths not attended in the hospitals.

Table 16 also shows the number of pregnant females receiving the complete recommended schedule of tetanus toxoid thru prenatal clinics both primary series and recommended boosters; using the same estimated target population, during 1981, 34.3% of the target population was adequately covered by tetanus toxoid.

In 1981, 3382 of the 6137 reported births, or 56.9% were attended in hospital. Data were not available on the proportion of total births attended by trained personnel vs. untrained personnel. To achieve the goal of attendance of 60% of all non-hospital deliveries by trained personnel, a traditional birth attendant (TBA) training program was instituted in 1974. By 1978, 55 of 92 known TBA's (60%) had been trained thru this program. This program has the stated target to train 8 TBA's annually - thus if 10 % of this goal was achieved during the years 1979-1981, an additional 24 TBA's would have been trained resulting in 86% of known TBA's trained. Caution must be exercised in interpretation

of these figures as the true number of TBA's in the country is not known. Of importance is the knowledge that among the Mayan population, TBA's are not used regularly, but rather family members often the husband or his brother attend to deliveries, suggesting cultural obstacles to achievements of the stated goal.

As stated earlier, post natal and early childhood health care are delivered through several clinics run by the health services. The aim is to register all children before 6 weeks of age, with appointments arranged at discharge time from hospital.

Table 17 presents the attendance of child health clinics in 1981. If one takes the target population to be all children less than 5 years of age, then in 1981, each child had an average of 2.1 visits to the child health clinics. Again, caution should be exerted in interpretation of these data when one keeps in mind actual access to services: In 1980, of the 69,817 rural inhabitants, 6,181 (8.9%) had direct access to a health center; 23,277 (33.3%) had access to health services through consistent mobile visits (1 x /month); 23,781 (34.1%) had access to health services to sporadic mobile clinics; and 16,758 (23.7%) had no direct access to health services.

2. Food and Nutrition Program

The government has identified through a Food and Nutrition Policy, objectives for a food and nutrition program, which is still in the early stages of implementation. The four objectives of the program are based on the findings of the nutritional survey conducted in the Toledo District

and are:

1. The reduction of severe and moderate energy-protein malnutrition in children less than 3 years of age.
2. The reduction of anemia in pregnant and lactating women.
3. The elimination of vitamin A deficiency.
4. The increase in food size sufficiency.

The current program activities are coordinated by the intersectorial Food and Nutrition Council with representation from the Ministries of Health, Agriculture Education and Social Development. These activities include: nutritional education programs conducted through the Rural Education Agricultural Program (REAP), home economics studies in the schools, and MCH educational programs through the MOH. There is an established National Food and Nutrition Week during which time there is an emphasis on education and sensitization of the public to various areas of health and nutrition.

Through the MCH program of the MOH, emphasis is placed on monitoring the growth and development of children seen in the child health centers. There are breast feeding clinics and local Breast is Best (BIB) groups to encourage breast feeding, and education of mothers to encourage proper weaning practices. In addition, education on child spacing has been included.

A survey of mothers attending child health clinics in July and August 1980 revealed that in 33% of their infants were exclusively breast fed during the first four months of age; when evaluated rural vs. urban, 55% of rural infants and 16-17% of urban infants were exclusively

breast fed during the first four months of age.

3. Immunization Program

Immunization activities are conducted through the MCH fixed and mobile clinics. Prior to 1981, the target population included was children less than 5 years of age. In 1981, the strategy was changed to emphasize coverage of the less than 1-year old population with the WHO-recommended vaccines. The stated objectives for 1982 is to achieve 75% coverage of the less than 1-year old population against the 6 EPI target diseases.

Table 18 presents the national coverages with the EPI vaccines for 1980/1981 - for the <1 year old population. With the exception of BCG, coverages with all vaccines has increased in both rural and urban areas. An explanation for the decrease in coverage with BCG is that prior to 1981, the public health nurses in Belize City were assigned to the Belize City Hospital and were therefore vaccinating all newborns prior to discharge in 1981, these nurses were assigned to the OPD's and therefore BCG immunizations were delayed until the 1st prenatal visit as the maternity ward nurses were unable to immunize the infants prior to discharge.

Coverage of the less than 5-year old population is estimated to be close to 100%. A high level of coverage of the childhood population with DPT and polio vaccines is further supported by the low incidences of diphtheria, pertussis, tetanus and polio. The lower coverages with measles vaccine are supported by the continued presence of measles

epidemics in 3-4 year cycles.

The recommended vaccine schedule calls for 3 doses of DPT and polio vaccines beginning at 2 months of age, with intervals of 1-2 months between doses, and measles vaccination to begin at 9 months of age, thus requiring four contacts with the health service to complete the immunization schedule. As there was no national shortage of any of the vaccines in 1980 nor 1981, the lower coverages seen with measles vaccine may be explained by a natural attrition that occurs with each further contact necessary to achieve a target.

Vaccines are purchased through the PAHO revolving fund.

Outreach to capture "delinquent" children is limited due to limited resources available.

4. Control of Diarrheal Diseases Program

Diarrheal diseases are a major cause of morbidity and mortality in the less than 5-year old population. In 1980, a national program to reduce the impact due to diarrheal diseases was instituted. This program at present places an emphasis on the reduction of mortality through the usage of oral rehydration salts (ORS) in the management of acute diarrhea and an educational component to prevent future episodes of diarrhea and maintain nutritional status of children through proper feeding practices during acute diarrheal episodes.

In 1981, a program director attended a PAHO sponsored national program manager's training course in Georgetown, Guyana. The designated

program director is a nursing matron in charge of in service training programs. As of August 1982, an ORS unit has been established at Belize City Hospital and 6 of the 7 district hospital nursing staffs have attended training seminars.

Early successes of this program were apparent during field visits at which time all staff interviewed mentioned that pediatric ward occupancies have decreased markedly since the introduction of the ORS for treatment.

Table 19 shows the number of children with diarrheal disease episodes treated monthly by the oral rehydration unit. Belize City Hospital as compared with the number of children admitted for diarrheal episodes and the number of deaths due to diarrhea (N.B. children admitted and deaths include children not treated by the ORS unit) comparing the periods January - July in both years shows a significant decrease in the number of deaths ($\chi^2 = 5.3499$, $P = .02$). Using the 1981 statistics for proportion of deaths, by July of 1982, 5 deaths were expected while none occurred. Country-wide, the number of deaths from diarrheal diseases in the less than 1-year old age group has decreased from 45 in 1979, to 28 in 1980 (the first year of implementation of ORS), to 24 in 1981 (1982 mortality figures were not available).

While program performance data on number of children treated with ORS were not available, reviews of clinic records in all health centers visited revealed that ORS was used in treating all cases of gastroenteritis seen during the months of July and August.

5. Family Planning

At the present point in time there is no family planning program in Belize. The only family planning activities at present involves educational programs on child spacing as part of the nutrition program.

Of anecdotal interest, the Belize Primary Health Care Program Proposal was under consideration for funding by the UNFPA, but funding was denied when the family planning component was dropped by the government.

6. Dental Health Program

At the present point in time the only preventive dental health activities include educational programs aimed at improving personal dental hygiene. There is no fluoridation of water supplies in the country. The only dental services regularly available in the government dental clinics are extractions. In 1981, over 7,000 extractions were performed in the Belize City Hospital Dental Clinics, with estimates country wide running above 14,000.

Table 1 Demographic characteristics, Belize, 1970-1981

Year	Population	Births/1000 population Natality	Births/1000 population 15-44 yrs Fertility	Rate/1000 population Mortality	Rate/1000 live births		Rate of natural increase per 1000 population
					Infant Mortality Total	Neonatal	
1970	119,934	37.1	191.6	6.8	N/A	N/A	30.3
1971	123,536	40.9	211.3	6.2	60	31	34.7
1972	127,137	38.6	199.3	6.5	N/A	N/A	32.1
1973	128,298	39.1	201.4	6.1	N/A	N/A	33.0
1974	126,712	39.3	202.6	5.3	N/A	N/A	34.0
1975	128,739	40.4	209.3	5.6	50	10	34.8
1976	130,928	41.6	215.7	6.2	45.9	N/A	35.4
1977	133,285	41.8	215.6	6.3	N/A	N/A	35.5
1978	135,684	39.7	204.0	6.4	34	12.5	33.3
1979	138,000	40.0	206.3	4.9	30	9.7	35.1
1980	145,353	38.6	218.0	5.6	38	9.8	33.0
1981	147,000	41.0	213.6	4.7	27	13.6	36.3

Source - collation of data from:

1. Health profile of Belize 1982
2. Report primary health care workshop, 11-15 May 1981
3. Belize 1980 census
4. Consultant report - malaria - 21 July - 18 August 1980

Table 2 Demographic characteristics, by district, Belize, 1980

District	Population	No. of births	Birth rate per 1000 population	No. infant deaths	Infant mortality per 1000 LB's	Total deaths	Death rate per 1000 population	Deaths in population >50 yrs	Proportion of deaths in >50
Cordzal	22,902	798	34.8	34	42.6	93	4.1	33	35.5%
Orange Walk	22,870	927	40.5	34	36.7	77	3.4	20	26.0%
Belize	50,801	2112	41.6	71	33.6	398	7.8	237	59.5%
Cayo	22,837	627	27.5	17	27.1	71	3.1	30	42.3%
Stann Creek	14,181	539	38.0	23	42.7	70	4.9	30	42.9%
Toledo	11,762	600	51.0	35	58.3	111	9.4	21	18.9%
Total	145,353	5603	38.5	214	38.2	820	5.6	371	45.2%

Source: Health profile of Belize, 1982 - Ministry of Health, Housing and Cooperatives

Table 3 Ten leading causes of hospitalization, Belize City Hospital, (excluding normal deliveries), 1980-1981

<i>Cause</i>	<i>1981</i>			<i>1980</i>		
	<i>Rank</i>	<i>No.</i>	<i>%</i>	<i>Rank</i>	<i>No.</i>	<i>%</i>
Direct obstetric care	1	574	20.6	2	520	14.3
Other' diseases of the respiratory system	2	308	11.1	6	388	10.6
Diseases of the female genital organs	3	287	10.3	10	214	3.4
Abortion	4	282	10.1	7	309	8.5
Diseases of other parts of the digestive system	5	280	10.1	4	459	12.6
Intestinal infectious diseases	6	276	9.9	1	563	15.4
Signs, symptoms and ill-defined conditions	7	255	9.2	5	419	11.5
Fractures	8	233	8.4	8	266	7.3
Disorders of eye and adnea	9	152	5.5	9	126	3.5
Diseases of the urinary system	10	133	4.8	3	473	13.0
TOTAL		2780	100.0		3647	100.1

Source: Belize Department of Medical Statistics, Statistical report for the year 1981, Ministry of Health, Housing and Cooperatives.

*Table 4 Leading diagnoses among hospital discharges,
Belize City Hospital, 1980*

<i>Diagnosis</i>	<i>% of Total*</i>
1. Normal delivery	23
2. Direct obstetrical causes	11
3. Intestinal infectious diseases	8
4. Trauma	7
5. Respiratory tract diseases	6
6. Urinary tract disease	6
7. Digestive tract disease	6
8. Ill defined conditions	6
9. Hypertensive disease	2
10. Skin disease	2
11. Diseases of blood	2
12. Eye disease	2
13. Diseases of female genitalia	2
14. Endocrine, metabolic, immunity	1
15. Adverse drug effect	1
16. Other causes	15

*N = 7393

Source: Health profile Belize, 1982, Ministry of Health,
Housing and Cooperatives

Table 5 *Leading causes of hospital admissions by hospital/district, Belize, 1981 (excluding direct obstetrical causes)*

<i>Hospital</i>	<i>Cause</i>	<i>No. of Admissions</i>	<i>% of total Admissions</i>
<u>Belmopan</u> N* = 1462	1. Malaria	95	6.5
	2. Intestinal infectious diseases	65	4.4
	3. Signs, symptoms and ill defined conditions	56	3.8
<u>Corozal</u> N = 1184	1. Ill defined conditions	58	4.9
	2. Gastroenteritis	36	3.0
	3. Other injuries, early complication of trauma	36	3.0
<u>Stann Creek</u> N = 1872	1. Intestinal infectious diseases	111	5.9
	2. Signs, symptoms and ill defined conditions	108	5.8
	3. Other diseases of the respiratory system	63	3.4
<u>Orange Walk</u> N = 2052	1. Signs, symptoms and ill defined conditions	86	4.2
	2. Intestinal infectious diseases	56	2.7
	3. Diseases of other parts of the digestive system	21	1.0
<u>Toledo</u> <u>Punta Gorda</u> N = 1085	1. Congestive heart failure	N/A	
	2. Intestinal infectious diseases	N/A	
	3. Other diseases of the respiratory tract	N/A	
<u>Cayo - San Ignacio</u> N = 1244	1. Signs, symptoms and ill defined conditions	247	19.9
	2. Intestinal infectious diseases	59	4.7
	3. Mental disorder	18	1.4

N = total admissions

Source: Belize Department of Medical Statistics, Statistical report for the year 1981, Ministry of Health, Housing and Cooperatives

*Table 6 Leading causes of outpatient visits,
Belize City outpatient clinics, 1980*

<i>Cause of Visit</i>	<i>% of Total Visits*</i>
1. Respiratory disease	26
2. Trauma	12
3. Ill defined conditions	8
4. Intestinal infectious diseases	7
5. Other infectious diseases	7
6. Skin disease	6
7. Musculoskeletal disease	4
8. Digestive system disease	3
9. Hypertensive disease	3
10. Urinary tract disease	3
11. Mental disorders	3
12. Ear disease	2
13. Other causes	13

*N = 57,786

Source: Health profile Belize, 1982, Ministry of
Health, Housing and Cooperatives

*Table 7 Ten leading causes of death, all ages,
Belize, 1981*

<i>Rank</i>	<i>Cause of Death</i>	<i>No. of Deaths</i>	<i>% of Total Deaths*</i>	<i>Rate/10,000 Population</i>
1	Diseases of the circulatory system	219	31.7	14.9
2.	Certain conditions originating in the perinatal period	70	10.1	4.8
3.	Pneumonia and influenza	64	9.3	4.4
4.	Malignant neoplasms	55	8.0	3.7
5.	Intestinal infectious diseases	41	5.9	2.8
6.	Bronchitis, emphysema, asthma	35	5.1	2.4
7.	Septicemia	28	4.1	1.9
8.	Accidents and trauma	24	3.5	1.6
9.	Diabetes mellitis	19	2.7	1.3
10.	Chronic liver disease and cirrhosis	13	1.9	0.9

*Total deaths = 691

Source: Health profile, Belize, 1982, Ministry of Health
Housing and Cooperatives

Table 8 Reported causes of early childhood mortality
by age groups, Belize, 1981

Reported Cause of Death	Age Group					
	0-28 days		1-11 months		1-4 years	
	No.	%	No.	%	No.	%
1. Signs, symptoms & ill defined conditions	1	1.2	5	6.3	4	9.3
2. Accidents (including burns & intracranial injuries)	0	0	0	0	4	9.3
3. Bronchitis, emphysema, asthma	4	4.7	13	16.5	4	9.3
4. Ulcers - duodenal & gastric	0	0	1	1.3	1	2.3
5. Congenital anomalies	2	2.4	5	6.3	3	7.0
6. Conditions arising in the perinatal period	60	70.6	10	12.7	0	0
7. Ischemic heart disease	2	2.4	0	0	0	0
8. Deficiencies in pulmonary circulation & other heart disorders	1	1.2	2	2.5	0	0
9. Cerebrovascular accidents	0	0	0	0	0	0
10. Meningitis	0	0	0	0	1	2.3
11. Acute myocardial infarction	1	1.2	0	0	0	0
12. Pneumonia	7	8.2	9	11.4	9	20.9
13. Influenza	0	0	3	3.8	0	0
14. Diabetes Mellitus	0	0	4	5.1	0	0
15. Anemia	0	0	3	3.8	0	0
16. Diseases of the central nervous system	0	0	0	0	1	2.3
17. Intestinal infectious diseases	6	7.1	18	22.8	8	18.6
18. Septicemia	1	1.2	6	7.6	4	9.3
19. Measles	0	0	0	0	2	4.7
Sub-total infectious diseases	14	16.5	36	45.6	22	51.2
TOTAL	85	100.2	79	100.1	43	100

Source: Belize Department of Medical Statistics, Statistical Report for the year 1981, Ministry of Health, Housing and Cooperatives

*Table 9 Infectious disease deaths, by cause
Belize, 1978-1980*

<i>Rank</i>	<i>Cause</i>	<i>No. of Deaths</i>	<i>% of ID Deaths</i>
1	Enteritis & diarrhea	179	34.2
2	Pneumonia	176	33.6
3	Other infectious causes	97	18.5
4	Tuberculosis	26	5.0
5	Influenza	21	4.0
6	Measles	17	3.3
7	Tetanus	5	1.0
8	Pertussis	1	0.2
9	Meningococcal	1	0.2

Source: Health profile Belize, Ministry of
Health, Housing and Cooperatives

Table 10 Reported cases of the 5 leading communicable diseases, 1980-81

<i>Disease</i>	<i>1980*</i>		<i>1981**</i>	
	<i>No.</i>	<i>Rate/10,000</i>	<i>No.</i>	<i>Rate/10,000</i>
Malaria	1608	110.63	2072	140.95
Gastro	888	61.09	878	59.73
Measles	609	41.76	186	12.65
Gonococcal	161	11.08	145	9.86
Influenza	3	0.21	117	7.96

* 1980 population 145,353

**1981 population 147,000

Source: Belize Department of Medical Statistics,
Statistical report for th year 1981

*Table 11 Annual incidence of diseases reported to CAREC
from Belize, 1980, 1981, thru week ending 31 Aug 1982*

<i>Disease</i>	1982	1981	1980
	<i>No. Cases</i>	<i>No. Cases</i>	<i>No. Cases</i>
Malnutrition	3	9	—
Amebiasis	16	—	1
Malaria	1651	2072	1608
Influenza	36	21	
Resp	—	—	20
TB (all forms)	36	33	21
Diphtheria	4	—	—
Pertussis	—	58	11
Tetanus (non NNT)	3	3	1
Poliomyelitis	0	—	3
Measles	4	186	607
Tetanus neonatorum	—	2	—
Typhoid fever	—	1	2
Dengue	447	9	4
Foodborne illness	1	—	—
Gastro (<5 y)	521	493	—
Rubella	6	6	—
Viral hepatitis	70	36	26
Syphillis	63	—	—
Gonococcal inf's	333	—	—
Ciguatera poisoning	2	.1	—
Meningitis	—	3	—
Bacillary	—	3	3
Unspecified dysentery	35	73	
Gastro	142	165	—
Mumps	25	19	22
Chicken pox	34	41	56
Pneumonia	3	7	6

Source: Weekly reports to CAREC from the
Department of Statistics, Ministry
of Health, Housing and Cooperatives

Table 12 Number of reported cases of communicable diseases,
Belize, 1970-1981 by disease and year

Disease	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Malaria	33	33	80	99	96	90	204	876	1,200	1,430	1,608	2,072
Pertussis	46	213	23	12	131	128	18	52	8	2	11	55
Measles	361	48	501	166	8	429	1,341	19	230	240	541	156
Tetanus	1	6	3	4	2	2	N/A	N/A	5	4	1	3
Polio	0	0	2	1	3	0	0	0	1	3	0	0
Diphtheria	0	0	1	0	0	1	0	0	0	0	1	0
Typhoid	2	5	3	5	4	7	5	4	2	10	2	1
Tuberculosis	43	29	27	25	41	29	N/A	31	16	33	21	33
Hepatitis	19	34	50	85	60	47	16	35	37	37	25	36
Gonorrhoea	241	386	349	359	249	273	N/A	177	101	140	121	145
Syphilis	42	82	331	287	165	191	N/A	138	28	47	15	29
Population at risk	119,934	123,536	127,137	128,298	126,712	128,739	130,928	133,285	135,684	138,000	145,353	147,000

Source: Health profile Belize, 1982, Ministry of Health, Housing and Cooperatives

*Table 13 Prevalence of malnutrition among Toledo children,
0-36 months of age, seen by government MCH services, 1976*

<i>Location</i>	<i>No. Children 0-36 mos.</i>	<i>Nutritional Status (%)</i>			
		<i>Normal</i>	<i>Gomez I</i>	<i>Gomez II</i>	<i>Gomez III</i>
Punta Gorda	171	63	30	5	2
Big Falls	54	37	46	13	4
Silver Creek	18	28	44	28	-
Rice Station	30	43	33	20	3
Fairview	32	53	31	16	-
Dump	10	100	-	-	-
Laguna	44	50	30	18	2
TOTAL	359	54	33	11	2

Source: Analyses from clinic records of weights at Punta Gorda Hospital for 1976 as contained in: Consultation report, primary health care services, Belize profile and analysis

*Table 14 Nutritional status assessment of 0-3 year olds
in selected clinics, Belize, 1981*

<i>Age Group</i>	<i>No. of Children</i>	<i>% of Total</i>	<i>% Obese</i>	<i>% Normal</i>	<i>% Gomez I, II, III</i>
0-11 mos	3594	82	14	71	15
1-3 years	765	18	4	41	55
0-3 years	4359	100	12	66	22

*Table 15 Nutritional status of 1-3 year olds
in selected clinics, by area, 1981*

<i>Clinic</i>	<i>No. Children</i>	<i>% Gomez I,II,III</i>	<i>% Obese</i>
Corozal Town	63	65 (41)	3
Orange Walk Town	115	59 (68)	1
Maskal, Belize	44	45 (20)	0
San Ignacio, Cayo	58	50 (29)	3
Benque Viejo, Cayo	51	25 (13)	0
Dangriga, Stann Creek	25	68 (17)	0
San Pedro Colombia, Toledo	96	70 (67)	3
Punta Gorda, Toledo	106	71 (75)	1
TOTAL	558 (73%)	59% (330)	

Source: Report on the consultanship to the Ministry of Health, Housing and Cooperatives of Belize in the evaluation of the Belize food and nutrition policy, 23 March - 22 April 1982

Table 16 Prenatal clinic attendance, by gestational date of visit and district, and tetanus immunization administration, Belize, 1981

District	< 5 mos. First Visit	< 5 mos. Later Visit	> 5 mos. First Visit	> 5 mos. Later Visit	Total Prenatal Visits	Tetanus Toxoid	
						Complete Dosage	Booster
Belize	475	194	891	5,710	7,270	389	71
Corozal	300	120	566	2,452	3,418	299	33
Orange Walk	264	100	884	3,302	4,550	247	158
Cayo	435	277	574	3,102	4,388	210	71
Stann Creek	181	136	357	1,611	2,285	220	106
Toledo	221	186	318	1,581	2,306	197	106
TOTALS	1,876	1,013	3,590	17,738	24,217	1,562	545

Source: Health profile Belize, 1982

Table 17 Child health clinics, Belize, 1981

District	Target Population	Fixed Clinics		Mobile Clinics			
		Attendance	No. clinics Held	Attendance	No. Areas Covered	No. Areas Scheduled	% Visits Held
Belize	8,580	14,032	227	2,788	30	269	39.0
Corozal	3,868	2,223	93	2,057	20	220	31.4
Orange Walk	3,863	3,808	174	3,387	24	276	47.5
Cayo	3,857	4,904	139	3,327	35	385	36.9
Stann Creek	2,395	3,477	173	3,638	21	231	90.9
Toledo	1,987	3,922	205	4,938	34	374	54.5
TOTAL	24,550	32,366	1,011	20,135	164	1,955	49.1

Source: Health profile Belize, 1981

*Table 18 Immunization coverage of EPI target population
by place of immunization (urban vs. rural)
Belize, 1980-1981*

<i>Vaccine</i>	<i>1980</i>			<i>1981</i>		
	<i>Total</i>	<i>Urban</i>	<i>Rural</i>	<i>Total</i>	<i>Urban</i>	<i>Rural</i>
DPT	44.7	56.3	32.2	50.4	66.0	33.7
Polio	41.4	54.7	27.1	50.6	66.7	33.3
Measles	20.0	21.6	18.3	36.9	47.3	25.8
BCG	66.5	90.3	40.9	65.9	83.7	46.8

Children < one year of age in 1980 = 5100; in 1981 = 5301

Source: Belize health profile 1982 and the
1981 EPI program report

Table 19 Number of children with diarrheal disease episodes treated by the oral rehydration unit Belize City Hospital 1981-July 1982, and the number of diarrheal disease admissions and deaths

Month	1981			1982		
	No. Treated	No. Admitted	No. Deaths	No. Treated	No. Admitted	No. Deaths
Jan	65	7	0	47	5	0
Feb	90	5	0	34	0	0
Mar	107	5	0	37	0	0
April	85	12	0	41	0	0
May	89	3	1	53	4	0
June	73	2	4	61	1	0
July	55	2	2	143	3	0
Aug	27	2	0			
Sept	33	1	1			
Oct	29	2	2			
Nov	40	0	0			
Dec	54	0	0			
TOTAL	747	41	10	416	13	

Source: National CDD program director report

Case No. _____

CARIBBEAN EPIDEMIOLOGICAL CENTRE (CARDEC)

POLYOMYELITIS INVESTIGATION

Name _____ Age _____ Sex _____ Occupation _____

Home Address _____ * Travel to other districts within last 30 days Yes No

School/Work Address _____

ILLNESS

DATE

Onset _____

Hospitalised _____

Reported _____

Physician: _____

Address: _____

Phone: _____

Hospital: _____

Immunization by OPV (Sabin) Inactivated Vaccine (Salk)

DOSE	Date of Vaccination
1	_____
2	_____
3	_____
4	_____

If oral vaccination within 30 days prior to onset:

Mfr. _____ Lot No. _____

Household or close contact with oral vaccine within previous 60 days

Yes

No

CLINICAL HISTORY

PRELIMINARY DIAGNOSIS

Non-paralytic polio

Paralytic Polio

Type of Paralysis Bulbar
 Spinal
 Bulbo-Spinal

* LABORATORY TESTS

FINAL DIAGNOSIS

SPECIMENS TESTED	DATE OBTAINED	LAB NO.	RESULT
LOCAL LAB			

Name of Investigator: _____

Date: _____

REFERRED TO
CARDEC

* Use back of form for additional notes

77

CARIBBEAN EPIDEMIOLOGY CENTRE (CAREC)
TYPHOID FEVER INVESTIGATION

NAME: _____ AGE: _____ SEX: _____ OCCUPATION: _____

HOME ADDRESS: _____

WHERE EMPLOYED: _____

<u>ILLNESS</u>	<u>DATE</u>	
Date of Onset		Physician : _____ Address: _____ _____ _____ Phone : _____
Stayed Home		
Began Treatment		
Hospitalised		
Reported		

T/TAB Vaccination (Date): _____

<u>DIAGNOSIS</u>	<u>RESULTS AND DATES</u>
Suspect	
Confirmed	Culture Blood _____ Stool _____ Urine _____ Widal _____

DURING FOUR WEEKS PRIOR TO ONSET OF ILLNESS

Water Source/s

Swimming _____

Milk/ Ice Cream Source/s

Food - Meals/ Snacks consumed (Other than at residence)

Sewage Disposal:

Additional Informations /Action taken:

INVESTIGATION OF V.D. CLINIC

A.

Name: Height:.....
 Age:..... Sex: Body Build:
 Address: Hair - colour
 Locality: Type:.....
 District: Ethnic Group:.....
 Occupation: Significant marks:.....
 Founded:

Procedure to follow - dates

Disease of the case: Smears:
 V.D.R.L.
 Date of on set: Treatment:
 Investigator:

B.

INVESTIGATION OF V.D. CONTACT

Name: Height:
 Age: Sex: Body Build:
 Address: Hair - Colour
 Locality: Type:
 District: Ethnic Group:
 Occupation: Significant mark:.....
 Founded:

Procedure to follow - dates

Disease of the case: Smears:
 V.D.R.L.....
 Date of on set: Treatment:
 Investigator:

NOTE: Part B is to be returned in one month's time to the Matron Roberts

DENGUE FEVER INVESTIGATION

NUM _____

Health Service _____

Name: _____ Age _____ Sex _____

Address _____ Date _____

1. Clinical data

Fever _____ Joint pain _____ Body pain _____ Headaches _____

Eye pain _____ No energy _____ Rash _____ Adenitis _____

Petichias _____ Diarrhea _____ Shock _____ Bruises _____

Blood in vomit _____ Blood in urine _____ Nose bleeding _____

Bleeding gums _____ others _____

2. Laboratory tests

W. B. C.

Albuminuria _____ Hematuria _____ Blood in stool _____

Serology: Yes _____ No _____ Date (one sample) _____

Two samples: (dates) 1st _____ 2nd _____

Results - 1st _____ 2nd _____

3. Investigation of the origin of the illnessDate of onset _____ Places and dates visited during
last week _____Other persons ill at the same place _____

Mosquito at home _____ Other ill persons at home _____

Date when were ill _____

Probable incubation period _____ Place of Infection _____

4. Treatments

Doctor _____ Self-medication _____ Ambulant _____

Bed at home _____ Hospitalization _____ Cause of hospitalization _____

Place and date of investigation _____

Investigator _____

EVALUATION OF A MALARIA CASE

Country: _____ State: _____ Investi-
NATIONAL MALARIA ERADICATION SERVICE Munic: _____ gation No. _____
 HISTORY OF THE CASE PART A Date: _____

Name of Patient: _____		EVALUATION OF THE CASE PART B, Date: _____			
Years Age: Months	Name of the Head of the Family	Stage of	Date	Case No.	
Present residences	Since what time	Primary attack		Related case:	
Other residences during past 2 years	Locality from until	Release		Where infected	
Occupation:		Locality (ics)			
Place of work:		Munic:			
Slide taken by:	Category	State:			
Date:	Locality:	Country			
Reason for taking slide:		(1) Proved	(2) Presumptive	(3) Possible	
Date of laboratory examination	Examined by:	Classified by:		Classification of case	
Species of plasmodia and density of parasites		Category			
Symptoms of this attack	Dates of onset	Reviewed by:			
		Category:			
Fever:		Drugs taken	Doses	Date taken	Response to treatment
Chills:					
Other:					
Other attacks and/or Slides taken					
Date	Locality	Date	Locality	Result	

Movement of the patient (places where he slept away from home and dates) and habits of sleeping (outdoors)

Contact with malaria case (known and suspected cases of malaria), dates of contact and addresses of the same, and dates of illness of contacts, if known,

Blood transfusion
 Observations: (if necessary, use the back of this sheet, }
 (but note here such use

Type of house:

Last date of spraying

Presence or absence of anophelines, breeding places etc.

 Name in Capitals and signature of Investigator

GASTROENTERITIS OR FOODBORNE ILLNESS

CASE HISTORY FORM

NAME _____ Age _____ Sex _____ Ethnic Group _____

Address _____ Occupation _____

_____ Place of Employment _____

Phone _____ Other Information _____

Signs and Symptoms (check appropriate items)

<u>Intoxications</u>	<u>Enteric Infections</u>	<u>Neurological</u>
Burning Sensation (mouth) _____	Abdominal Cramps _____	Headache _____
Metallic Taste _____	Diarrhea _____	Chills _____
Excessive Salivation _____	Bloody _____	Myalgia _____
Nausea _____	Mucus _____	Edema _____
Vomiting _____	Watery _____	Jaundice _____
Flushing _____	No./day _____	Anorexia _____
Itching _____	Fever _____	Rash _____
Prostration _____	°F _____	Weakness _____
Cyanosis _____	Duration _____	Dehydration _____
		Numbness _____
		Dizziness _____
		Double Vision _____
		Blurred Vision _____
		Dysphagia _____
		Dysphoria _____
		Delirium _____
		Paralysis _____
		Coma _____

Other symptoms _____

Duration _____ Severity _____ Fatal _____ Treatment _____

Physician Consulted _____ Address _____

Hospital (name) _____ Address _____

<u>Specimens Obtained</u>	<u>Date of Collection</u>	<u>Laboratory Results</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

REMARKS AND DIAGNOSIS _____

94

Food history for previous 72 hours or other specified times:

Ill _____ Well _____

Day of Illness Date _____
 Breakfast: Hour _____
 Place _____

Day Before Illness Date _____
 Breakfast: Hour _____
 Place _____

Two Days Before Illness Date _____
 Breakfast: Hour _____
 Place _____

Lunch: Hour _____
 Place _____

Lunch: Hour _____
 Place _____

Lunch: Hour _____
 Place _____

Supper: Hour _____
 Place _____

Supper: Hour _____
 Place _____

Supper: Hour _____
 Place _____

Snacks (item, time, and place) _____

History of eating suspect food _____ Source _____ Address _____

Common event and names and addresses of others at event: _____

Recent travel (locations) _____

Contacts with known cases before illness _____

Contacts after illness _____

Pets _____ Housing condition _____ Crowding _____ Water supply _____

Excreta disposal _____ Shellfish _____ Milk supply _____

REMARKS _____

INVESTIGATOR _____ DATE _____

IV. POSITION PAPERS/PROJECT PROPOSALS

7. Environmental Health Program

a) Organization and administration

The environmental health services are carried out by the Public Health Inspectorate which is part of the Public Health Bureau (Ministry of Health) and is headed by a Medical Officer of Health, although the Principal Public Health Inspector is now generally reporting directly to the Chief Medical Officer (see Organization Chart, EH 2) and the Permanent Secretary.

The duties of the three levels of inspectors are listed (see EH 3a, b, c). Due to resignations and transfers there is a shortage of trained inspectors to carry out their broad program of environmental control (see EH 4a, b, c). As a result, some untrained public health assistants are employed to fill the gaps and provide a pool from which inspector candidates can be selected and sent to the West Indies School of Public Health in Jamaica for basic training. Some of these assistants received training this year (5 July - 7 August) from a PAHO consultant and more such training programs are planned.

Most of the finance and other administrative support services for the inspectorate are housed in the central Ministry of Health, and only secretarial services, drivers, etc. are at hand in their offices at the Matron Roberts Health Center on Magazine Road in Belize City. Indeed, although requested, a 1982-83 budget for the inspectorate could not be supplied. However, extracts for the organization from the official government budget for the year 1982-83 are provided (see EH 5a, b, c).

The administration of environmental health services is now slowly shifting from the specialized and isolated technical unit of the past to an integrated element in the Primary Health Care services of the future. In this regard much will depend on the continued development of the health team concept and the utilization and performance of the new Community Health Workers whose job description specifically states that:

"5. Assist the Environmental Health Officer in educating and advising the community on the identification and solution of their environmental health and sanitation problems, especially water supply, disposal of excreta and waste, and food protection."

b) General activities

Training:

Because of a growing concern in the Ministry over the shortage of trained environmental health personnel a short in-house training program for 11 public health assistants was held (with PAHO assistance) from July 5 to August 7, 1982; and the unit participated fully in lectures and field visits. Senior staff also participate, on demand, in the training of other health personnel from time to time (e.g. sanitation workers in Belize City).

Legislation:

An inherent feature of environmental control is the control of man's activities for which legislation is essential. Existing legislation is out-of-date; and in addition, the lack of standards also

weakens enforcement of control measures through the courts.

Health education:

This is a routine function of all environmental health personnel, but the new trend for greater community participation will undoubtedly demand an increased effort in this aspect of their work.

Information system:

Much basic environmental health information is collected by the unit (and by census takers), but the appropriateness and usage of the information are in need of review, especially in light of the Ministry's intentions to develop the management aspects of all programs.

Program design and management:

Environmental surveillance and other activities of the unit are basically carried out on an open-ended basis making monitoring and evaluation somewhat difficult if at all possible. Activities need to be programmed within definite time-frames, and managed for improved effectiveness within the limitations of available resources.

Inter-sectoral coordination:

Coordination between environmental health and other environment-oriented services of the Ministry (e.g. Housing) and other ministries (e.g. Water Supply, Local Government) is far from developed at this time, and will require deliberate directives from the highest policy level.

Disaster sanitation:

The unit is not organized or prepared to meet serious or urgent post-disaster demands for its services. No emergency environmental

health management action plan exists and vulnerability assessment of water supply and other environmental health systems have not been made.

c) Water supply

- Urban

About half the population in Belize live in eight urban centers served by communal water supply systems, all with chlorination facilities (see EH 6 for available details) and operated by the Water and Sewerage Authority (WASA). For urban areas there is a large percentage without internal plumbing (40%) or served by standpipe (19%).

Water quality control is primarily carried out by WASA.¹ In Belize City, 10 samples are taken twice monthly for bacteriological analysis and 10 samples daily for residual chlorine concentration. Physical and chemical analysis are carried out approximately four times annually. The plan for other urban systems is 10 samples to be taken, once monthly. However, what is currently achieved is far short of the planned schedule. All samples are analysed in the relatively new WASA laboratory at the Belize City water plant.

The water sampling and analysis by Ministry of Health personnel in urban areas are limited to two samples, once weekly, in Belize City. Tests for residual chlorine concentrations are taken at irregular intervals.

As indicated in EH 7 prepared by the inspectorate, "the present surveillance of drinking water quality is inadequate" in urban areas.

¹Useful budget data re 1982-83 are available in minutes of a meeting of WASA held on 20 May 1982.

- Rural

Three different organizations, under different ministries, are responsible for different rural water supply programs as follows:

Ministry of Natural Resources:

This program is primarily for livestock development (cattle) and irrigation, but also provides drinking water to a small population. Drilled wells are constructed on private farms.

Ministry of Energy and Communications:

The Water and Sewerage Authority (WASA) constructs individual drilled wells with hand pumps and also provides rudimentary water supply systems, primarily in the Stann Creek and Cayo districts.

Ministry of Health:

Under a rural water supply and sanitation program the Public Health Service of the Medical Department constructs individual drilled wells with hand pumps (previously with CARE support) in the Corozal, Orange Walk, and Belize districts.

The program is particularly hampered by the lack of pumps and 56 villages were identified in 1979 by a CIDA study as deserving rudimentary water supply systems.

In water quality control, both physical and chemical testing are carried out initially on wells drilled by WASA and the Public Health Service but not for wells drilled in the livestock development program. It appears that bacteriological analysis is not carried out initially or on a regular basis.

d) Sewerage

- Urban

There are two communal sewerage systems -- one in Belmopan and one being constructed for Belize City. In the latter, some building connections have already been made and two sewerage lagoons south of the city are operative. A pump station and some sewers are still being built. Both systems are owned and operated by WASA. The role of the Ministry of Health (Public Health Services) is to approve the design, construction and operation of septic tanks and other individual disposal systems (42 septic tanks approved in 1981-82); but it is felt that the regulations are "grossly abused by the public". Low income houses still use bucket latrines, the contents of which are dumped into canals or bushy areas in Belize City. This may be why the figures in EH 1 show a very high percentage (38%) of "Other/Not Stated" disposal facilities.

- Rural

The main method of sewage/excreta disposal in rural areas is the pit latrine (76% in EH 1). Some of these were undoubtedly constructed as part of the Ministry of Health former latrine program for rural areas, which is no longer fully operative. Experience in other parts of the Caribbean suggest that a latrine program is a long term need for rural areas. Also, the problems of non-usage in the Toledo district need to be studied with a view to improving the situation.

e) Solid waste management

The execution of solid waste management programs in Belize City and other district capitals is the responsibility of local government

councils, and the common method of disposal is the sanitary landfill, which in many cases is really open dumping. Solid waste collection and disposal are affected by:

- insufficient transport and other equipment,
- untrained and unmotivated workforce,
- vague and outdated legislation.

Only for Belize City are any data available, and the unit's responsibilities are limited to:

- advice on appropriate disposal areas,
- periodic check to ensure safe environmental impact,
- training of Belize council staff,
- educating the public by community campaigns.

It is essential that the Ministry of Health is allowed to play a more positive role in what is a leading environmental health problem in the country.

f) Food sanitation

The food sanitation program of the Public Health Inspectorate covers four main areas, little mention being made of milk sanitation and beverage plants:

- Food establishments
- Food handlers
- Unwholesome food
- Meat hygiene

Food establishments:

The current program includes an inspection of food establishments when

complaints are registered or annually with quarterly follow-up inspections. These establishments, nearly 1100 in all, include restaurants, clubs, hotels, beer parlours and wholesale liquor shops. The following table represents 1981/82 activity in this area:

<u>Establishments Inspected</u>		<u>Approval</u>		<u>Major Defects</u>
	<u>Full</u>	<u>Conditional</u>		
Liquor = 889	153	301		.435
Non-liquor = 188	23	77		88

The shortage of trained inspectors and the lack of standardization in food inspection are the main problems at this time.

Food handlers:

The coordination of the clinical examination of food handlers is carried out throughout the year. Weekly clinics are held in each district and laboratory samples are collected and analyzed. Certified food handlers are examined every 90 days and clinical exams are conducted biannually.

The 1981/82 figures are as follows:

Food handlers clinics	--	42
Persons attending	-	816
Persons treated for various		
parasites	-	69 (54 female)
Certificates issued	--	343 by government clinics
	-	23 by private practitioners

Because of the high turnover of food handlers and weak legislation, the effectiveness of the program is subject to question.

Unwholesome food:

Another inspectorate responsibility in food sanitation is the inspection, condemnation and destruction of decomposing food stocks. It is feared that due to the manpower shortage, the inadequacy of food disposal means, and the weakness of food control legislation, a sizeable amount of unwholesome food reaches consumers. We have witnessed the open dumping of spoilt boxed and canned foods away from the main Belize City solid waste disposal site in such a manner that they could be recovered and used later.

Meat hygiene:

Inspection of abattoirs and poultry plants and the examination of meat are important features of the overall food sanitation program. Because of the erratic scheduling of animal slaughtering in some of the districts (each has a slaughterhouse), the required procedures are not followed and inspections are frequently conducted by untrained personnel.

g) Vector control

Except for mosquito control in the malaria eradication program and the anti-Aedes aegypti program, both of which are now executed by another unit in the Public Health Department, vector control is carried out in a modest way by the environmental sanitation unit. Rodent control (or extermination) is practised with the cooperation of the public; and on request houses may be sprayed with insecticides against cockroaches and bed bugs.

Because many urban buildings are wooden and their surrounding areas are insanitary, a more concerted drive on rodents is necessary,

starting with surveys of rodent prevalence.

For anti-rabies control, vaccination and extermination of feral animals (e.g. dogs) are carried out. In 1981-82, 551 animals were vaccinated and rabies infection was identified in 7 dogs, 6 cows, one pig and one human.

h) Housing

The inspection of premises, traditionally the public health inspector's prime responsibility, is carried out despite the shortage of trained manpower and the difficulty of winning court convictions. Unlike many other areas in the Caribbean, the uni' plays no role in enforcing minimum environmental control standards in the pre-construction stage of buildings. In the 1981-82 year only 2056 premises (or 10% of all in the country) were actually inspected.

i) Quarantine

Chapter 89 of the Quarantine Regulations empowers the inspectorate to carry out Quarantine duties at the Belize International Airport and other ports of entry. Surveillance is limited to yellow fever (from South America) and cholera (from Africa and Asia). The total number of planes and ships arriving in Belize in 1981-82 were 5,549 while total certificates were 41,606.

j) Water pollution control

The inspectorate has been involved in studying and reporting on water pollution problems from disposal of treated industrial wastewater, with assistance from PAHO. Unfortunately, a full water pollution control

program depends on the drafting, enactment and enforcement of modern legislation, which is still outstanding. The rivers involved are the New River, Old Belize River, and South Stann Creek; and sugar, metal plating and citrus industries are involved.

k) Occupational hygiene and safety

Occupational hygiene and safety is primarily the responsibility of the Ministry of Labour. The Public Health Inspectorate has more than a passing interest in the working environment, but the manpower shortage has not allowed them to become very active in this field. As in other CARICOM countries, the Labour Inspectorate is mainly interested in accident prevention, and a joint program between ministries is still to be formalised.

l) Control and abatement of nuisances

The unit responds almost daily to the report of environmental nuisances and, in 1981-82, 416 nuisances were reported and 91 abated. These are generally related to waste disposal problems in housing areas.

m) Miscellaneous environmental control

There are several areas of environmental control not now served by the inspectorate either because problems have not been considered serious enough to deserve attention or due to the shortage of trained manpower, such as:

- Institutional sanitation
- Noise control
- Air pollution control
- Accident prevention
- Sanitation of recreational areas

Assessment of Performance

a) Resource shortages

In environmental health the great resource shortage is in trained manpower. Although the population of Belize (approx. 145,000) is relatively small the people are distributed through the country, and the administration of an effective national environmental health program in many scattered communities will require at least the doubling of public health inspectors and assistants within the foreseeable future. It is clear that more inspectors and assistants are needed to improve environmental surveillance and the enforcement of minimum control standards. In addition, a concentrated attack on rural water supply and sanitation will require additional well drillers and maintenance crews, as well as latrine construction and installation workers.

Naturally, an expanded environmental health program will not be possible with a shrinking budget. Besides the present manpower shortage there is a need now for transport and other equipment; and indeed, rural water supply wells being drilled are capped because there are not hand-pumps in stock. This is more a sad reflection of limited funding for environmental health (if not of the whole health sector) than it is of the lack of management expertise.

b) Legislation

The second most important weakness in the environmental health program is the lack of modern environmental health legislation and standards. To control the environment one has to control man; and to

control man and his environmental activities requires laws, regulations and standards. Some aspects of the program depend more on legislation than others (e.g. water pollution control). However, education is not enough and must be backed up by the threat of court-awarded penalties.

c) Administration and management

The public health inspectorate is a technical unit with administrative direction from the Ministry and limited administrative support from within. Management expertise for the unit and its various technical programs is seriously lacking. If there is any development of environmental health projects, there will have to be a parallel development of program project design and management capability within the Unit.

d) Communities

There is a lack of community awareness and participation in environmental health activities in most urban and rural areas, due largely to the low socioeconomic standing of most segments of the population who give a low priority to environmental problems. The lack of environmental planning, consultation and infrastructure in the growing number of refugee settlements poses a serious threat of environmental diseases (e.g. enteric and vector-borne) for the future.

EH Table 1

*Water Supply and Sewage/Excreta Disposal
in Urban* and Rural Areas*

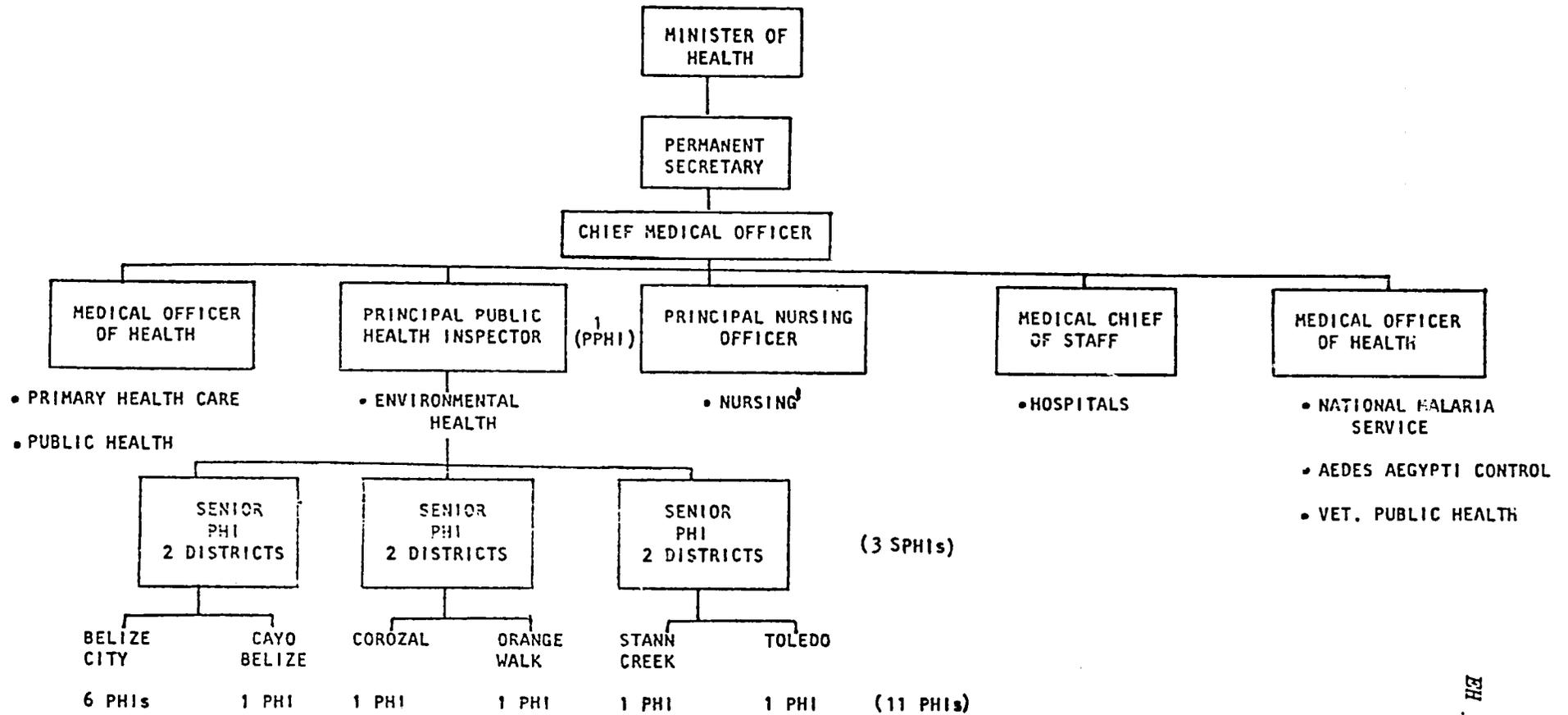
<u>Supply Connections</u>	WATER SUPPLY	
	<u>Urban (14,775 Households)</u>	<u>Rural (13,362 Households)</u>
1. Public -- internal	21%	2%
2. -- external	40	13
3. Private -- internal	7	5
4. -- catchment	4	18
5. Public standpipe	19	9
6. Public tank	0	1
7. Other/not stated	9	52
	<u>100%</u>	<u>100%</u>

<u>Disposal Systems</u>	SEWAGE/EXCRETA DISPOSAL	
	<u>Urban (14,775 Households)</u>	<u>Rural (13,362 Households)</u>
1. Connected to communal sewer system	6%	1%
2. WC and septic tank	29	6
3. Pit latrine	26	76
4. Other/not stated	39	17
	<u>100%</u>	<u>100%</u>

*Urban areas include the towns of: Belize City, Corozal Town, Orange Walk Town, Dangriga, Punta Gorda, San Ignacio and Belmopan

Note: Figures from the 1980 Population census.

ORGANIZATION CHART OF PUBLIC HEALTH INSPECTORATE, BELIZE



Note: Salaries are: PPHI (\$99,575 - 15,864)
 SPHI (\$97,958 - 12,324)
 PHI (\$85,388 - 7,872)

Duties of the Principal Public Health Inspector

The duties of the Principal Public Health Inspector include:

1. Responsible for the day to day functioning of the Environmental Control Service.
2. Makes plan for the efficient functioning of the service.
3. Plans the Budget and ensures that all sections are adequately provided with materials and supplies.
4. He liaises with the Medical Officer of Health to ensure that all health policies are carried out.
5. Prepares progress reports.
6. Organizes in-service training programs for Public Health Inspectors.
7. Health education.
8. Undertake any other special investigations required by the Medical Officer of Health.

Duties of the Public Health Inspector

The duties of the Public Health Inspector include:

1. Control and abatement of nuisances as defined by law Chapter 87 Section 136.
2. Investigation of complaints.
3. Inspection of offensive trades.
4. Inspection of factories.
5. Collection of water samples.
6. Collection of food samples.
7. Inspection of food samples
8. Inspection and condemnation of unsound food.
9. Meat inspection.
10. Inspection of septic tanks.
11. Drainage
12. Rabies - control
13. Port health duties
14. Health education
15. Specialized campaign.
16. Pollution - control and prevention.
17. Keeping of records.
18. Reporting promptly and
19. Any other investigations required by the Medical Officer of Health.

Duties of Senior Public Health Inspector

The duties of the Senior Public Health Inspector include:

1. Acting in the absence of the Principal Public Health Inspector.
2. Purchase and issue stores.
3. Keep stores ledger.
4. Receive and collate Public Health Inspectors' reports.
5. Supervise and advise Public Health Inspectors.
6. Represent the Public Health Bureau in court, and;
7. Undertake any other special investigations required by the Medical Officer of Health.

Program of Environmental Control for the
Year 1981 and 1982

SOLID WASTES

Objectives:

1. To have a proper designated place for disposal of garbage for each municipality.
2. To obtain collection frequency of twice per week in all cities, and towns.
3. To have 100% of businesses provided with proper storage facilities.
4. To have 50% of private sector provided with proper storage facilities.

LIQUID WASTES

Objectives:

1. To have 100% of food establishments provides w/c for both sexes in all townships.
2. To have 50% private sector provide proper unit.
3. To have 100% rural families provided with acceptable units.
4. To have 100% of school provided with acceptable sanitary units.
5. Have 50% school provide hand washing facilities.

WATER SUPPLIES

1. Quality control

- a) Weekly sampling of municipal supplies.
- b) Monthly sampling of rural supplies.

2. Provision

- c) To provide 100 wells in the Cayo District.

EH 4b

- d) To provide 50 wells in the Belize District.
- e) To provide 50 wells in the Toledo District.
- f) To re-establish the San Jose' system.
- g) To build the new Dougals Section (San Juan).
- h) To construct the new Chan Pine Ridge System.

FOOD CONTROL

- a) Register 100% of establishments.
- b) Register 75% of the vendors.
- c) Organize 4 food-handlers seminars.
- d) Submit 4 samples of flour for evidence of pesticides, herbicides, insecticides and food composition.

RABIES CONTROL

- a) Eliminate 100% of stray dogs.
- b) Vaccinate 80% owned dogs.
- c) Investigate all dog bites.
- d) Doctors to treat all suspect cases.

HEALTH EDUCATION

- a) Lectures to schools on problems relative to the areas.
- b) Lectures to groups and organizations.
- c) Continue on person to person basis.
- d) Continue weekly radio program with change of format - more interviews, more call in.
- e) Continue to participate in agriculture shows - highlight general problems.

MEAT INSPECTION

- a) Inspection of all meats slaughtered at the slaughterhouse.
- b) Improve the sanitary condition of all slaughterhouses.
- c) Improve the hygienic condition in which meats are transported.
- d) Register all butchers as food-handlers.
- e) Regulate slaughtering of animals.

POLLUTION CONTROL

- a) Monitor Orange Walk River.
- b) Monitor Belize and Sibun Rivers.
- c) Monitor North Stann Creeek River.

OCCUPATIONAL SAFETY

1. Monitor the work places.
2. Ventilation.
3. Lighting.
4. Noise level.
5. Temperature.
6. Accident prevention.
7. First aid.

INSECT AND VERMINS CONTROL

1. Continue to distribute rat-poison.
2. Continue the spraying of houses against roaches and bedbugs.

ENVIRONMENTAL SANITATION EXTRACTS FROM BELIZE 1982-83 BUDGET

HEAD 22 -- MINISTER OF HEALTH (cont'd)

sub-Head No.	Establishment		Details of Expenditure	Estimates 1981/2	Approved Estimates 1981/2	Revised Estimates 1981/2	Increase	Decrease	Actual Expenditure 1980,
	1981/2	1982/3							
			IV. Public Health	\$	\$	\$	\$	\$	\$
(a)			Health Education Officer	15,563					
(b)	1	1	Principal Public Health Inspector AS3	15,563	12,893				
(c)	2	2	Senior Public Health Inspector AS5	22,168	18,909				
(d)	15	14	Public Health Inspector TSA u	101,021	90,334				
(e)	1	1	Visual Aid Officer TS5	5,796	5,127				
(f)	1	1	Supervisor of Public Nurses NIA u	11,044	8,762				
(g)	1	1	Senior Public Health Nurse N2A	9,636	7,794				
(h)	13	13	Public Health Nurse N3A qu	103,004	89,918				
(i)	41	41	Rural Health Nurse N5 qu	231,281	176,458				
(j)	2	2	Nurse/Midwife N3	17,528	12,971				
(k)			Overtime Fees to P.H. Inspector		21,780				
			Sanitary Engineer AS3		11,376				
(l)			Social Security	34,172					
			10% Salaries Increase		22,186				
	78	77	TOTAL, HEALTH SERVICES	566,676	479,138		87,538		

EH 5a

HEALTH PROGRAMMES

Sub-Head No.	Establishment		Details of Expenditure	Estimates 1982/3	Approved Estimates 1981/2
	1981/2	1982/3			
1.			II. Rural Environmental Sanitation PERSONAL EMOLUMENTS		
(a)	1.	1	Assistant Sanitary Engineer A	8,340	7,582
(b)	1	1	Foreman T2	7,234	6,183
(c)	1	1	Carpenter T5	4,994	4,227
(d)	2	2	Well Rig Operator T4	11,416	9,864
(e)	2	2	Typist C4	8,477	4,710
(f)	1	1	Messenger M	2,491	2,463
(g)			Unestablished Staff	50,625	43,255
			Social Security	5,615	3,915
	8	8		99,142	82,199
			OTHER CHARGES		
2.			Subsistence Allowance	15,000	10,000
3.			Stationery and Incidentals	3,500	1,500
4.			Running and Maintenance of vehicles	30,000	18,000
5.			Running and Maintenance of Rigs	25,000	15,000
6.			Materials and labour	70,000	20,900
7.			Miscellaneous		15,000
8.			Maintenance of Rudimentary Water Systems	12,500	6,600
				156,000	87,000
			Total, Rural Environmental Sanitation	255,192	169,199

4. PUBLIC HEALTH SERVICES

Description:- This subhead is concerned with carrying out the provisions of the Public Health Ordinance, Chapter 87, Its main functions are:

- (a) enforcing regulations affecting environmental sanitation;
- (b) conducting immunization programmes;
- (c) implementing health programmes
- (d) conducting malaria eradication and anti-rabies campaign and aedes aegypti eradication.

The analysis of expenditure in terms of object Accounts is provided below:-

Sub-head No.	Details of Expenditure	Estimates 1982/3	Approved Estimates 1981/2	Revised Estimates 1981/2	Actual Expenditure 1978	Actual Expenditure 1979	Actual Expenditure 1980	Increase	Decrease
22.4	Public Health Services	\$	\$	\$	\$	\$	\$	\$	\$
1.	Personal Emoluments	566,676	479,138		227,631				
3.	Materials and Supplies	13,000	12,000		4,783				
4.	Other Operating & Maintenance	100,000	131,000		68,523				
		679,676	622,138		300,937			57,538	

110

Brief Description of Urban Water Supply Systems

<u>Locality</u>	<u>Population</u>	<u>Source</u>	<u>Treatment Facilities</u>
1. Belize City	39,771	Belize River	2 I.MGD, Intake, Low lift pumps, 1 Clarifier, 4 Gravity sand filters, Chlorination and High lift pumps.
2. Belmopan	2,935	River	Coagulation, Sédimentation, Filtration and Chlorination.
3. Benque Viejo	2,435	Spring	Chlorination
4. Corozal	6,899	Bore Hole	Chlorination
5. Dangriga	6,661	River	Coagulation, Sedimentation, Filtration and Chlorination.
6. Orange Walk	8,439	Bore Hole	Chlorination
7. Punta Gorda	2,396	Bore Hole	Chlorination
8. San Ignacio	6,179	River	Chlorination

Water Quality Surveillance Activities in Belize

<u>Surveillance Activity</u>	<u>W.A.S.A.</u>	<u>Public Health Bureau</u>
1. Laws, regulations and policies	None	General public health regulations
2. Enforcement	-	As needed above
3. Drink water standards	None	-
4. Training water works operators	Only two with some local training	None
5. Sanitary surveys	None	None
6. Approval of source	None	None
7. Sampling and monitoring	Urban areas only but irregular	Urban areas only but extremely limited in scope and irregular
8. Standard method of analysis	Residual chlorine analysis, chemical and bacteriological but limited in scope	Residual chlorine and limited bacteriological
9. Reporting requirement	For activities 7 and 8	For activities 7 and 8
10. Remedial action	No effective procedure	No effective procedure
11. Design standards	None	None
12. Control of cross connections	None	None
13. Plumbing code	None	None
14. Materials and additives standards	None	None
15. Regulation of special water supplies:		
International airport	None	None
Hospitals	None	None
Schools	None	None
Army posts	None	None
Sea port	None	None
Ice manufacture	None	None
Tanker supplies	None	None
16. Medical examination of waterworks operators	None	None

Conclusions: As can be seen from the foregoing, the present surveillance of drinking water quality is inadequate because of many reasons, i.e. inadequate to provide and significant measure of protection to the public from the potential health hazards which could arise by drinking unwholesome water.

8. Primary health care (PHC)

The different components of the PHC project in Toledo district are in various stages of planning and implementation. Selection and recruitment of trainees has taken place; a nurse/midwife/educator is based in a centrally located village from which she makes periodic visits to trainees and health centers; a public health/primary care/educator just arrived in the country ready to assist in the training and supervision process; a solar powered radio communication network is being developed for the bulk of villages in the district; proposals have been made for instructional aids; elements of a disease reporting system have been devised; a project proposal has been prepared and submitted to support an assessment of the PHC program; and related needs in Toledo district identified.

This program has been given high priority by the government of Belize; has benefited by intersectoral collaboration; and has been supported by a variety of donor agencies including, for example, IDRP/Canada, CIDA/Canada, Project Concern, Council for International Health, UNICEF, and ODA.

There is a need to build additional health clinics, to rehabilitate old ones, to make optimal use of health data generated, to improve the resources of the health facilities network which supports the work of the PHC network, and more. However, the program is only beginning and optimism justified.

Position papers/project proposals

The stated objective of this health sector assessment was "to assist Belize health authorities in identifying priority health problem areas in the first Belize Health Policy Paper (or plan) now being prepared." Accordingly, at our final meeting on September 8, Mr. Shoman presented us with written drafts describing 5 projects which the Ministry wishes potential donors to support. In descending order of priority, they deal with the need for a hospital in Belize City, development and upgrading of the network of district hospitals, improved anti-malaria services, development of PHC infrastructure, and a rural water supply and sanitation project in Toledo district.

1. *Re a hospital in Belize City*

TO: Minister of Health

FROM: Chief Medical Officer

SUBJECT: On the need for a maternal and child hospital in Belize City

DATE: August 4, 1982

As you are aware, many difficulties have arisen in Government's efforts to procure external financing for a new General Hospital in Belize City. Among the factors that can be cited are the following:

- 1) Insufficiency of the EDF funding for the original ODS proposed hospital,
- 2) Ambiguity in pursuance of the Mexican offer to assist Belize in this

matter,

- 3) Increased construction costs due to difficult site conditions,
- 4) Hospital construction is a low priority item in present international funding agencies' agendas.

A possible alternative that would allow Government to meet it's pressing commitment, and effectively enhance secondary and tertiary care for the population groups identified as prioritary in the Ministry's Health Policy Statement, is the construction and equipping of a new Maternal and Child Hospital in Belize City. The justification for such a step are the following:

- 1) According to the 1981 Hospital Statistics, 75% of all admissions to Belize City Hospital are of Obstetrical, Gynaecological or Pediatric nature. Of these, Obstetrical - Gynaecological cases represent 62% of all patients admitted to Belize City Hospital. Pediatric and neonatal (premature babies) represent 13% of the total Normal Deliveries, Direct Obstetric causes. Diseases of the female genital organs and abortion are among the five leading causes of hospitalization, and represent 40% of all admissions. It is important to note that the hospital beds assigned to Maternity and Gynaecology number a total of 36, or 20% of the hospital complement of 174. In other words, 20% of the hospital beds provide care to over 60% of the demand. This can be explained by the fact that Maternity beds have a high turnover rate, i.e., the average length of stay is 3 days, whereas other services, such as Medicine and Surgery have between 9 and 10 days of average length of hospitalization.

Pediatrics takes up 30% of all hospital beds and attends to 13% of all hospital admissions, which is as much as Surgery and considerably more than Medicine. All in all, the Maternity and Pediatric Sections of the Hospital have 50% of the beds and attend to 75% of the patient load. All these figures are summarized in the following table:

Movements of inpatients - Belize City Hospital - 1981

<i>Service</i>	<i>Beds Available</i>	<i>Admissions</i>	<i>Average Occupancy (%)</i>	<i>Average Length of Stay</i>
Gynaecology	11	1883	45.0	9.8
Obstetrics	25	2425	80.0	3.0
Premature Newborn	12	165	11.0	2.8
Pediatrics	43	768	48.0	9.9
Surgery	40	990	60.0	9.0
Medicine	48	684	33.0	9.0

As can be seen, a modern, relatively small (80 to 100 beds) Maternity and Child Hospital would provide secondary and tertiary care of high quality to attend 75% of the Hospital service demand. And it would provide such care to those groups that would benefit most and require priority attention.

- 2) Such a Hospital would be administratively and programatically linked to the Maternal and Child Health Programme of Belize. It would be a functional vertex of Maternal and Child Health activities from the community level on up. The Hospital would provide adequate advanced tertiary care to all "high risk pregnancies" and complicated deliveries

in the country, as well as support primary and secondary care needs for the Belize District populations.

This fact would allow the possibility of tying the Hospital into a wider multilevel M.C.H. package that would be more attractive to external financing; and could include other aspects such as Health education, equipping of Health Centres, Midwifery Training, etc.

- 3) By improving secondary and tertiary care for the Maternal and Infant population, such a Hospital would have a significant impact on the major health indicators such as Infant and Maternal mortality, life expectancy and Child mortality.
- 4) Very little additional staffing would be required to run the new unit, since the Medical and Nursing Staff currently engaged in these services would simply be transferred. Serious thought would have to be given to improving the quality of staff, i.e., by training in prenatal care, neonatology and some other, Pediatric Specialities (infectology, pediatric surgery, etc). With sufficient time and planning, such manpower development could be achieved in a relatively short period (one to two years).
- 5) The present Belize City Hospital would become a Medical Surgical Hospital providing secondary care for the adult population of Belize City and surrounding areas. It could develop tertiary facilities for treating major prevalent adult conditions, such as heart disease, trauma, diabetes, orthopedic conditions and acute mental illness.
Present overcrowded bed capacity could be reduced to around 80 to 100 beds, and the existing facilities would be moderately upgraded.
Better space distribution would be possible. New areas for specialized

tertiary care could be opened and equipped at a moderate expense: a Cardiological unit, an Orthopedic traumatology unit, an intensive care area, and a Psychiatric ward. Finance for this upgrading effort could partly be met by Social Security funding, since this is an area of concern for this Institution.

- 6) It is a definite fact that it is easy to elicit public sympathy and support to an M.C.H. It may be difficult to procure all the required funding from one external source; in fact, it will probably be necessary to develop a wide range of contributors, including friendly Government, aid agencies, external non-governmental organizations and Belizean voluntary groups both in country and abroad. This is obviously a situation that could develop undesirable political ramifications; but, if well led, a large measure of community involvement would perhaps allow the project to arise above traditional political boundaries. (Neutrality of health as a common good).
- 7) It is impossible at this premature stage to provide any hard financial costs that the project would entail; an extremely cautious guesstimate would be the following:

Construction new Maternal and Child Hospital:	Under \$Bze - 8 Million
Equipping:	\$1000.000 to \$2.000.000
Training Abroad:	\$200.000 to 400.000
Upgrading Old B.C.H.	\$2 million
Total	<u>\$11.2 to 12.5 million</u>

This is well under a third the estimated costs of the O.D.A. project and about half that of the Mexican I.M.S.S. 250 bed hospital. The

possible sources of funding could be the following:

Local government sources:	\$1.500.00	Bze
Social Security Board:	500.00	"
Local nongovernmental contributions:	1.000.00	"
External nongovernmental contributions:	2.000.00	"
Foreign governmental or international aid agencies:	7.000.00	"
	<hr/>	
	\$12.000.00	"
	<hr/>	

Note that it is estimated that about 25% of the total cost could be raised through voluntary non-governmental contributions, both local and abroad. Also, various governmental aid agencies could be approached to finance different components of the project, i.e., E.D.F., A.I.D., some European governments, Canada, Japan, etc. Other foundations interested in health care, such as Kellogg, could be tapped also.

Objectives of the Project:

1. To improve the quality of Maternal and Child Health Care at the primary, secondary, and tertiary level.
2. To provide facilities for adequate tertiary level of care of prenatal and prenatal pathology.
3. To develop adequate training facilities in the fields of midwifery and pediatric nursing.
4. To provide facilities for adequate tertiary level care of

prevalent pediatric conditions.

Project Components:

The project can be divided into three major component areas:

- 1) Service Component
- 2) Training Component
- 3) Administrative and Support Services

1) *Service Component:*

The following service activities and corresponding areas would be included in the facilities:

a) Outpatient Care:

- Prenatal Clinic
- Family Education Clinic
- Child Health Clinic
- Gynaecology Clinic
- High Risk Prenatal Clinic
- Postnatal Clinic
- Nutrition Clinic
- Pediatric Clinic
- Dental Health Clinic

b) Hospital Care:

- Maternity Ward (25 - 30 beds)
- Labor Room (approx 4 - 5 beds)
- Delivery Room (2 beds)
- Females Postoperative Ward (10 beds)
- Female Surgical (8 - 15 beds)
- Neonatal Ward (8 - 15 beds)
- Infant Ward (8 - 15 beds)
- Preschool Ward (8 - 15 beds)

- School Ward (8 - 15 beds)
- Child Isolation Ward (5 beds)
- Female Isolation Ward (5 beds)
- Newborn Ward (20 bassinets)

2) *Training Area:*

a) Auditorium (for general use, including meetings, seminars, in service training, formal lectures, etc.) approximately for 30 to 40 people.

b) Midwifery Laboratory

c) Small Classrooms for group work (3 to 5)

3) *Administration Area:*

a) Hospital Administrator's Office

b) Medical Director's Office

c) Matron's Office

d) Secretarial Pool

e) Accounts Section

A) Supply Area

B) Maintenance Area

C) Other Services: Kitchen, laundry, etc.

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2. *Project development of a regionalized hospital care system*

Background

Although Primary Health Care (PHC) has been identified as the key strategy to improving health in Belize, it is also considered necessary to significantly upgrade the hospital care facilities in the country, which

are at present insufficiently equipped and staffed for providing the basic care which is demanded of them. PHC activities will probably lead to an increased demand for some secondary care services, as public awareness of health needs increases. PHC will have a definite impact on many major health problems, especially infectious diseases and perinatal morbidity, but other sources of morbidity may well become more frequent, due to wider coverage of now underserved areas of the country.

Extended PHC activities will also place an additional load on many hospital based support services, such as laboratories, out-patient departments, supply services, etc. All hospitals in the country are presently ill-equipped to meet the present needs; any further demand will place an unmanageable burden if steps are not taken to improve secondary care facilities.

Secondary and tertiary care is now concentrated in Belize City Hospital, which is the national referral center for the country. With the exception of Belmopan Hospital, all district hospitals are little more than maternity centers and first aid stations; most lack basic diagnostic and therapeutic facilities. As a consequence, established bed capacity is grossly underutilized. This places an excessive load on Belize City Hospital, where physical facilities are dilapidated, building maintenance is costly, and patient care is inefficient. The average length of stay for surgical or medical patients is around nine days, which is extremely high given the basic nature of the services provided. The reason for this is the existence of many material bottlenecks due to supply shortages, insufficient basic equipment, insufficient staffing, etc.

In essence, the quality of secondary and tertiary care now being provided in the country is not what the country could afford if scarce resources were used more rationally and efficiently. On the other hand, the basic hospital infrastructure now installed, with the exception of Belize City, is sufficient to deal with present and potential demand, but is not being fully utilized due to the deficiencies already mentioned. Belize City Hospital itself is in need of major upgrading and reconstruction, an investment that may not be worthwhile making if it remains at its present site, exposed to hurricane damage.

In conclusion, the hospital care system requires major improvements at all levels. The principles on which upgrading should be made are the following:

a) Regionalization

Some district hospitals should be strengthened and upgraded to the point where they can provide basis hospital care, including the four basic specialities and ancillary diagnostic facilities. These should be Orange Walk Hospital and Belmopan Hospital. Each would attend to approximately one third of the population in the Northern and Southern Districts respectively.

Belize City Hospital would provide secondary care for the Belize District and specialized tertiary care in some priority areas such as traumatology, rehabilitation, neonatology and cardiology, for the whole country.

b) Decentralization

Related to the above condition, it emphasizes that secondary

health care should be made available to the population as close as possible to where they live.

Objectives and Goals:

1) To reduce patient referrals from district hospitals to Belize City by 70% by 1987.

2) To increase surgical output in Belmopan Hospital by 100% by 1985.

3) To provide permanent surgical and obstetrical care at Orange Walk Hospital by 1985.

4) To provide permanent obstetrical care at Belmopan Hospital by 1985.

5) To provide basic postoperative care facilities at OWH, Belmopan Hospital and Belize City Hospital by 1985.

6) To provide basic laboratory and X-ray services at Corozal, San Ignacio, Dangriga and Punta Gorda Hospitals by 1984.

7) To provide basic laboratory services at San Antonio, San Narciso, Independence, Benque Viejo Health Centers by 1985.

8) To provide basic pediatric and medical care at all district hospitals.

9) To provide specialized tertiary care in the following areas in Belize City by 1987:

Orthopedics-Traumatology
Peri- and Neonatology
Cardiology and Intensive Care.

10) To establish a Central Supply Unit in Belize City Hospital
by 1984.

Project Strategies:

To obtain the above goals, a complete revision of all available and potential resources, both human and material, must be made. It would be premature at this stage to detail all the required inputs in terms of manpower development, projected equipment and supply needs, transport facilities, etc. In any case, external assistance would undoubtedly be required in the following aspects, although it is not possible to determine definite quantities at this point.

- Renewal of basic hospital equipment
- Provision of basic laboratory and other diagnostic equipment (X-ray, EKG, microscopes, etc.)
- Renewal of surgical facilities in Orange Walk Hospital
- Expansion of bed capacity in Orange Walk and Belmopan hospitals.
- Reconstruction of some areas of Belize City Hospital vs. construction of a new hospital in Belize City or construction of a smaller Maternal and Child Hospital.

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3. National malaria control service

In 1979 Cabinet's approval was given for the construction of a revised plan of operation for the National Malaria Services based on the recommendations of a PAHO Short Term Consultant.

It was estimated that for the 1982 financial year, a sum of \$923,000. BZE would be required to implement the revised plan of Operations reflecting increased costs of spraying operations for salaries and subsistence payments to the spraying squads.

Only \$377,858. BZE were approved for the Programme in the 1982 estimates despite recognition of the fact that malaria posed and continues to pose the most serious health hazard to the country.

There was no projection for increases in materials, supplies and operational costs to meet the demands of a greatly intensified and expanded programme.

Implications of Reducing Scope of Programme

During the 1st five years the malaria situation in this country has deteriorated progressively. Today malaria is one of our major public health problems because highest morbidity is recorded for this disease.

Number of Cases

1973	99	1978	1215
1974	96	1979	1394
1975	90	1980	1529
1976	199	1981	2072
1977	894	1982	+3000 (est.)

Aware of the deteriorating malaria situation, a PAHO Consultant was invited in 1979 and the National Malaria Program was reorganized. According to the re-organized program certain areas of the country were selected for intensive anti-malaria measures. These areas are designated as "Attack Phase" areas and are shown on the map (shaded red) as As and Ab areas. These areas were selected for intensive anti-malaria measures (including bi-annual DDT spraying) on the basis of intensive transmission of malaria, high population density and easy accessibility.

During the past year entomological studies were conducted to detect any mosquito resistance to the insecticide (DDT). In 1980 entomological studies were conducted with the assistance of a PAHO/HO consultant.

General Description

The total superficial area of the country covers 22,965.3 Km² with 155,370 inhabitants for 1980 of which is divided as follows:

Attack phase	15,804.3 km ²	88,144 inhabitants
Consolidation	7,149.69 km ²	27,339 "
Maintenance	11,371 km ²	39,887 "

For purposes of epidemiological evaluation (FCS) there is a total of 25,795 houses to be visited for fever cases detection.

For purposes of spraying operation with DDT there is a total of 15,795 houses to be sprayed to cut out the malaria transmission.

Based on these above figures the average household is comprised of 5 persons. The number of houses by localities should be

more than expected for the years 1982-1983.

Financial Support

PAHO/WHO is the only international agency assisting Government in the eradication of malaria. This assistance has included a revolving fund for transport, anti-malaria drugs, laboratory supplies and short-term consultant.

Some of the factors involved in the financial increment of this program are:

- 1) Higher cost price of the (DDT) insecticide
- 2) Increase prices of gasoline, and kerosene oil
- 3) Salary increments

We are now faced with a financial problem, and the implementation of the reorganized programme is threatened if this unfortunate situation is not righted, then we can expect that the malaria program will deteriorate.

If the spraying operation in the "Attack Phase" is interrupted for any length of time, i.e. one year, the current level of malaria transmission in the "Attack Phase" will extend into the present consolidation areas.

At present spraying itineraries are prepared and a time is set for spraying of each district, but because there is not adequate transportation for the spray teams, the time that it takes to spray a certain district or locality is often doubled.

Spraying is being done in the districts by three (3) spray teams, to cover the inineries effectively we would need at least four spray teams and we also need proper transportation.

At present there are only four vehicles in working condition for the entire malaria program. Of these four vehicles, two are very old and are often in need of repairs.

There are only nine evaluators working at present, there are three vacant posts for which we are awaiting establishment permission to employ people to fill these posts. The villages should be visited once every twenty days but this cannot be done because we do not have a full staff of evaluators.

Community Participation

It is a felt need and must be improved if malaria control activities are to be more effective. Although a small network of voluntary collaborators already exists, supervision and training is deficient. A major component of a revised Malaria Control Program should be to increase their members and provide sufficient training, materials and supervision so that these collaborators can participate in case detection and treatment and other health education activities. The communities must become more actively involved in the program, including planning, implementing and evaluating activities.

Objectives and Goals

- 1) To decrease the yearly incidence of malaria by 66% in the

next three years.

2) To decrease the yearly incidence of malaria by 60% in the subsequent two years.

3) To eradicate malaria from major urban areas in the next three years.

Strategies

1) To ensure an adequate supply of materials and supplies (insecticide, spray equipment, slides, etc.)

2) To improve training and supervision of all malaria field workers.

3) To improve transport facilities to ensure adequate mobility and coverage.

4) To extend spraying and detection activities to all malaria infested communities.

5) To strengthen community participation, by increasing the network of voluntary collaborators, including training, supervision and supplying team with needed materials.

6) To increase health education activities and public awareness.

7) To undertake massive mobilization campaigns, including community organizations and voluntary organization, combining vector control activities and host treatment.

8) To establish coordination and support (human, material) from other government agencies (Agriculture, BDF, Social Development, etc.).

Budget Estimates 1983-1987

A. Government of Belize (one thousand Belize \$)

	<u>1983</u>	<u>1984</u>	<u>85</u>	<u>1986</u>	<u>1987</u>	<u>TOTAL</u>
Personal Emoluments	260	260	260	260	260	1.300
Travel & Subsistence	180	180	180	180	180	900
Operating & Mtce.	80	90	100	100	100	470
Materials & Supplies	-	-	100	100	150	350
TOTAL	520	530	640	640	690	3.020

B. External Funding Agency (one thousand Belize \$)

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>TOTAL</u>
Training Activities	15	10	5	5	5	40
Equipment	10	5	-	-	-	15
Materials & Supplies	200	200	100	100	50	650
Vehicles	120	-	-	-	-	120
TOTAL	345	215	105	105	55	825

APPENDIX I

VIII. Evaluation Operations, 1981

	<i>Phases of the Program</i>				<i>TOTAL</i>
	<i>Attack phases</i>	<i>Consolid. phase</i>	<i>Mainten. phase</i>	<i>Non-malar area</i>	
1) Passive case findings:					
a) Hospitals, health and medical services					
Slides examined	5540	865	1895	0	8300
Positive cases	1265	136	52	0	1453
b) Voluntary collaborators					
Slides examined	1453	213	305	0	1971
Positive cases	353	11	9	0	373
2) Active case findings:					
Slides examined	6078	3613	1173	0	10864
Positive cases	130	4	2	0	136
3) Epidemiological investigation and follow-up:					
Slides examined	15202	8819	1304	0	25325
Positive cases	75	6	0	0	79
4) TOTAL					
Slides examined	28273	13510	4677	0	46460
Positive cases	1823	155	63	0	2041
<u>P. falciparum</u>	29	12	0	0	41
<u>P. vivax</u>	1794	143	63	0	2000
<u>P. malariae</u>	0	0	0	0	0
Mixed infections	0	0	0	0	0
Without species diagnosed	0	0	0	0	0

APPENDIX II

National malaria control services

Description:

This subhead is concerned with all activities oriented towards control and eventual eradication of malaria, including:

- a) Spraying operations
- b) Epidemiological evaluation
- c) Entomological investigation
- d) Health education.

A staff directed by a Medical Officer of Health undertakes the above work. Particulars of staff are set out in the schedule of Personal Emolument. An analysis of proposed expenditure in terms of Objective Accounts is as follows:

21.5 National Malaria Eradication Service

.1 Personal emoluments

259.547

1	Chief of Operation T2	8,405
1	Administrator C2	7,629
3	District Supervisors T4	17,813
1	Flying Squad Chief T4	5,388
1	Statistical Aid C3/4	5,233
12	Evaluators	58,208
1	Miscroscopist I T4	6,170
1	Miscroscopist II	4,404
1	Laboratory Aid	3,579
1	Mechanic T4	6,204
1	Assistant Mechanic T4	6,204
1	Secretary C4/3	7,047
1	Typist C4/3	7,047
1	Watchman & Relief T6	3,966
1	Messenger M	2,220
3	Spraymen (3 spray team 8 spraymen per team)	76,320
4	Flying Members T5	22,020

.2 Travel and Subsistence

183.195

A. Subsistence

1	Chief of Operations	4 day/wk @ \$48/wk	x 50 wks	2,400.
1	Flying Squad Chief	4 day/wk @ \$48/wk	x 50 wks	2,400.

APPENDIX II

3 District Supervisors	4 day/wk @ \$48/wk	x 50 wks	7,200
1 Statistical Aide	2 day/wk @ \$24/wk	x 50 wks	1,200
4 Flying Squad Members	4 day/wk @ \$48/wk	x 50 wks	9,600
12 Evaluators	3 day/wk @ \$36/wk	x 50 wks	21,600
3 Spraying Squad Chiefs	7 day/wk @ \$66.50/wk	x 50 wks	10,065
24 Spraymen	7 day/wk @ \$88.50/wk	x 50 wks	96,600

B. Subsistence: (Motor-cycle allowance)

12 Motor-cycles @ \$45.00 per month for 12 months	6,480
12 Motor-cycles @ .40 per mile @ 500 miles per month	2,400

C. Lodging

1 Chief of Operation - 3 days/wk @ \$45	for 50 wks	2,250
1 Flying Squad Chief - 3 days/wk @ \$45	" 50 wks	2,250
3 District Supervisors - 3 days/wk @ \$135	" 50 wks	6,750
4 Flying Squad Members - 3 days/wk @ \$180	" 50 wks	9,000
12 Evaluators		3,000

.3 Materials & Supplies

	<u>Quantity</u>	<u>Cost</u>
DDT - 100% - (500 gms/house)	5,000 kgs	\$17,000
DDT - 75% - (670 gms/house)	19,500 kgs	80,500
Kerosens for 100% DDT @ 54 gls.		
/24 lbs DDT	300 drms	50,000
Chloroquine 150 mg Tablets	170,000	8,500
Primaquine 15 mg Tablets	40,000	2,000
Primaquine 5 mg Tablets	27,000	1,350
Gemsa Stain	150 gms	2,000
Immersion Oil	14,000 cc	700
Sodium Posphate	700 gms	600
Microslides	60,000	4,500
Blood Lanclets	60,000	4,000
Uniforms		6,000
Stationery & incidentals		8,000

.4 Other operating & maintenance services

Running & maintenance of vehicles	70,000
Transport	7,500
Rentals	2,000

.8 Equipment

6 Hudson X-Pert Sprayers (3 gals)	3,000
Pump parts Hudson X-Pert	1,500

APPENDIX II

<u>CAPITAL EXPENDITURE</u>		<u>120,000</u>
Four (4) vehicles for spray team & District Supervisor	120,000	
		600,000
Total Recurrent Expenditure:		(711,892)
Total Capital Expenditure:		120.000

4. *Development of primary health care infrastructure*

A. *Buildings in Toledo as part of infrastructure for PHC*

(1) Renovation of Punta Gorda Hospital

- Lab including equipment
- Storage space to serve as District Supply Center
- Office space for:
 - (i) Health Education, Communication Center
 - (ii) Financial Management
 - (iii) Rural Water Project Manager
- Space for 2 physicians
- The design work space to accommodate Mayan culture
- Build Thatch kitchen in rear for visitors use
- Build shelter for hammocks " " "

(2) Renovate San Antonio H.C.

- Training Center conference room
- Laboratory
- 2 Bed holding area
- Bathroom with shower
- Office for C.N.P.
- Storage Vat
- Housing shelter - Thatch for hammocks

(3) Partition in S.P.C. for Treatment room

B. *Radio Communication System for Toledo* - Compatible with R.C.F.M. system

C. *Development of National P.H.C. program*

(1) Training D.N.T.s to be trainers, all districts including

Belize - CARICOM/AID

(2) Administrative infrastructure for coordination center of all Government and NGO PHC activities

- (a) Data processing
- (b) Word processing
- (c) Office space and equipment

(3) Upgrading and renovating existing clinics and hospitals preparatory to extension of service

(4) Plan to use volunteers through NGOs as health extension officers for the first 3 years

(5) Information Library. Central to each of 7 District Centres including B.C.H.

D. Equipment Maintenance/Vehicle Maintenance - Part of above

- (1) Equip service facility
- (2) Training

E. Hurricane Shelter - St. Martin de Porres

- Serve as pre-school
- Mobile H.C.
- Community Center

F. Support for Health Education - Part of C above

Video cassettes for urban H.C.s - 3-4 B.C.
6 Districts

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5. Toledo rural water supply and sanitation project

I. Summary

For the past year and a half, the Government of Belize has undertaken to introduce primary health care in the country. The Toledo District has been chosen as the site of Government's first major primary health care effort and a pilot programme of this nature is currently being implemented in the rural areas of the district. It is proposed that this programme be expanded to include a rural water supply and sanitation project.

Funds, in the amount of \$415 (USCY), over a three (3) year period are requested by the Ministry of Health for this project which would be integrated into the overall Toledo Primary Health Care Programme.

II. Background Information - The Toledo District

A. *General*

The Toledo District, with an area of some 1979 square miles, is the most southernmost of the six districts of Belize. The 1980 Census reported a total population of 11,762 with the main district town of Punta Gorda having a population of 2,396 and rural Toledo with 9,366.

About 70% of the population are Mayan Indians (consisting of two groups - Mopan Mayans and Kekchi Mayan). 20% are Garinagu (Caribs of African descent) with the remainder being Creole, East Indians and Chinese. The Mayan population is found in and around the villages of San Antonio, San Pedro Columiba, Crique Sarco and remote villages in the interior. The Mopan Maya live mainly around San Antonio and Aquacate. The Kekchi Maya

live in the south and in the interior. The Garinagu live chiefly in Punta Gorda Town and in the coastal settlements of Monkey River and Barranco.

Toledo is the least developed district of Belize. One of the main factors that has affected the district's development is the lack of an adequate communication/transportation system within the district as well as from Toledo to the other parts of the country. Bad weather conditions, prevailing for a large part of the year, affect communication by road, sea and air. The road network in the rural areas is poor.

The Maya of the interior practice subsistence farming although in some areas red kidney beans and rice are grown as cash crops; citrus and bananas are produced in the northern part of the district. The Carib villages rely largely on fishing, including lobster and shrimp.

B. Health

The mortality rates in Toledo are significantly higher than the national figures. In 1980, the mortality rate was estimated to be 9.5/1000 for Toledo and 5.5 for all districts. Accurate data on the causes of death in Toledo are not readily available. Nevertheless, important causes of death appear to be acute respiratory infections including pneumonia and whooping cough, gastroenteritis, hypertension and diabetes mellitus.

The reported infant mortality rate for Toledo in 1980 is 58.3 in contrast to the national rate of 40.2. The reported neonatal death rate is not significantly higher than that of total Belize, hence it appears that the excess infant deaths occur in the postnatal period when

environmental factors exert their influence. The data, however, must be interpreted with caution as it is likely that there is considerable under reporting of vital events in the Toledo District. There is reason to believe that when accurate data are available the infant mortality rate will be shown to be higher than what is now recorded.

Reliable morbidity data for the district are difficult to obtain. The main problems of the Maya would seem to be intestinal parasitic infections, especially hookworm and Trichuris diseases. A study done by Garcia in 1977 in the villages of San Antonio, Santa Elena, Pueblo Viejo, Crique Sarco and San Lucas showed that 91% of the 812 persons from which stool specimens were obtained had at least one intestinal parasite. More than one third had multiple infestation. The main parasites were found to be hookworm (*Necator*), *Ascaris* and *Trichuris*.

Malaria is prevalent, cases were reported in 1981 but there is thought to be considerable under-reporting in view of the remoteness of the region and difficulties experienced in adequate epidemiological surveillance of Malaria.

Anemia is reported to be a major problem in women and children but due to the absence of laboratory facilities it is impossible to quantify the extent of its occurrence. A survey on the prevalence of parasitic infection and anemia conducted in May of 1979 in the San Antonio-San Pedro area revealed that the vast majority of school children and pregnant mothers are anemic.

Malnutrition is prevalent. Computations from clinic records of weights at the Punta Gorda Hospital for 1976 show that of the 359 children

studied, two percent were found to be severely mal-nourished (Gomez III); eleven percent were Gomez II and thirty-three percent in Gomez I.

Gastroenteritis quite frequently occurs affecting chiefly the under five population.

Skin infections - impetigo and fungus infections are common. The former occurs chiefly in children.

C. Water supply and sanitation

The Government of Belize has adopted the goal of providing one well fitted with a hand pump for every ten (10) households (average household size according to 1980 Census: 5.7) in rural areas with a population under 250 and a community rudimentary water supply system in those villages with a population over 250. There are a total of thirty-one (31) hand pumps in rural Toledo, or one hand pump for every 296 persons.

Over the last ten years several attempts have been made to improve environmental sanitation in Toledo through the provision of pit latrines in the rural areas. These efforts have not met with success. Although more than 1,700 seats and concrete slabs have been provided, just over 600 latrines have been built. It is estimated that only between 5 and 10% of the latrines built in Mayan villages are used as toilets. The reasons for this lack of success may be failure to convince the Maya of the need to use latrines and of the problems associated with them. The water table is very high in Toledo so that the pits are quickly filled with water. There is an associated offensive odour, users are splashed by the water during defecation, and the Mayas believe that the latrines are

breeding places of mosquitos and may therefore be the cause of the recrudescence of malaria.

III. Objectives

Over a three-year period, it is proposed:

A. To ensure a safe water supply to approximately 6,500 persons in the Toledo District by providing fourteen (14) villages with a total of forty-eight (48) wells and hand pumps and six (6) villages with rudimentary community water supply systems.

B. To identify and introduce sanitary, appropriate and culturally acceptable methods of excreta disposal to the rural population of the Toledo District.

C. To provide health education to the Toledo population specifically related to water and sanitation.

IV. Strategies and Activities

The project will be an integral component of overall Toledo Primary Health Care Programme. Through village health committees (presently being established) and the village councils, community members will participate in the planning, construction, financing, operation and maintenance of both water supply and excreta disposal systems. Through stipended village Community Health Workers, trained at the districts primary health centres, water supply and sanitation public health education will be delivered to the population.

The following table outlines by village the number of wells,

fitted with hand pumps, that will be installed.

<i>Village</i>	<i>Population (1980)</i>	<i>Number of households</i>	<i>Present # of wells & pumps</i>	<i>Wells & pumps to be constructed</i>	<i>Total upon completion of project</i>
Aquacate	149	32	0	3	3
Baranco	229	58	0	5	5
Big Falls	323	57	0	5	5
Crique Sarco	184	42	0	4	4
Dolores	193	38	0	3	3
Laguna	205	50	0	5	5
Moho River/San Lucas	197	34	0	3	3
Otoxha	182	36	0	3	3
San Benito Pointe	261	42	0	4	4
San Miquel	227	43	1	3	4
Santa Elena	177	32	1	2	3
Santa Teresa	116	23	0	2	2
Silver Creek	175	27	1	2	3
Forest Home	206	38	0	4	4
TOTAL	2,824	552	3	48	51

Rudimentary piped water supply systems will be provided to the following villages:

<i>Village</i>	<i>(1980) Population</i>
Indian Creek	264
Pueblo Veijo	346
San Antonio	1,087
San Jose	599
San Pedro Columbia	784
Santa Cruz	349

Prior to introducing the programme to any of the villages,

community surveys will be conducted to determine present water supply and sanitary practices.

In the case of villages receiving a piped rudimentary water supply system, residents will be mobilized in the laying of the pipes. A revolving loan fund will be established to make financing available to residents to cover the costs of home connections.

Through the village councils, residents will contribute a small monthly fee which will be used to maintain the equipment. Each village will choose a resident who will be trained to and responsible for maintaining the equipment.

Technical assistance has been requested of the British Development Division to determine the most feasible and appropriate water supply for each village as well as to identify appropriate latrine technologies. The United States Peace Corps will be requested to provide a volunteer for on site, day-to-day technical assistance.

In addition to intra-sectoral coordination with all health care programmes of the Ministry of Health, inter-sectoral coordination is anticipated with the Ministry of Social Services (community development and village councils), the Ministry of Education (water conservation and environmental sanitation curriculum development in the schools) and other programmes and projects operating in the Toledo District.

The entire project will be administered by the Ministry of Health through the Principal Public Health Inspector. A Project Coordinator, based in the Toledo District will be hired for the duration of the project.

The project will be coordinated through the district health team.

Research and study will be undertaken to determine appropriate latrine technology suited to the local economic, geographic and social conditions. On an experimental basis, various types of sanitary excreta disposal systems will be introduced to some of the villages.

V. Budget

<i>A. Funds requested (over a three year period)</i>	<i>In U.S. currency</i>
1. Salary of Project Coordinator	\$ 17,000
2. Supplies	
- 6 piped water systems (fittings, pipes, generator, casings, cement tanks)	200,000
- 48 wells and hand pumps (fittings, pipes, well roads, casings)	48,000
- latrines	60,000
- spare parts	4,000
3. Equipment	
- four-wheel drive vehicle	15,000
- well rig	50,000
4. Revolving Loan Fund	15,000
5. Health Education Supplies and Equipment	
- 2 generators for showing movies	2,000
- electric stencil cutter	2,000
- movies, printed material, etc.	2,000
	<u>\$ 415,000</u>

B. Resources provided by the Ministry of Health

The Ministry of Health's contribution to the project will include:

- administrative support
- clerical support

- telephone and telegraph
- office space
- office supplies
- vehicle maintenance and gas
- support of Ministry staff in organizing communities and in health education
- use of educational equipment, i.e. mimeograph machine, movie projectors, overhead projectors, etc.
- use of one of the Ministry's well rigs*
- manpower of well drilling teams assigned to the project

Rural Water Supply System

As part of the International Drinking Water Supply and Sanitation Decade, the Ministry of Health has adopted the following goals for achievement by the year 1990.

1. To provide all rural areas with populations over 250 with a public rudimentary water supply system.
2. To provide all rural areas with populations under 250 with bored wells and hand pumps at the rate of one per every ten households (WHO Standard)

A number of strategies will be employed in the provision of rural water supply. These include:

- integration with primary health care programmes
- community participation

*The Ministry of Health currently has four (4) well rigs. However they are not in very good condition. Given the terrain of the Toledo District, it will not be possible to use them in certain remote areas. Hence an additional well rig, suitable for Toledo's terrain is requested in this proposal.

- close linkage with health education
- appropriate technologies
- inter and intra sectoral coordination

Criteria for providing water supply will include:

- health aspects with recognition of existing health and health related programmes
- population sizes to give the greatest cost effectiveness versus health effectiveness
- existing levels of service
- cost effectiveness versus village spread
- accessibility
- logical progression of drilling from a logistics point of view
- water quality

Recently the Public Health Inspectorate undertook a study of the present situation of rural water supply. Based on available data it was determined that the present situation of water supply, by district, is as follows:

<i>District</i>	<i>Number of Persons Per Available Hand Pumps and Wells</i>
Belize	44
Cayo	160
Corozal	134
Stann Creek	190
Orange Walk	119
Toledo	296

Although greater study and analysis is required, a cursory

review of data suggests a significant relationship between health status and the availability of potable water supply, by district, in Belize.

A draft proposal has been developed for a rural water supply project in the Toledo District, to be implemented over the next three years. The following is a project of the number of additional wells, hand pumps and piped rudimentary water supply systems that would be required to bring similar projects to the other districts of the country by the year 1990.

<i>District</i>	<i>Piped Rudimentary Supply Systems</i>	<i>Bore Wells Fitted With Hand Pumps</i>
Corozal	20	12
Orange Walk	7	23
Belize	8	19
Cayo	9	53
Stann Creek	7	45
TOTAL	<u>51</u>	<u>152</u>

A rough estimate of the material and equipment for implementing projects in the above mentioned five (5) districts is as follows:

(In U.S. Currency)

<i>District</i>	<i>Rudimentary Systems</i>	<i>Hand Pumps</i>	<i>Total</i>
Corozal	\$ 650,000	\$ 24,000	\$ 674,000
Orange Walk	227,500	46,000	273,500
Belize	260,000	38,000	298,000
Cayo	292,500	106,000	398,500
Stann Creek	227,500	90,000	317,500
	<u>\$1,657,500</u>	<u>\$304,000</u>	<u>\$1,916,500</u>

USCY

These costs do not include labour, nor administrative and support costs.

Estimates* for cement slabs and wooden risers for drop privy-pit latrines for the country of Belize with the exception of the Toledo District.

1. Belize District	-	500
2. Orange Walk District	-	500
3. Corozal District	-	500
4. Cayo District	-	500
5. Stann Creek District	-	500
		<u>2,500</u>

Total slabs and risers required - 2,500

1. Materials - slabs	-	\$ 50.00
2. - risers	-	20.00
3. Labour	-	5.75
		<u>\$ 75.75</u>

Cost of producing 1 slab and riser - \$75.75

Cost for 2,500 slabs and risers x \$75.75 = \$19,000.00

*Belize currency

HP - Hand Pumps
 RWS - Rudimentary Water Supply

WATER SUPPLY

Villages and Rural Localities With More Than 50 People

<i>Area</i>	<i>Population 1980 Census</i>	<i>No Households</i>	<i>Water Supply</i>
<u><i>Corozal District</i></u>			
Buena Vista	330	60	2-HP
Calcutta	709	118	1-HP
Caledonia	942	160	1-HP
Carolina	197	32	
Chan Chen	351	62	4-HP
Chunok	439	61	
Concepcion	608	107	8-HP
Consejo	60	11	
Consejo Road	59	11	
Copper Bank	190	28	
Cristo Rey	377	60	11-HP
Estrella	118	21	
Libertad	1,518	274	RWS
Little Belize	329	51	
Louiseville	439	82	7-HP
Paraiso	510	84	4-HP
Patchakan	700	112	13-HP
Progreso	781	130	
Ranchito	604	98	8-HP
San Adres	459	73	4-HP
San Antonio	264	42	4-HP
San Joaquin	929	161	RWS
San Narciso	1,436	245	3-HP
San Pedro	271	53	6-HP
San Roman	448	78	6-HP
San Victor	349	63	5-HP
Santa Clara	449	72	3-HP
Santa Cruz	69	13	
Sarteneja	1,005	187	
Kaibe	760	125	10-HP
Yo Chen	78	17	1-HP
<u><i>Orange Walk District</i></u>			
August Pine Ridge	885	154	2-HP
Blue Creek	661	118	
Carmelita	164	64	
Chan Pine Ridge	291	48	
Douglas	453	78	

<i>Area</i>	<i>Population 1980 Census</i>	<i>No Households</i>	<i>Water Supply</i>
<i>Orange Walk District (cont)</i>			
Guinea Grass	1,291	201	RWS
Hill Bank	66	41	
London	64	15	1-HP
Nuevo San Juan	111	21	4-HP
Richmond Hill	50	13	
San Antonio	345	61	2-HP
San Estevan	978	166	RWS
San Felipe	585	96	RWS
San Jose	1,164	185	RWS
San Jose Palmar/Nuevo	477	77	1-HP - RWS
San Lazaro	567	106	6-HP - RWS
San Lorenzo Road	404	72	
San Luis	162	34	5-HP
San Pablo	638	101	1-HP -RWS not working at present
San Roman, Rio Hondo	352	65	
Santa Cruz, Rio Hondo	76	9	
Santa Martha	121	31	5-HP
Ship Yard	2,446	374	
Tower Hill	193	39	
Trial Farm	483	85	15-HP
Trinidad	423	75	12-HP
Yo Creek	810	130	RWS
<i>Belize District</i>			
Ambergris Caye	1,136	241	RWS
Bermudian Landing	220	39	6-HP
Biscayne	136	31	2-HP
Bomba Nor. River	51	11	
Burrell Boom Area	684	157	8-HP --RWS
Caye Caulker	435	116	
Corozalito	71	13	5-HP
Crooked Tree	508	105	7-HP
Crooked Tree Road	111	14	3-HP
Dcuble Head Cabbage	294	52	12-HP
Flowers Bank	142	31	3-HP
Freetown Sibun	71	18	1-HP
Gales Point	365	65	RWS
Grace Bank	114	14	
Gracie Rock	366	57	
Isabella Bank	58	16	3-HP
Kings College	53	2	
Lucky Strike	160	45	5-HP
Ladyville	1,806	338	11-HP - RWS connected to B.C. System

<i>Area</i>	<i>Population 1980 Census</i>	<i>No Households</i>	<i>Water Supply</i>
<i>Belize District (cont)</i>			
La Democracia	113	27	3-HP
Lemonal	191	29	
Maskall	675	126	14-HP
May Pen	132	22	
Hattieville	657	119	4-HP -RWS
Northern Highway (20 - 27 mile)	168	41	
Old Hattieville	132	35	
Rancho Dolores	282	45	3-HP
Rockstone Pond	114	18	13-HP
San Hill Area	412	87	10-HP
Santana	195	47	11-HP
Salt Creek Road	75	12	3-HP
Scotland Half Moon	117	20	5-HP
St Ann's	98	22	11-HP
St Paul's Bank	120	18	6-HP
Western Highway (Burdencana to Tropical Park)	110	24	
Willows Bank	120	26	10-HP
<i>Cayo District</i>			
Arnez	159	25	
Augustine Pine Ridge	164	43	
Benque Viejo Rural	179	32	2-HP
Blackman Eddy	201	37	3-HP
Buliatt Tree Falls	438	67	1-HP
Calla Creek	149	27	
Central Farm	250	54	
Chiquibul Road	82	11	
Cool Shade	55	7	
Cotton Tree Bank	127	21	1-HP
Cristo Rey	335	55	3-HP
Esperanza	845	130	RWS - connected to San Ignacio System
Georgeville	405	70	2-HP
Hummingbird Hershey	108	42	
La Clarissa Falls	58	8	
Lower Barton Creek	230	34	
Macaw	86	16	
Mile 30 to Sibun River	104	26	
More Tomorrow	84	13	
Norland Farm	100	28	
Ontario	408	71	2-HP

<i>Area</i>	<i>Population 1980 Census</i>	<i>No Households</i>	<i>Water Supply</i>
<u><i>Cayo District (cont)</i></u>			
Paslow Falls, Plantain Sucker and Romano	124	19	
Paslow Falls Road	88	14	
Pilgrimage Valley	45	11	
Roaring Creek	842	138	6-HP - connected to Belmopan System
San Antonio Caye	736	119	4-HP
Santa Familia	441	72	
San Jose	68	11	
San Jose Succotz	945	164	1-HP -RWS- connected to Benque System
Spanish Lookout Road	76	15	
San Luis	103	39	
San Martin and Branch Mouth	129	16	
Spanish Lookout	1,276	217	
Teakettle	576	93	5-HP
Unitedville	324	56	6-HP
Upper Barton Creek	111	13	
<u><i>Stann Creek District</i></u>			
Agricultural Station	57	17	
Alta Vista	182	33	
Canada Hill Road	70	13	1-HP
Cow Pen	266	80	1-HP
Georgetown	220	42	2-HP
Hopkins/Commerce Bight	749	127	2-HP
Lyman	91	2	1-HP
Mango Creek/Independence	1,474	261	2-HP
Maya Centre	91	15	
Maya Mopan	61	12	1-HP
Melinda	179	32	
Middlesex	275	55	
Mullins River	211	38	
Placnecia	334	164	
Pomona	434	104	1-HP -RWS
Qualn Bank	112	59	
Riversdale	54	15	
Santa Rosa	162	26	
Seine Bight	465	94	
<u><i>Stann Creek Valley Road</i></u>			
A. Dangriga Boundary (To Five Miles)	154	30	1-HP

<i>Area</i>	<i>Population 1980 Census</i>	<i>No Households</i>	<i>Water Supply</i>
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Stann Creek Valey Road (cont)

B. 5 Miles to Hope Creek Bridge	69	11	?
C. Hope Creek to Melinda	96	26	?
D. Agri. Station to Pomona	65	14	?
E. Pomona to Alta Vista	162	40	?
F. Alta Vista to 35½ Mls.	97	20	?
G. 16 Miles to 21 Miles	361	83	
H. Wala Loaf	104	?	

Toledo District

Aguacate	149	32	
Barranco	229	58	
Big Falls (including Never Delay and Esperanza)	323	57	
Big Falls Road	175	30	3-HP
Blue Creek	191	36	
Cattle Landing	97	19	
Crique Jote	164	30	1-HP
Crique Largarío	53	9	
Crique Sarco	184	42	
Dolores	143	38	
Dump	53	7	
Elridge	135	20	
Fairview	56	10	
Forest Home	206	38	
Golden Stream	68	13	
Hicattee Creek	110	21	
Indian Creek	264	51	
Jacintqville	107	19	1-HP
Jalacte	58	12	
Laguna	205	50	
Mabila	57	10	
Mafredi	129	22	1-HP
Moho River	134	23	
New Road	106	15	
Otoxha	182	36	
Pueblo	346	66	1-HP
P.G./San Antonio Road 2½ - 3½ Miles	87	15	9-HP
P.G./San Antonio Road 10 miles	67	11	9-HP
P.G./San Antonio Road 14 Miles	92	17	9-HP
P.G./San Antonio Road 18 Miles	70	14	9-HP

<i>Area</i>	<i>Population 1980 Census</i>	<i>No Households</i>	<i>Water Supply</i>
<i>Toledo District (cont)</i>			
P.G./New City Area	81	16	
Punta Negra	55	7	
San Antonio	1,087	229	2-HP
San Benito Pointe	261	42	
San Felipe	47	110	
San Jose	599	110	
San Lucas			
San Miguel	227	43	1-HP
San Pedro Columbia	784	142	2-HP
Santa Cruz	349	75	1-HP
Santa Elena	177	39	1-HP

V. COMMENTS

Why a new Belize City Hospital (BCH)?

Why improve district hospitals (DH) and expand their function(s)?

The BCH is old, falling apart, difficult and costly to maintain, inadequate, hazardous to staff and patients (even in good weather no less in tropical storms) and needs to be replaced. However, any proposed structure and function depend on its role in a system of personal health services. Other considerations in decision-making, for example, include the availability of suitably trained stable health personnel of all types. Whether or not the network of DH is improved and expanded, there is a need for a BCH as it is the only hospital available to the public in a metropolitan area which serves nearly one-third of the population of the country.

The BCH is also the only referral center in the country. Transportation costs are prohibitive, amounting to thousands of dollars, for air evacuation of each critically ill patient to medical centers in the U.S.A. or Panama. At present, only a few patients whose prognosis appear favorable are sent abroad for definitive diagnosis and treatment.

What are the alternatives and what are the demands each imposes? One is to upgrade the DH and to improve locally available services. At present and in an expanded network, each DH serves as a subcenter providing support/management/consultation to peripheral curative and preventive services, to environmental services, to local people seeking ambulatory medical care and hospitalization for childbirth and certain illnesses and accidents. With the exception of Belmopan, surgery cannot be performed in the DH network owing to lack of skilled personnel, and, to a certain extent, facilities and equipment. The work of the District Medical Officer (DMO)

is demanding for he serves as physician/manager/public health officer responsible for the total array of preventive and curative services — a difficult task requiring broad clinical and public health training and experience, at best, rare in new medical recruits. The 'turnover rate' of medical and nursing personnel was not documented but is said to be rapid and emigration frequent. Present vacancies go unfilled. If an improved and expanded DH network were to become a reality, at least one problem would be recruitment and retention of an increased number of suitably trained health professionals. At present, nursing is in a better position than medicine re training since a system of sound training in nursing is already in place in Belize and augmented by advanced studies in the Caribbean region. At present, there is no radiologist or pathologist in the country.

Another possibility would be to limit improved DH to one or two areas which are remote from Belize City and ready referral. Such an example might be the DH at Punta Gorda.

The choice is not a matter of an improved BCH or network of DH but would appear to be a balanced development of a nationwide system of facilities to support a system of services beginning with small communities and including a new BCH.

Future Assistance

Nothing illustrates the economic difficulties faced by the Belizean health sector so well as the problem of a new hospital for Belize City. The total cost will depend on the number of beds (which could be anywhere from 150 to 200), on how much is spent to "hurricane-proof" the building, and on how much can be salvaged from the existing hospital. Estimates run about 15 million dollars; that is 100 dollars for every man, woman and child in the country. Even if the cost were spread over ten years, the construction of the hospital would take an amount equal to one-eighth of total current health spending every year during that period. To repay a loan for the full amount over the ten years would absorb the proceeds of about one percent of total exports. These are not insurmountable sums, but they indicate why a new hospital is unlikely to be built without foreign assistance. No other likely use for external resources is health is anywhere near so large.

Belize may have to depend, for the foreseeable future, on foreign assistance for such large capital investments. It should not, however, need much if any assistance for a variety of measures that would improve the functioning of the health sector and get more use out of the existing capital. The difficulty is that the decisions on some of these issues - proper use of district hospitals, correct staff balance, desirable vehicle fleet - are connected to the decisions as to how large a hospital is needed, and what services it should provide. This means that foreign aid that paid for a new hospital would incidentally facilitate the rationalization of the system of which the hospital is part.

Medical and nursing manpower at the Belize City Hospital (BCH) and elsewhere
in the country

Data concerning medical and nursing manpower are shown in the Health Profile of Belize (see tables 111-4, 111-5, 111-6, 111-7, and 111-9). At the time of our visit, three general practitioners staff the BCH's three outpatient clinics; four generalists provide services in its Emergency Room; there are 9 specialists — two internists, two general surgeons, two gynecologists, one pediatrician, and one full-time and one part-time ophthalmologist; and there are 5 house officers — two in surgery and one each in medicine, pediatrics, and gynecology. About 10 MDs practice privately full-time in Belize City outside the hospital. In the rest of the country, there is one specialist — a surgeon in Belmopan; another 10 MDs practicing privately full-time; and one or two (usually two) medical officers in each district. These physicians are permitted to do private practice in addition to their government duties.

There is no medical training program in Belize.

The Health profile points out that nursing is a critical area despite local training programs; emigration is frequent; and 50 established positions went unfilled in 1980. A nursing manpower study is in progress which seeks to estimate requirements of the entire system of health services and to plan an appropriate training program in nursing. Therefore, it is not possible at present to assess the adequacy of training programs until a rational plan emerges, needs are identified, and capabilities to match needs examined.

Comment on Malaria Control

It is generally accepted that the implementation of such programs is associated with improved economic as well as general health. However, attainment of goals requires not only sufficient funds; and continuity of technical assistance from PAHO, for example, but sustained commitment locally and regionally, and support services, such as, transportation; vehicle maintenance; recruitment, training and retention of stable personnel; and competent management services.

Comment on Rural Water Supply and Sanitation in Programs

To combat environmental diseases and problems in rural areas the Public Health Inspectorate in the Ministry of Health implemented a successful Rural Water Supply and Sanitation Program with assistance from CARE. The Ministry proposes to re-activate this program with external assistance, and a PAHO environmental health mission to Belize in April 25-30, 1982 gave the program top priority for documentation and funding, especially in view of the constant increase in refugee settlements in rural areas.

It is understood that the program would consist of the following:

a) Water supply

- Survey of water needs and supplies in rural areas.
- Collection of hydrogeological data for subsurface water exploration.
- Drilling of wells and installation of hand-pumps for communities less than 250 in population.
- Development of rudimentary water supply systems (well, storage tank, pump and distribution main) in communities with over 250 in population.

b) Excreta disposal

- A study of appropriate latrine technology and community needs in all rural areas.
- Privy construction program, including pre-casting of slabs and

and risers, and making of wooden seats at a central plant; and the installation of latrine units at pre-selected homes where pits have been dug beforehand.

c) General

- Within the context of a Primary Health Care Program, the environmental health education of the communities and the active participation of the public in the program.

Another important aspect of this highly commendable program is the preference of the Ministry to initiate activity in the Toledo Primary Health Care pilot district so that the program will be integrated into the Primary Health Care system from the start. It should also be coupled with the mosquito control operations in the malaria and *Aedes-aegypti* control programs.

There is no question about the great need in rural Belize for water supply and excreta disposal facilities. Certainly their development throughout rural communities can have the greatest beneficial effect towards better community health. Because of this conviction PAHO is in the process of assisting the Ministry in documenting the project for external funding.

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