

COMBATTING CHILDHOOD COMMUNICABLE DISEASES PROJECT

COUNTRY ASSESSMENT

RWANDA

Country Assessment Team:

Government of Rwanda
Centers for Disease Control
USAID - Rwanda

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TABLE OF CONTENTS

	Executive Summary	1
1.0	Introduction	4
2.0	The CCCD Project	4
3.0	Methods Used in Rwanda CCCD Country Assessment	6
4.0	Background Information on Rwanda	7
	4.1 Geography	7
	4.2 Transportation and Communications	7
	4.3 Recent History	8
	4.4 Economy and Fiscal Policy	8
	4.5 Population	11
	4.6 Demography	11
5.0	Health System	15
	5.1 Ministry of Health	15
	5.2 Missionary Health Facilities	16
	5.3 Pharmaceuticals	17
	5.4 Health Personnel	20
	5.5 Health Facilities	23
6.0	The Third Economic Plan 1982-86	26
7.0	Budget and Health Financing	28
	7.1 National Budget	28
	7.2 Public Health Budget	28
	7.3 External Assistance to the Health Sector	29
8.0	Health Information Systems	31
	8.1 Routine Morbidity Reporting	31
	8.2 Birth and Death Reports	32

9.0	Disease Epidemiology	35
	9.1 Birth and Death Rates	35
	9.2 Infectious Disease Morbidity and Mortality	35
	9.3 Diseases Preventable by Immunizations	37
	9.4 Diarrheal Disease	37
	9.5 Malaria	39
10.0	Programs for Control of Childhood Communicable Diseases	39
	10.1 Expanded Program on Immunizations (EPI)	39
	10.2 Diarrheal Disease Control	45
	10.3 Malaria Control	47
	10.4 Maternal and Child Health	50
	10.5 Nutrition Centers	50
	10.6 Health Education/Information	51
11.0	Strategy for a Bilateral CCCD Project in Rwanda	51
	11.1 Proposed CCCD Activities in Rwanda	53
	11.2 Proposed Objectives and Targets for CCCD Activities	58
	11.3 Proposed Workplan for CCCD Activities	60
12.0	Proposed CCCD Budget	62
	12.1 Budget	62
	12.2 Recurrent Costs	62
13.0	Acknowledgements	68
Annexes		69

EXECUTIVE SUMMARY - RWANDA

The Combatting Childhood Communicable Diseases (CCCD) Project is an effort of Cooperation for Development in Africa (CDA) to assist African nations to reduce childhood morbidity and mortality through improved public health programs to control vaccine-preventable diseases, malaria and diarrheal diseases.

At the request of the Republic of Rwanda, a preliminary study was conducted of the feasibility of implementing a bilateral CCCD program in Rwanda. From October 5-27, 1983, a CCCD assessment team of two CDC technical consultants, the USAID health/population officer, and several Rwandan Ministry of Public Health (MOH) officials carried out the following activities:

- o review and analysis of current morbidity and mortality of communicable diseases;
- o review and analysis of current Rwandan policies, plans and strategies for the control of childhood communicable diseases;
- o observation of ongoing activities in childhood disease control programs;
- o assessment of the effectiveness of current activities in controlling target diseases.

About one-quarter of all children born in Rwanda die before reaching five years of age. According to available health information, the CCCD target diseases are major causes of reported outpatient visits, hospitalizations and

hospital deaths. Malaria is the most frequently reported disease in Rwanda. Measles, diarrheal diseases (excluding bacillary dysentery), malaria and tetanus account for 52 percent of the nine most common causes of hospitalization. Measles, diarrheal disease and malaria account for 67 percent of the eight most common causes of hospital deaths.

Because of the public health importance of measles, tetanus, and whooping cough, the MOH initiated the Expanded Program on Immunization (EPI) in 1978. The EPI in Rwanda is a national immunization program that has effectively used USAID, UNICEF and WHO support to achieve significant progress in reducing morbidity and mortality from vaccine-preventable diseases. Based on current data, the number of measles cases reported in 1983 will be only 20 percent of the total number of cases reported in 1980. An unusual part of the Rwanda EPI is the supervision system based on one EPI regional supervisor in each prefecture. Although its full potential has yet to be realized, the regional supervisors effectively supervise EPI activities at the peripheral level.

Only a small part of health facilities use oral rehydration solution (ORS) as the primary treatment of dehydration caused by diarrheal disease. Limited supplies of ORS (both in individual packets and in bulk) have been available. There is no overall national strategy to increase the use of ORS either in health facilities or the community.

Although malaria is an important cause of morbidity and mortality in Rwanda, there is no nationally coordinated program for malaria control. A variety of antimalarial medicines are widely used to treat acute fevers presumed to be

malaria. Vector control measures are limited to urban areas (about 5 percent of the population). P. falciparum resistance to chloroquine is suspected on the basis of treatment failures.

The CCCD assessment team recommends a bilateral CCCD project for Rwanda to maintain the momentum of the EPI program and to help the MOH initiate coordinated efforts to reduce childhood mortality caused by diarrheal diseases and malaria. The success of the EPI program indicates the level of government commitment to preventive health programs. The EPI will be assigned the additional responsibility for diarrheal diseases and malaria to provide the focus for personnel training; provision of ORS and chloroquine; management information system; and supervision and evaluation for all three program activities. The CCCD project located in the National Directorate of Epidemiology would integrate all three programs.

The preliminary budget for a 4 year bilateral CCCD project is \$1,926,971. Personnel costs are not included. Bilateral (USAID) assistance will be \$1,030,797. The Government of Rwanda (GOR) will contribute \$896,174. The GOR will also provide for the costs associated with the additional new positions recommended by the CCCD assessment team. Several factors clearly illustrate the GOR's capability and willingness to assure that recurrent costs will be covered. The GOR proposes to meet two thirds of the recurrent costs during the life of the project. This represents a modest 2 percent annual increase in the overall public health budget. Furthermore, the GOR has historically followed a fiscally conservative economic policy--reducing expenditures when government income is reduced.

1.0 Introduction

The Combatting Childhood Communicable Diseases (CCCD) project is the major health initiative of the group Cooperation for Development in Africa (CDA) (member countries are Belgium, Canada, France, Germany, Italy, the United Kingdom and the United States). The United States Agency for International Development (USAID) has coordinating responsibility for the CCCD project. The Centers for Disease Control (CDC), an agency of the United States Public Health Service in Atlanta, Georgia has managerial responsibility for United States technical cooperation under the CCCD project.

In September 1982, the Republic of Rwanda, through the U.S. Embassy Kigali, requested USAID and CDC to assist the Ministry of Public Health (MOH) in a CCCD country assessment to develop a comprehensive program for combatting childhood communicable disease in Rwanda.

2.0 CCCD Program Components

2.1 Goal

The CCCD project focuses on three of the most important causes of childhood mortality in Africa for which practical and effective control measures are presently available. The three priority areas for CCCD are:

- diseases preventable by immunization (particularly the EPI program)
- diarrheal diseases (particularly the syndrome of dehydration)
- malaria.

These three disease groups are among the most important causes of morbidity and mortality in Africa particularly in the CCCD selected target groups of (a) children less than 5 years old and (b) pregnant women. The CCCD program can also support public health measures to control other childhood communicable diseases that are important public health problems in particular countries if effective public health control measures for the disease exist.

The interventions proposed in the CCCD program emphasize a public health and primary health care ("soins de sante primaire") approach as opposed to hospital based/curative one. The CCCD programs emphasize activities at peripheral health facilities ("formations sanitaires") and, as much as possible, in the community.

2.2 Strategy

The major interventions advocated by the CCCD program are:

- Immunization of children less than one year of age against measles, whooping cough, tetanus, diphtheria, polio and tuberculosis.
- Immunization of pregnant women with tetanus toxoid to prevent neonatal tetanus in their children.
- Use of oral rehydration during diarrhea to treat and prevent dehydration - the major cause of death in acute diarrhea in infants.

- Adequate feeding of infants during and immediately after attacks of diarrhea (and other acute illnesses) to prevent retardation of growth and development and increased susceptibility to infectious disease.
- Presumptive treatment of all acute malaria attacks in children less than 5 years old and pregnant women with effective antimalarial drugs (emphasis is on chloroquine, the lowest cost and most effective antimalarial drug).

2.3 Regional and Bilateral Technical Assistance

There are two major types of cooperation available in the USAID funded portion of the CCCD project - regional and bilateral.

Regional cooperation is available to all subsaharan African nations on request through the USAID. The regional activities are primarily technical cooperation in the areas of:

- training of health personnel
- development of training materials
- improvement of health information systems
- operational research
- health education

Bilateral cooperation is available through bilateral agreements between USAID or other member nations of CDA on the one hand, and particular African nations, on the other. Bilateral CCCD projects are generally 4 years in length and include material cooperation and increased technical cooperation in support of:

- training of health workers
- development of training materials
- operational research
- health information systems
- transport
- cold chain and vaccination equipment
- oral rehydration salts
- chloroquine
- health education activities
- long term technical assistance

2.4 Rwanda Country Assessment

The objective of the Rwanda CCCD country assessment was to determine the current health situation in the Republic of Rwanda and design a proposal for a bilateral project to strengthen program activities in the CCCD priority programs. Specific activities were to (a) assess current plans and strategies for primary health care, (b) identify available and needed resources, and (c) determine specific needs for external assistance. The assessment report is intended to contain the information necessary to develop a project grant agreement if Rwanda is selected for U.S. bilateral assistance through CCCD.

3.0 Country Assessment

3.1 Method of Assessment

During the period from October 7 to October 27, 1983, an assessment of current and proposed primary health care activities in Rwanda was conducted by a team consisting of officials of the Ministry of Public Health; the USAID population officer; and a technical officer and a medical officer from CDC.

Initial coordinating meetings were conducted with the Secretary General and the Director of the Epidemiology Bureau in the Ministry of Public Health. At that time, a schedule of site visits was developed. The Assessment Team visited the central, regional and peripheral levels of both the public and private church affiliated health sectors in Kigali, Butare, Gisenyi and Ruhengeri in order to observe the delivery of health services and review health related procedures and documents at these levels. The representatives of French and Belgian cooperation agencies and UNICEF were visited. A complete list of persons and organizations participating in the assessment can be found in Annex 1.

3.2 Scope of Work

Preliminary assessment activities focused on the following activities:

- Review and analysis of current Rwandan policies, plans and strategies for the control of childhood communicable diseases;
- Review and analysis of current morbidity and mortality of priority diseases;
- Observation of ongoing activities in childhood disease control programs;
- Assessment of the effectiveness of current activities in controlling the targeted diseases.

Based on the activities, the Team identified strengths and weaknesses of ongoing efforts, determined additional resource needs, and designed a work plan and budget to accomplish primary health care goals related to CCCD in Rwanda.

4.0 Background Information - Republic of Rwanda

4.1 Geography

Rwanda is a small, landlocked equatorial country located in the mountains of east-central Africa. The country covers 25,261 km² and is approximately the size of Maryland, and roughly circular in shape. It borders Uganda on the North, Tanzania on the East, Burundi on the South, Zaire and Lake Kivu on the West.

Mountains rise steeply along the western edge of the country with the Virunga range of volcanoes along the northwest frontier. Another mountain range runs along the southwestern portion of Rwanda. These mountain ranges are part of two major African watersheds. The area west of the mountains drains into the Zaire river basin. The eastern section (four-fifths of Rwanda) drains into the Nile River basin.

The rest of the country consists of steep hills and low mountains, diminishing in height towards the east and southeast. Near the Tanzanian border, the semi-arid savanna is broken by low hills, swamps and shallow lakes. The Akagera National Park runs along the eastern border and contains 10% of the land area of the country.

Rwanda's economic growth in the second half of the 1970's was due, in part, to good weather. There are two rainy seasons from February through May, and from November to December which allows two growing seasons. Approximately 55 percent of the land is cultivated, 20 percent pasture and 11 percent forest.

4.2 Transportation and Communications

Domestic transport is almost totally dependent on the road system which consists of 2,280 km of major roads of which only 490 km are paved. The few paved roads connect Kigali, the capital, to Uganda, Tanzania and Burundi. It is possible to drive across the country in 5-6 hours. District and rural roads total an additional 4,000 km. A considerable part of the road system is of poor quality with uneven surfaces; steep gradients and many narrow curves. Some parts of the country lack year-round passable roads. Air transport plays a very limited role in the internal transport of goods because of the small size of the country. Rwanda has no major waterways, however, the eastern shore of Lake Kivu lends itself to limited navigation. Rwanda has no internal railroad system.

The nearest railheads are in Kampala, Uganda and Kigoma, Tanzania. These two main transport corridors provide Rwanda access to Indian Ocean ports. The Northern route via Kampala, Uganda to Mombassa, Kenya (1,740 km by road or 1,924 km by road/rail) carries more than 70 percent of Rwanda's total external trade. The southern route via Bujumbura, Burundi to Dar es Salaam, Tanzania (1,715 km) is the other major access by road/lake/rail transport. The high cost of external transport is due to cumbersome administrative and customs procedures governing transit traffic, multiple border crossings, and deteriorating road conditions in Uganda.

Air transport plays a significant role in Rwanda's external transport. According to the World Bank, 20 percent of Rwanda's total foreign trade is

handled by the Kigali airport which has recently been expanded to handle wide-bodied aircraft and store/handle larger volumes of goods.

In addition to the severe restraints on the transport of goods, Rwanda's communication system is expensive and limited. Two factors, however, operate to the country's benefit. Rwanda is a linguistically homogenous country and small in size. These factors enable complete radio coverage of the population from Kigali. Although only 5-6 percent of all Rwandans speak French, everyone speaks Kinyarwanda. Recent estimates of the number of radios in Rwanda vary from 80,000 to 150,000. Radio is generally acknowledged to be extremely effective in the diffusion of news and other programs. Two weekly health programs are broadcasted throughout Rwanda and forty percent of the population above the age of 7 is able to read (1978 census).

4.3 Recent History

Rwanda became independent of its Belgium trusteeship on July 1, 1962 under the leadership of President Kayibanda. The Rwandan Armed Forces overthrew the Kayibanda regime following a period of ethnic and political unrest on July 5, 1973, in a bloodless coup known as the Second Revolution. Under the Movement Revolutionnaire National pour le Developement (MRND), a new constitution was approved in a national referendum in 1978, and Major General Habyalimana was elected, without opposition, to a five year term as President of the Republic. Gradually civilians have replaced the military as heads of most ministries. Presidential elections are scheduled for December 1983.

RWANDAN ADMINISTRATIVE LEVELS

<u>Level</u>	<u>No.</u>	<u>Ave. Population</u>	<u>Civil Authority</u>	<u>Medical Authority</u>
Prefecture	10	500,000	Prefect	Regional Medical Director
Commune	143	35,000	Bourgmeister	Director, Health Center
Sector	1400	3,000	Committee	Sanitary Agent, health post (planned)
Cell	22,000	50 families	Committee	-

4.4 Economy/Fiscal Policy

According to World Bank estimates, the Rwandan GNP per capita in 1982 was \$239 compared to the middle income level of sub-sahara Africa of \$1,053. This per capita income is one of the lowest in the world. The Rwandan economy depends heavily on agriculture which provides 47 percent of the GDP, 90 percent of employment and 60-70 percent of all export earnings. Over 95 percent of the population lives in rural areas, cultivating an average of less than one hectare per family. About one-fourth of the annual rural income is monetized

income derived from the sale of coffee, tea, pyrethrum, cinchona or food crops. Despite its high population density and small farm size, Rwanda has traditionally been able to feed itself. Food production has increased steadily in recent years. This has been achieved through substantial increases in cultivated land area, government incentive price policies, favorable weather conditions and hard work. Even so, unchecked population growth threatens to outstrip increases in food production. Staple food crops include bananas, sweet potatoes, cassava, potatoes, beans, sorghum, maize, peas and peanuts. Foodstuff cultivation accounts for over 80% of the agricultural production. Cash crops contribute 5% to the gross domestic product, but also account for 80% of the country's export earnings. The main cash crops are coffee and tea which provide major cash earnings for farmers, trade, budget equilibrium and foreign exchange reserves.

Manufacturing (16%) and commerce (15%) are the next most important components of the GDP after agriculture. Mining constitutes 2 percent of the GDP and nearly 20% of exports.

The Rwanda economy is potentially very vulnerable. For this landlocked country, access to foreign markets to sell its exports depends upon friendly relations with neighboring countries. More important, the rapid growth (3.7%) of Rwanda's present population (5 1/2 million persons) impedes real economic growth. The limitations to further expansion of the agricultural sector is clearly illustrated by the intense cultivation of almost all arable land in this hilly country. Lack of natural resources such as oil and minerals further hinders economic diversification and expansion. In spite of these impediments, Rwanda's GDP between 1969 and 1981 is estimated to have grown 5 percent in real terms. Accelerated growth accrued in the second half of the seventies due to favorable weather conditions, high world market coffee prices, and good economic management by Rwandan officials including sound fiscal, balance of payments and debt management. Additional factors include political stability, the relatively low share of resources devoted to defense expenditures, and the government's concern with fostering equity in economic opportunity.

Traditionally, the Government has pursued conservative fiscal policies. A principal indicator of this has been the budget surpluses during 1977-81 of 2.5 percent of the GDP. In addition to the budget surpluses, the economic growth of the late seventies allowed the Rwandan government to increase both the recurrent/operational and development budget expenditures. The economic situation, however has worsened since 1981. Budgetary receipts from coffee export duties have remained at lower levels and inflationary pressures have risen mainly from supply shortages caused by frequent disruptions of external trade routes because of political problems in Uganda. Thus, in contrast to preceding years, increases in revenues have fallen short of increases in expenditures, and budget surpluses have disappeared.

Unlike some other African countries, Rwanda's current financial difficulties are more attributable to external factors than to poor economic management. External debt servicing is not as burdensome since Rwanda receives its external loans at very low interest rates which are payable over long periods. One of the more favorable aspects has been, according to the World Bank, the willingness of the Government to acknowledge and respond to the current financial situation. The prospects of economic growth improves as the world's economic situation improves.

Table 4.1: Economic Indicators - Rwanda

<u>Gross Domestic Product in 1981</u>	<u>Annual Rate of Growth (%, Constant 1976 Prices)</u>		
	<u>US \$ Mln.</u>	<u>%</u>	<u>1977-81</u>
GDP at Market Prices	1,257.8	100.0	5.8
Gross Domestic Investment	282.4	22.5	8.0
Gross National Saving	109.8	8.7	-
Current Account Balance	-172.6	-13.7	-
Export of Goods, NFS	150.9	12.0	-3.9
Import of Goods, NFS	332.0	26.4	5.0
<u>Merchandising Exports (Average 1978-81)</u>			
	<u>US\$Mln.</u>	<u>%</u>	
Coffee	79.5	54.8	
Tea	10.6	8.0	
Cassiterite	17.6	13.1	
Wolfram	5.5	4.1	
Pyrethrum	1.3	0.9	
Cinchona	1.9	1.5	
Other	<u>23.9</u>	<u>17.6</u>	
	140.3	100.0	

Government Finance

	<u>Central Government</u>		
	(RWF Mln.)	% of GDP	
	<u>1981</u>	<u>1982</u>	<u>1972</u>
Current Receipts	14,827	12.7	8.3
Current Expenditure	14,040	12.0	10.7
Current Surplus	787	0.7	-2.4
Capital Expenditures	2,562	2.2	1.2
Overall surplus	-2,241	-1.9	-3.0

Money, Credit and Prices

	1977	1978	1979	1980	1981
	(Million Rwf outstanding end period)				
Money Supply	10,175	11,204	14,185	15,331	16,331
Bank Credit to Government (net)	363	23	-1,350	-2,929	-1,939
Bank Credit to Private Sector	4,389	5,134	4,563	6,515	8,171
	(Percentage or Index Numbers)				
Money as % of GDP	14.0	13.8	14.6	14.4	14.2
Consumer Price Index (Jan-Mar 1976=100)	116.7	131.3	152.1	163.2	172.8
Annual percentage changes in:					
Consumer Price Index	14.5	12.5	15.8	7.3	6.5
Bank Credit to Government (net)	-77.4	-93.7	-5970.0	-117.0	33.8
Bank Credit to Private Sector	60.1	17.0	11.1	42.8	25.4

SOURCE: WORLD BANK, 1983

4.5 Population

The estimated population of Rwanda in 1982 was 5,530,000. There are three main ethnic groups: the Hutu (90 percent of the population), the Tutsi (9%) and the Twa (1%). Traditionally the Hutu are cultivators, the Tutsi as cattle raisers, and the Twa as hunters and gatherers. For hundreds of years, Rwanda was a feudal society with a Tutsi monarchy. In return for the loan of Tutsi cattle and use of pastures and farm land, the Hutu pledged their services to a Tutsi lord. Over time the boundaries of race and class faded as successful Hutu entered the Tutsi aristocracy and the fortunes of some Tutsi declined. In 1959, the Hutu overthrew the Tutsi monarchy in a bloody revolution. This has resulted in significant numbers of Rwandans (an estimated 2 million in Zaire) moving to neighboring countries. The aim of the present government which came to power after the last period of ethnic unrest in 1975, has been to reconcile the various ethnic groups and promote equitable economic and social development of the country.

All Rwandans speak the same language (Kinyarwanda), and share a common culture. In recent times, population pressure has reduced the importance of cattle raising. Almost 95% of the population depends upon farming. Most Rwandans live in scattered family homesteads, cultivating less than one hectare of hillside farmland to support an average of 5 persons. The urban population is only 4.5 percent of the total population. Kigali, the national capital, is one of the smallest capital cities in the world.

Rwanda is largely a Christian country with 51.7 percent Catholic and 15.2 percent Protestants. The educated elite is largely Catholic. Animists total 24 percent, Adventist 6.3 percent and Muslims less than 1 percent.

4.6 Demographic Data

Rwanda has the highest population density in Africa (1978 - 258 persons per km² of arable land) and the third highest in the world after Bangladesh and Sri Lanka. The estimated population in 1982 was 5,530,000. The population is expected to reach 10 million by the year 2000 and 23.5 million by 2020 if the present growth rate of 3.7 percent and the fertility rate of 8.8 children per woman (1982) continues. Extremely rapid population growth represents Rwanda's overriding development problem. The government has adopted an active policy to address this concern.

A national census was conducted in 1978. Prefecture population, density per square kilometre and 1970-1978 population growth rate are shown on Table 4.2:

Table 4.2: Population Distribution and Growth Rate by Prefecture and Arable Land, 1978

<u>Prefecture</u>	<u>1978 Population</u>	<u>Density per Arable Km²</u>	<u>1970-1978 Annual Growth Rate</u>
Butare	602,550	342.9	.9
Byumba	521,894	200.3	4.5
Cyangugu	333,187	298.4	2.2
Gikongoro	370,596	237.3	1.7
Gisenyi	468,882	357.6	2.8
Gitarama	606,212	281.0	2.8
Kibungo	361,249	135.5	5.1
Kibuye	336,588	259.5	4.7
Ruhengeri	<u>531,927</u>	<u>368.8</u>	<u>1.6</u>
Total	4,831,527	258.0	3.3

Source: Census - 1978

Based on the current population estimate of 5,530,000 in 1982, the population density per km² of arable land has risen to 295.3 persons.

Pertinent age and sex data, also taken from the 1978 census are as follows:

Table 4.3: Population by Age and Sex, 1978

<u>Age</u>	<u>Male</u>	<u>Population Female</u>	<u>Total</u>	<u>% of Total Population</u>
0-4 yrs.	461,245	465,401	926,646	19.2%
5-9 yrs.	329,828	343,321	683,149	14.1%
10-14 yrs.	<u>295,658</u>	<u>296,169</u>	<u>591,827</u>	<u>12.2%</u>
Sub-total	1,096,731	1,104,891	2,201,622	45.5%
15-19 yrs.	191,468	286,718	579,186	12.0%
19 yrs. +	<u>973,978</u>	<u>1,076,741</u>	<u>2,050,719</u>	<u>42.5%</u>
Total	2,363,177	2,468,350	4,831,527	100.0%

Source: Census - 1978

Table 4.4: Social Indicators

	Rwanda			Reference - low Income Sub-Sahara African States
	1960	1970	Most Recent Est.	
Population (000)	2,858.0	3,695.0	5,530.0	---
% Urban...	2.4	3.2	4.5	17.8
Population density per arable sq km.	189.3	240.7	295.3	86.7
Crude Birth Rate	51.2	---	53.3	47.3
Crude Death Rate	27.2	22.3	20.1	19.5
Life Expectancy at Birth (years)	37.2	42.1	45.2	45.6
Infant mortality rate (per 000)	147.0	142.0	137.0	129.9
Child mortality rate (ages 1-4)	32.0	30.5	29.0	26.7
Primary School Enrollment (%)				
Male	68.0	83.0	74.0	72.7
Female	30.0	64.0	67.0	50.2
Total	49.0	73.0	70.0	63.2
Secondary School Enrollment (%)				
Male	2.0	3.0	3.0	13.2
Female	1.0	1.0	1.0	6.6
Total	2.0	2.0	2.0	10.2
Vocational Enrollment (% of Secondary)	39.9	12.2	16.7	7.9
Adult literacy Rate (%)	16.4	23.0	49.5	34.0

Source: World Bank

5.0 Health System

The health sector in Rwanda is a mix of governmental, private church affiliated and private institutions (see Annex 4). The MOH has the overall planning and managerial responsibility. The MOH directly runs about half of the health facilities in Rwanda. Private church affiliated health facilities are integrated into the overall national health system. Private companies are important in pharmaceuticals. In addition, foreign support from French and Belgian cooperation and from private church affiliated/philanthropic organizations is substantial. Ministries other than the MOH administer important health related activities in Rwanda. These outside MOH health activities include:

<u>HEALTH ACTIVITY</u>	<u>MINISTRY RESPONSIBLE</u>
a) Family Planning	Social Affairs and Community Development (MINISODECO)
b) Nutrition Centers	Social Affairs and Community Development (MINISODECO)
c) Training of Physicians	Higher Level Education
d) Paramedics Training	Primary and Secondary Education (MINIPRISEC)

5.1 Ministry of Public Health

The Ministry of Public Health has the responsibility for coordination, planning and management of all health activities in Rwanda. The present organizational structure of the MOH is shown in Annex 4. The MOH has a relatively small number of physicians (the Minister, Secretary General, Director General of Basic Health Services, Director of OPHAR and Director of Epidemiology) who are involved in most major decisions in the health sector. The MOH occupies several buildings in Kigali which provide clearly inadequate physical space for the MOH staff.

The MOH has pursued a policy of decentralization of management to the Regional Medical Directors in the 10 Prefectures. The Regional Director's office staff includes an administrative assistant, secretary, nurse in charge of pharmacy, a nurse in charge of statistics, the chief of the hygiene activities, and the regional EPI supervisor. The Regional Director supervises all health facilities (both MOH and private church affiliated) in the prefecture. The Regional Director should visit each facility every three months.

5.2 Private Church Affiliated Health Facilities (Agree)

Christian religious missions play an important role in the delivery of curative and preventive health services in Rwanda. The MOH supports private church affiliated health facilities by (a) assigning MOH staff ("sous-statut") to the facilities, (b) subsidizing 80% of the salaries of some professional staff and (c) providing some drugs. However, the bulk of operating funds comes from fees charged for services and philanthropic donations from inside and outside Rwanda. Because of external financial resources and religious commitment of its staff, private church affiliated health services often are (a) better equipped; (b) have fewer interruptions of supplies of medicines and (c) offer a wider range of services than comparable MOH facilities. Expatriates occupy major professional and managerial positions in many private church affiliated health facilities. The private church affiliated health facilities are certified ("agree") to provide care in Rwanda under conventions with the State. They are legally under the direction of the MOH.

5.2.1 BUFMAR

In 1974, the Christian medical missions formed a coordinating agency called BUFMAR ("Bureau des Formations Medicales du Rwanda"). BUFMAR has offices in Kigali that include (a) a pharmaceutical production and repackaging facility, (b) storerooms; (c) a health document center; (d) a workshop producing health education materials (such as flannograms and posters). BUFMAR prepares and repackages pharmaceutical, represents the member health facilities in contact with the MOH and conducts 4 well-attended weekend training sessions on health and development a year. The 1983 budget is 29 million FRW of which almost all is derived from the sale of pharmaceuticals. BUFMAR has increased in size and activity in recent years. The facilities represented by BUFMAR are listed in Table 5.1.

Table 5.1 Health Facilities in BUFMAR

<u>Church</u>	<u>Hospitals</u>	<u>Health Centers</u>	<u>Dispensaries</u>	<u>Maternity</u>	<u>Total</u>
Catholic	5	51	10	2	68
Anglican	3	1	1	-	5
Adventist	1	4	-	-	5
Presbyterian	2	4	-	-	6
Baptist	-	2	-	-	2
Methodist	1	-	-	-	1
Pentecostal	-	-	1	-	1
Other	<u>1</u>	<u>1</u>	<u>1</u>	<u>-</u>	<u>2</u>
	12	63	13	2	90

Source: BUFMAR (adapted)

5.3 Pharmaceuticals

There are five major means of acquisition of pharmaceuticals for Rwanda: (a) the Ministry of Public Health Directorate of Pharmaceuticals ("OPHAR"); (b) private pharmacies, (c) foreign assistance to MOH hospitals; (d) foreign assistance to private church affiliated health facilities, and (e) BUFMAR.

In 1982 the estimated total expenditure on pharmaceuticals was at least 490 million FRW (US\$ 5.2 million) or about one dollar per person. Although direct foreign assistance to medical missions is unknown, the following are estimates of drug acquisitions in 1982. OPHAR purchased about 100 million FRW of medicines; private pharmacies imported about 230 million FRW worth; French and Belgium cooperation activities imported about 140 million FRW of medicines (principally for the hospitals in Ruhengeri, Kigali and Butare); and BUFMAR sold about 20 million FRW worth of drugs.

Rwanda established a list of essential drugs ("liste de medicaments essentiels") in 1980. The list includes 286 products. To date, the essential drug list has only been implemented in POHAR and the MOH hospitals and health facilities.

Present MOH policy is that medicines are provided free of charge to hospital patients and ambulatory patients. In practice, the cost of medicines is partly recovered through the small fees charged by MOH facilities - hospitalized patients pay 20 FRW (US\$ 0.22) per day and out-patients 10 FRW (US\$ 0.11) for treatment of each illness. Missionary health facilities charge the same fees plus some additional charges for special services and medicines.

Major changes are in the offing in the pharmaceuticals sectors in Rwanda.

- The construction of a large new storage and administrative facility of OPHAR.
- The start-up of a well equipped pharmaceutical production and repackaging laboratory in Butare.
- A new MOH policy establishing communal pharmacies in every commune that would charge fees for medicines.

5.3.1 OPHAR

OPHAR ("Office Pharmaceutique du Rwanda") is the MOH unit responsible for the purchase and distribution of medicines and supplies to both MOH and private church affiliated health facilities. OPHAR was created in 1962. The budget for OPHAR were identical in 1977 and 1982 - 130 million FRW (US\$ 1.4 million). Considering that (a) OPHAR is the primary source of medicines for most MOH facilities; (b) the Rwanda population increased by about 800,000 persons in the time period and (c) inflation averaged 10% per year: There was a substantial decrease in the quantity of medicines available through OPHAR between 1977 and 1982.

OPHAR distributes pharmaceuticals directly to hospitals and to health centers through the Regional (Prefectural) Health Offices. OPHAR ships pharmaceuticals once every three months. Hospitals, health centers and dispensaries have fixed FRW quotas. Government health facilities receive much larger quotas than private church affiliated ones as shown in the following table.

TABLE 5.2: OPHAR Annual Quotas (FRW) by Type of Health Facility

<u>Type of Health Facility</u>	<u>Range of OPHAR Quota in FRW, 1982</u>	<u>Approximate Value in US Dollars</u>
1) Health Regions	2-8,000,000	\$ 21,000-84,000
2) Kigali Hospital	18,000,000	\$189,500
3) Butare Hospital	10,000,000	\$105,250
4) Other MOH Hospitals	3,500,000	\$ 36,800
5) Missionary Hospitals	260,000	\$ 2,700
6) Missionary Health Centers and Dispensaries	80,000	\$ 840

Source: Rapport Annuel 1982 (MOH)

The amount of pharmaceuticals supplies by OPHAR is quite small. It is not surprising that most MOH facilities run out of pharmaceuticals within a few weeks after the quarterly OPHAR supply has been delivered.

OPHAR presently occupies crowded and poorly maintained quarters in Kigali. An African Development Bank (ADB) project is financing the construction of new storage and administrative facilities for OPHAR in Kigali. When completed in 1984 or 1985, the new facilities should help alleviate the present storage and management problems experienced by OPHAR.

5.3.2 Pharmaceutical Laboratory, Butare

The construction, equipping and stocking with basic materials of a modern pharmaceutical laboratory in Butare has just been completed. The laboratory was constructed and equipped with financial and technical assistance from Belgium. OPHAR is responsible for the acquisition of primary materials and packaging materials. At the time of the CCCD assessment in October 1983, sophisticated equipment for all phases of preparing and packaging pills, capsules, syrups, suppositories, and oral rehydration salts had been installed. There was a large stock of bulk materials and packaging materials but actual production had not been started. All pharmaceuticals produced will be sent to OPHAR for distribution. The laboratory had on hand bulk materials to prepare several million chloroquine tablets and several hundred thousand oral rehydration salt packets to make up one liter of solution.

5.3.3 Communal Pharmacies

The MOH plans to establish a semi-governmental pharmacy system similar to TOGOPHARMA in Togo. The new pharmacy system would be administratively a part of OPHAR and would sell medicines to the public at concessional prices. The semi-governmental scheme has been chosen to make the pharmacy system financially autonomous and able to use its income to buy medicines. The MOH and OPHAR cannot provide adequate funds to purchase enough medicines to fill public needs as indicated by frequent shortages of medicines in government health facilities. Because of these shortages and the clear evidence the public is willing to pay even the high prices charged by private pharmacies, the MOH will abandon the current policy of free medicines. The plan envisages the gradual creation of a communal pharmacy in each of the 143 communes. Present plans are that the communal pharmacies will be initially located in and staffed by existing health centers. The scheme is under review in the MOH, in part because no financial support for the initial stocking of the communal pharmacies has been found. Although there are potentially serious personnel, management, and financing problems, this scheme, if effective, would be a major step in making health services generate income and improving the availability of medicines.

5.3.5 BUFMAR Pharmaceutical Importation and Production

BUFMAR is authorized to import medicines in bulk free of taxes. It repackages the medicines and, in a small laboratory, prepares liquid medicines, syrup, suppositories, and an oral rehydration salt mixture. The pharmaceutical activity is supervised by a Dutch pharmacist. About fifty basic medicines are sold to the private church affiliated health facilities. In 1983, pharmaceutical sales to members of BUFMAR will be about 20 million FRW (US \$210,000).

5.4 Health Personnel

Expenditures for personnel constitute about 60% of the recurrent budget of the MOH.

Summary data on the types and numbers of health personnel in active service (1982) is shown on Table 5.3. Several important points should be noted:

Physicians: The physician/population ratio is 1:29,000. Although this is much less than the WHO recommendation of 1:10,000, it is a 17% improvement over the ratio in 1979. Sixty-eight percent of practicing physicians are Rwandans; in 1967 only 10% were Rwandan. Most physicians are engaged in hospital-based clinical practice.

Medical Assistants: More than half of the medical assistants are employed in peripheral dispensaries or health centers where they practice primarily curative medicine since these facilities are not staffed by physicians.

Nurses and Nurse-midwives: There are 3 types of nurses and 3 types of nurse-midwives including aides who are trained "on the job". There is little difference in the training of a nurse A2 and a medical assistant A2. However, the great majority of medical assistants are employed in dispensaries and health centers and the majority of nurses are engaged in hospital nursing. Midwives are employed in maternities attached to hospitals or freestanding maternities.

Laboratory Assistants, Sanitary technicians, X-ray Technicians: The number of personnel in these professions is extremely limited. UNICEF and WHO have helped to establish a laboratory school at Butare, however, the first class will graduate in 1986/7.

Traditional Practitioners: There are as many as 50,000 herbalists practicing part-time. They clearly constitute the most numerous category of health personnel in the country. Traditional birth attendants are much less common. In a recent survey in the Gahini region, only 4% of home deliveries were attended by a traditional birth attendant.

Table 5.3: Health Personnel in Active Service, 1982

<u>Category</u>	<u>Rwandans</u>	<u>Expatriates</u>	<u>Total</u>	<u>Ratio in 1000</u>
Medecins	132	62	194	1:29
Assistants medicaux	276	2	278	1:20
Infirmieres A1	49	27	76	1:73
Infirmieres A2	333	92	425	1:13
Infirmiers A3	344	14	358	1:15
Infirmieres	74	4	78	1:71
Aide accoucheuse	185	1	186	1:30
Aide infirmieres	199	8	207	1:27
Sociales	117	5	122	1:45
Technician Vaccin	73	1	74	1:75
Pharmacien	6	1	7	1:790
Dentiste	-	2	2	1:2,765
Autres	<u>156</u>	<u>11</u>	<u>167</u>	1:33
TOTAL	1,944	230	2,174	

Source: Annual Report - 1982 (MOH)

Table 5.4 summarizes the current status (1982) of students in Rwanda's health professions schools. Several additional points should be noted:

One basic problem in understanding the work of paramedical personnel is the lack of clear definitions of the different categories of personnel. For example, medical assistants A2 (male) and nurses A2 (female) both receive 6 years training in similar fields. Medical assistants normally direct health centers; nurses staff hospitals.

The establishment of new categories of paramedical health professionals and the development of training curricula is the responsibility of the Ministry of Primary and Secondary Education. Although these tasks are supposed to be a joint effort of both ministries, there is little collaboration.

Table 5.4: Students in Health Schools, 1982

Facility	Graduates	School Year							Total
		1st	2nd	3rd	4th	5th	6th	7th	
<u>University</u>									
Medicine	24	41	22	27	24	16	24	--	154
Pharmacy	--	36	8	--	--	--	--	--	44
Public Health	17	35	16	18	--	--	--	--	69
<u>Medical Assts.</u>									
Butare	24	42	31	--	--	25	30	22	150
Kigali	16	--	--	--	34	21	17	19	91
Kibogora <u>Nurse A2</u>	--	44	32	--	31	30	--	--	137
Kabgayi	8	--	--	--	22	14	15	18	69
Rwamagana	19	41	22	--	--	17	14	7	101
<u>Nurse A3</u>									
Kirinda	17	32	18	--	--	18	--	--	68
Mugonero	--	--	--	--	--	23	--	--	23

Source: Annual Report 1982 (MOH)

One can project, based on the above table, the average number of future graduates per year: 20 physicians, 20 medical assistants and 15 nurse A2's. These amounts are significantly lower than projected requirements described in the Third Development Plan (1982-1986).

5.5 Health Facilities

Rwanda's network of health facilities is reasonably well developed and services are fairly evenly distributed throughout the country. This coverage is due, in part, to the close relationship between government and private church affiliated activities. Prior to Rwanda's independence, the private church affiliated medical sector expanded almost as rapidly as the government sector. In addition to the private church affiliated - operated facilities, there are a few other privately-run health facilities associated with industry. Access to health facilities, however, is difficult because of the scattered located of houses ("collines"), poor roads and hilly terrain.

Health facilities consist of four major types: hospitals (referral, regional and rural), health centers (by definition to include a dispensary, maternity and nutrition center), dispensaries (usually only outpatient care) and specialized institutions. The Third Development Plan (1982-1986) states that there should be, at a minimum:

- three hospitals in each prefecture; a regional hospital located in the prefectural seat and two rural hospitals
- one health center in each of the 143 communes
- one health post in each sector.

The following is a brief description of the current status of Rwanda's health facility infrastructure.

5.5.1 Hospitals

There are 27 hospitals in Rwanda including three reference hospitals in Kigali, Butare (the University Hospital), and Ruhengeri. Of the ten prefectures, three do not have a regional or reference hospital located in the regional capital city. The remaining 20 hospitals are classified as rural. There are specialty hospitals in Rwanda for patients who have leprosy, tuberculosis, or who are physically or mentally handicapped.

The total number of hospital beds in Rwanda is 4,394. The private sector accounts for 2,304 or 52 percent of these beds. Including the 3,498 additional beds in health centers and dispensaries, the total hospital bed/population ratio is 1 to 683. Table 5.4 summarizes the distribution of hospitals and beds by prefecture.

Table 5.5: Hospitals and Hospital Beds by Prefecture, 1981

Prefecture	Hospital		Hospital Beds*	Beds Per 1000
	Public	Private		
Kigali	1	1	1,241	1.5
Gitarama	1	1	1,115	1.7
Butare	1	2	1,145	1.7
Gikongoro	-	1	468	1.2
Cyangugu	1	2	640	1.7
Kibuye	1	2	681	1.9
Gisenyi	3	1	688	1.3
Ruhengeri	1	1	688	1.2
Byumba	2	1	420	0.7
Kibungo	<u>2</u>	<u>2</u>	<u>806</u>	<u>1.9</u>
Sub Total	<u>13</u>	<u>14</u>	7,896	1.5
Total	27			

*Includes beds located in health centers and maternities

SOURCE: ANNUAL REPORT, 1981 (MOH)

5.5.2 Health Centers

The focal point for the delivery of primary health care services is the health center. As the primary source of health care in a commune, a health center serves an average of 35,000 people within a radius of 8 to 10 kilometers. It also evaluates cases referred from nearby dispensaries. Health centers' services include diagnosis and treatment, maternal/child health care, acute emergency care, prevention services and, in some cases, family planning and nutrition education.

There are 126 health centers in 101 of the 143 communes. Thus, 42 communes lack a health center, however 25 of these have dispensaries which will be upgraded through renovation and enlargement. Some of these communes are presently served by hospitals. Only seven communes in five regions are not served by any health facility. Minimum professional staffing at a health center includes a medical assistant, a nurse-midwife, a social worker, an auxiliary nurse or nurse's aide and, in some cases, a vaccinator.

5.5.3 Peripheral Health Facilities: Dispensaries and Health Posts

The quality of services provided at the dispensary level varies throughout the country, due in part to the number of staff, supply of drugs and materials available. Most dispensaries will be either upgraded to health center status or be downgraded to health posts in the upcoming years.

Health posts have been established in a dozen places, largely voluntary and self-supporting. The MOH expects to establish one post in each of the 1400 sectors. Health posts will be staffed by sanitary agents who will promote MOH health programs and provide limited services. This program level is in the developmental stage.

Table 5.6 summarizes the distribution of both public and private health centers, dispensaries, maternities (separate from hospitals or health centers which also provide maternity services), and health posts.

Table 5.6: Non-Hospital Facilities

<u>Prefecture</u>	<u>Health Centers</u>		<u>Dispensaries</u>		<u>Maternities</u>		<u>Health Posts</u>	
	<u>Public</u>	<u>Private</u>	<u>Public</u>	<u>Private</u>	<u>Public</u>	<u>Private</u>	<u>Public</u>	<u>Private</u>
Kigali	16	10	11	3	-	-	-	7
Gitarama	11	4	8	1	1	-	-	-
Butare	5	13	11	1	-	1	-	-
Gikongoro	2	8	3	2	-	-	-	1
Cyangugu	1	4	8	1	-	-	2	1
Kibuye	2	10	-	3	-	-	-	-
Gisenyi	5	5	4	3	-	2	-	-
Ruhengeri	9	7	4	1	-	-	-	-
Byumba	3	4	11	2	-	-	1	-
Kibungo	<u>5</u>	<u>2</u>	<u>5</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
Sub Total	<u>59</u>	<u>67</u>	<u>65</u>	<u>17</u>	<u>1</u>	<u>3</u>	<u>3</u>	<u>9</u>
Total	126		82		4		12	

6.0 The Third Economic, Social and Cultural Development Plan, 1982-1986

6.1 Health Policy

The national health policy is based on the concept of "medecine de masse" as a means to achieve the World Health Organization's goal of health for all by the year 2000. As described in the Third Development Plan (1982-88), the national health policy gives priority to prevention, access to health care services, and improvements in the distribution of pharmaceuticals. Prevention activities include improved maternal/child health services, nutrition education, school health (primarily immunization), and occupational health. Access to health services includes the decentralization of services and utilizing the potential of traditional medicine. Top priority is given to the childhood immunization program (EPI) with its goal of total coverage of infants under the age of 1. Second priority is given to the proposed school health (immunization at the primary school level) program. With the exception of the EPI program, no other high priority activity has a measurable objective.

6.2 National Health Plan and Strategy

The main features of the health program as outlined in the Third Development Plan do not reflect the priority given to prevention as stated in the national health policy. The development plan is geared basically towards the construction or renovation of health facilities and increases in trained personnel.

6.2.1 Health Facilities

The national health plan calls for the expansion in the number of health facilities at each administrative level. Each of the ten prefectures should have one regional hospital and two rural hospitals. In turn, each commune should have one health center. All dispensaries should be upgraded to health centers. A new entry-level network of health posts should be created, one in each sector. In addition, the annual increase of hospital beds, currently at 1.9%, should match with the annual population increase of 3.7%.

6.2.2 Health Personnel

Additional personnel should be trained to meet current and future staffing needs. Categories of personnel to be trained include physicians, medical assistants, nurses, pharmacists, dental technicians and laboratory workers. Funds for training health personnel are contained in the development budget of the Ministry of Education.

The national plan also calls for improvement in the distribution of pharmaceuticals, however, the plan does not clearly define the necessary steps to be taken. There is mention of a new system of pharmacies at the commune level where out-patient drugs will be sold. This concept is not fully developed.

The Third Development Plan also includes the development budget.

Table 6.1: Third Development Plan 1982-1986
(FRW in millions)

<u>Program</u>	<u>Amount</u>
<u>I. RENOVATION AND IMPROVEMENTS</u>	
Expansion of 10 hospitals for a total of 800 new beds	1,410
Improvement of 46 health centers	<u>465</u>
Sub Total	1,875
<u>II. NEW CONSTRUCTION</u>	
8 new hospitals	3,082
35 new health centers	763
31 new nutrition centers	93
123 commune pharmacies	1,055
New center for traditional medicine	25
1 mental health dispensary	40
OPHAR new building	<u>178</u>
Sub Total	5,236
<u>III. TRAINING (Ministry of Education)</u>	
Paramedicals	(495)
Physicians	(N/A)
<u>IV. PROGRAMS</u>	
Vaccination program - primary schools	N/A
Vaccine program for under 1 year	120
Nutrition surveillance	<u>33</u>
Sub Total	<u>153</u>
TOTAL HEALTH DEVELOPMENT PLAN	7,264

SOURCE: IIIeme Plan de Development 1982 - 1986

6.3 Limitations of the National Plan and Development Budget

The plan was published in November 1982 and does not take into consideration the current problem of fiscal constraints. The plan is oriented to infrastructure and personnel expansion and many proposals are not clearly developed. The health plan has been revised in May 1983 at a health program workshop sponsored by the World Health Organization. The revision reduces the expansions of health facilities and personnel, however, further elaboration and budget estimates are unknown. The revised plan has not been officially announced.

7.0 Budget and Health Financing

7.1 National Budget

The national budget for Rwanda consists of two parts: the operational budget and the development budget. In 1982 and 1983, Rwanda projected small increases in both its ordinary and development budgets. The ordinary budget, covering recurring operational expenses, increased by 12% in 1982, and by 14% in 1983. The development budget, providing investments in infrastructure and expanded production, grew by 20% in 1982, but only by 2.6% in 1983 reflecting budget and fiscal constraints. Straining under the impact of the world recession, the GOR has followed its customary conservative fiscal policy. Anticipated deficits for 1982 were largely covered by increasing the money supply and increased postal and communication charges. Personal taxes were increased in 1981. It is anticipated that the government will raise consumer taxes on beer and cigarettes as well as import duties to increase government receipts in 1983.

The national budget for 1983 provides major increases for the certain ministries: primary and secondary education (an increase of 18%; 22% of the overall budget), higher education and research (an increase of 21%; 3% of the overall budget) and finance (an increase of 15%; 18% of the overall budget). Although one-third of all ministries' budgets were reduced in 1982, only the budgets for the Civil Service, Commerce and Natural Resources were reduced in 1983.

7.2 Public Health Budget

The public health budget for Rwanda in 1983 totals 888,908,494 FRW (US \$9,716,972), an increase of 7% over the previous year. Like many other ministries, the Ministry of Public Health budget had been reduced in 1982 (by 4%). Despite the increase in 1983 resources, the proportion of the national budget allocated to public health decreased from 5% to 4.8%.

Table 7.1: Ordinary Budget 1978-1983 (FRW in thousands)

<u>Year</u>	<u>Total Nat'l Budget</u>	<u>MOH Budget</u>	<u>% of Nat'l Budget</u>	<u>% change Over previous Year</u>	<u>FRW Per Capita Health Expenditure</u>
1978	6,643,412	533,107	8.0	---	110
1979	9,214,319	588,037	6.4	+ 10.3	118
1980	11,976,057	718,386	6.0	+ 22.2	139
1981	14,459,400	863,708	6.0	+ 20.2	160
1982	16,240,100	829,997	5.0	- 4.0	149
1983	18,441,769	888,908	4.8	+ 7.0	154

Source: African Development Bank

Since 1970, the MOH has received 5 to 7% of the ordinary budget. The proportion of the health budget for salaries has increased from 53% in 1977 to 60% in 1983. Regional services such as hospitals and health centers, and special subsidies to the Rwandan Red Cross and private church affiliated run hospitals have remained constant. In contrast, budgeted expenditures for drugs and medical supplies fell from 30% of the budget in 1977 to 15% of the budget in 1983. Table 7.2 summarizes the major categories of expenditures anticipated for 1983, and their respective proportions of the public health budget.

Table 7.2: 1983 Ordinary Public Health Budget
(FRW in thousands)

	<u>Amount</u>	<u>% of Health Budget</u>
Salaries/contracts	530,900	60%
Drugs and Supplies	132,540	15%
Regional Health Services	51,250	6%
Special Health Projects	50,000	6%
Subsidies to Certified Institutions	48,000	5%
Vehicles/Fuel	37,292	4%
Office Materials/Travel	26,426	3%
Epidemiology	<u>12,500</u>	<u>1%</u>
	888,908	100%

Source: 1983 National Budget

7.3 Health Sector Expenditures

Health services in Rwanda are financed by many sources besides the MOH budget. Rwandans are required, by law, to pay for medical services at all public and private health facilities. The law of 14 March 1974 states that medical examinations, care and hospitalizations are provided on a paying basis in the dispensaries, health centers, and hospitals operated by the government and the private church affiliated facilities. Several categories of individuals are entitled to free health care such as government employees (for whom a health service deduction is made from their salaries), medical personnel, indigents, students, prisoners and the Armed Forces. This law thus provides two means through which the public helps finance health services: fees for services and the health contribution of civil servants. These funds go to the Ministry of Finance. No figures are available for total amounts collected. The government is also considering instituting charges for drugs used by outpatients.

Estimated health expenditures by sector were analyzed in 1978 by Laurent. Only 36.4% of the total estimate on health came from Rwandan sources. Almost one-quarter of all expenditures were attributable to external private aid. Forty percent was derived from bilateral or multilateral funds. Expenditures for services provided by traditional healers were not included.

7.4 External Assistance

Rwanda receives a significant portion of its health finances from:

United Nations Agencies: WHO, UNICEF, UNFPA, UNDP

Multilateral cooperation: ADF, EDF, World Bank

Bilateral cooperation: Belgium, France, USA, Germany, Japan, Holland, China

Private voluntary agencies: International Red Cross, American, French, German and Dutch voluntary agencies

World Health Organization (\$1,346,000 for 1982-83 biannual regular budget.)

WHO is supporting the development of basic health services through assistance the the Expanded Program of Immunization, (in collaboration with UNICEF and USAID), and basic sanitation/water development. WHO is also involved in personnel training abroad, at the University at Butare and the medical assistants' school in Kigali. WHO also supports an epidemiology project to improve the health information system. There are several program proposals in the areas of diarrhea and anti-malaria control that are being considered.

UNICEF (\$450,000 for the 1983 regular budget for health)

UNICEF currently provides funds for the purchase of vehicles, vaccines, oral rehydration packets, refrigerators and operating expenses for some programs.

Bilateral Assistance

Several countries provide bilateral assistance to Rwanda's health sector either through direct grants or channeling funds through private voluntary organizations. As with the multilateral assistance much of the bilateral assistance is in well drilling or health facility construction. Belgium and France support operating costs of hospitals in Kigali and Butare (Belgium) and Ruhengeri (France).

Belgium (\$1,326,755 in 1983)

Belgium is the most important source of financial assistance in the health sector. Technical and financial assistance to the medical school in Butare supports for Belgian teaching staff and some operating costs. Similar assistance is given to the two nursing schools at Kabgayi and Rwamagana. Personnel and financial assistance is provided to the Kigali Hospital, the maternal/child health program in the Kigali region/prefecture, the drug production/packaging laboratory in Butare, and research efforts in trypanosomiasis, bilharzia, diarrhea and psychiatry.

France

French assistance has basically been limited to the Ruhengeri health region. The regional director is a French physician. Assistance is given to the Regional hospital (approximately 80% of all French assistance to the region) and the health centers. There is no construction to expand peripheral facilities. Implementation of the plan for new French assistance in the Gisenyi region has started. These activities include the construction of a new surgery at the Regional Hospital, a regional laboratory and upgrading of 10 dispensaries into health centers. French assistance in Gisenyi will concentrate on the training, supervision and equipping of the rural health facilities to improve primary health care especially MCH.

US (\$700,000 in 1983)

USAID supports two health projects. One is designed to expand and improve the capability of ONAPO, and the Ministries of Health and Social Affairs to deliver family planning information and services. The project includes short and long-term training assistance in demography, statistics, health education and health services in addition to the provision of commodities and the construction of 4 health centers, 2 nutrition centers and an ONAPO training center. The second project funds EPI technical assistance, training and commodities for the collaborative program with WHO and UNICEF.

8.0 Health Information System

8.1 Routine Morbidity Reporting

The reported cases of communicable disease in Rwanda reflect the major trends in cases seen at ambulatory health facilities. There are however, significant problems and deficiencies in the system which include (a) diagnosis usually based only on the clinical impression of a medical assistant or nurse seeing a large number of patients a day; (b) poor record keeping in most outpatient departments; (c) lack of data on age, vaccination status, and residence of patients; (d) inadequate training of regional and national level staff who compile the reports; (e) lack of an overall system of reporting forms and procedures for data compilation and analysis, and (f) the failure of health facilities and regional health authorities to keep cumulative totals of cases to better follow the occurrence of communicable diseases.

The basic reporting forms for ambulatory cases of communicable diseases are the (a) Weekly ("Hebdomadaire") and (b) the Monthly ("Mensuel") Epidemiologic Bulletins which include, respectively, 28 and 16 diseases. There is no overlap between the two lists and it is not clear why there are two different reporting forms. Simple diarrhea is not included in either bulletin.

Cases of infectious diseases are identified by the health workers who diagnose and treat ambulatory patients. Usually this is a medical assistant or nurse who often must diagnose and treat a large number of patients in a short time period. In most outpatient departments, there are no individual patient records. During the frequently very busy ambulatory clinic, the medical assistant notes the number of new patients who have infectious

diseases. Such patients are noted on small scraps of paper using "tick marks" for each patient. In almost all ambulatory facilities, the diagnosis of patients is based solely on a very brief clinical assessment of the patient because laboratory services are limited. The better equipped health centers may be able to do microscopic exams of (a) blood ("goutte epaisse") for malaria and recurrent fever and (b) stool looking for red and white blood cells and parasites. After the clinic session, the number of new cases of infectious diseases is written in a hand drawn table in the large notebook used as the clinic register of both communicable diseases and activities such as laboratory exams and prenatal visits. The communicable disease table has a column for each day of the month and rows of all the infectious diseases included in the two Epidemiologic Bulletins. Two problems were frequently noted: (a) in some health facilities the entry of the number of new patients diagnosed into the register was 5-10 days behind and (b) the hand drawn tables were so crowded that it appeared easy to make recording errors. Most clinics did not have monthly totals for infectious diseases and none had cumulative totals for the year.

At the Prefecture level, the person responsible for the compilation of the Epidemiologic Bulletins and other statistical reports coming from the health facilities is a nurse or secretary in the office of the Regional Medical Director. Usually this person has no training in statistics or epidemiology. The two Epidemiologic Bulletins are regularly submitted by hospitals and health centers with 90-95% of all facilities having submitted Bulletins to the Regional Medical Director two to three weeks after the end of the reporting period. A regional report combining all the hospital, health center and dispensary reports is compiled and sent to the MOH in Kigali 3-4 weeks after the end of the reporting period.

At the MOH in Kigali, the regional Epidemiologic Bulletins are consolidated into national totals by the MOH Statistical Service. Almost all (more than 90%) of regional reports are submitted within a month of the end of the reporting period. The Statistical Service consists of only a director, secretary and assistant. Despite this extremely limited personnel, comprehensive MOH annual reports are published 3-5 months after the end of the calendar year. The Annual Reports include information from the Epidemiologic Bulletins, hospital admission deaths in hospitals and a wide variety of useful statistical data. There is little "feedback" of epidemiology to the health facilities.

8.2 Civil Registration of Births and Deaths

As in most nations, the registration of vital events (birth, marriage and death) is obligatory in Rwanda. As in most developing nations, there is considerable under-registration of deaths while approximately half of births are registered.

8.2.1 Civil Registration at Commune Level

The people of Rwanda are asked to report vital events to civil registration offices located in the headquarters of each of the 143 communes. Travel to reach the commune office may be a long distance. There is a proposal to eventually provide for civil registration at the secteur level. Secteur level registration will make registration officer more accessible. However, there is presently no administrative structure (either buildings or personnel) at most secteurs to allow such a change.

The communal civil registration office records detailed information about reported births or deaths including cause of death. Each month the commune sends a list of the persons who have been born or died or married to Kigali. The lists are send (a) to the Statistics Section of the Ministry of Planning and (b) to the Ministry of the Interior. The lists give the name, age, sex, ethnic group and birth date but not the cause of death. Therefore, there is no cause of death data available at the national level.

8.2.2 Registered Births

The following numbers of births is reported by the Ministry of Planning:

1976	116,122
1977	114,261
1978	131,560
1979	109,061
1980	108,186

The completeness of these reports can be estimated by comparing the reported births in 1978 (131,560) with the number of children less than a year old reported by the 1978 census (261,268). Only about one half of births were registered.

8.2.3 Registered Deaths

The following numbers of registered deaths of persons of all ages and infants less than a year old were available at the Ministry of Planning:

	<u>Total Deaths All Ages</u>	<u>Infant Deaths Less Than One Year</u>
1977	37,840	4,354
1978	40,413	4,228
1979	28,289	4,117
1980	27,034	3,847
1981	21,554	2,465

The completeness of these reports can be assessed by comparing the figures with (a) the number of deaths of children less than one year of age identified during the 1978 census (17,514) which indicates that about one quarter of such deaths were registered and (b) the rates of overall mortality and infants mortality calculated from these reports of registered deaths compared to the estimates of the mortality rates from the 1978 census.

	1978 <u>Registered Deaths in Age Group</u>	1978 Census <u>No. of Persons In Age Group</u>	Death Rate <u>in Age Group Per 1000</u>	1978 Census <u>Estimate of Death Rate in Age Group</u>
Less than one year	4,228	261,268	16	144
All ages	40,413	4,831,527	8	18

These estimates indicate that only 11% of infant deaths and only 44% of total deaths were registered.

9.0 Disease Epidemiology

9.1. Birth and Death Rates

Because of the incomplete registration of births and deaths, realistic birth and death rates cannot be calculated from available data—a situation that is commonly found in developing countries. These rates have to be estimated based on (a) household interview histories or births and deaths in the recent past or (b) demographic inference from the age structure of the present population. Rwanda is fortunate to have recently (1978) completed a national census. The census also collected data on births and deaths in the year prior to the census. The birth and death rates estimated from this census are very high even in comparison to other African nations. The crude birth rate found in the 1978 census was 54 births per thousand population. The rate by prefecture varied from a low of 46/1,000 in Gitarama to a high of 61/1,000 in Gisenyi. When death rates were calculated based on the reports of deaths that had occurred in the year before the census, the rates were surprisingly low (for instance infant mortality of about 60/1,000 live births). These low rates were interpreted as underestimates and indirect methods were used to adjust the findings closer to the "real" rates. The adjusted annual rates from the 1978 census are:

	Infant mortality per 1000 <u>live births</u>	Mortality per 1,000 children <u>1-4 years</u>
Rwanda	144	89
Gisenyi (highest)	161	107
Gitarama (lowest)	124	69

Surveys in other developing countries appear to consistently yield low estimates of infant and other age specific mortality rates. The problems encountered during the 1978 national census of Rwanda underscores the major technical difficulties of determining "true" mortality rates in developing countries. The available data on registered deaths is so incomplete that it cannot be used to calculate realistic rates and survey methods yield consistently low estimates of mortality. In any case, the adjusted childhood mortality rates are very high, estimating that about one quarter of children born (23%) in Rwanda die before reaching five years of age.

9.2 Infectious Disease Morbidity and Mortality

The substantial number of cases of infectious diseases which are not reported and the incomplete registration of deaths make it impossible to calculate real population-based rates of morbidity and mortality. The only available data are (a) case reports coming primarily from hospital outpatient departments and health centers (with all the limitations discussed in section 8.1.), (b) the diagnoses of hospital patients and (c) hospital deaths. It must be remembered that hospitalized patients are a highly selected group representing the small fraction (about 5%) of the population living within 5-10 km of a hospital.

Table 9.1: Eight Most Common Causes of Outpatient Visits and Cases per 1,000 Total Population, Rwanda, 1981.

<u>Disease</u>	<u>No. of Cases (*)</u>	<u>Rate/1,000</u>
1) Malaria	173,430	32.1
2) Influenza	82,238	15.6
3) Gastro intestinal (particularly dysentery)	63,273	13.7
4) Measles	58,163	10.8
5) Pneumonia	39,182	7.3
6) Whooping cough	16,171	3.5
7) Gonorrhoea	16,115	3.4
8) Chickenpox	11,344	2.4

* Cases reported in weekly and monthly Epidemiologic Bulletins.

Source: 1981 Annual Report - MOH

Table 9.2: Eight Most Common Causes of Hospitalization, Rwanda, 1982

<u>DISEASE/CONDITION</u>	<u>NO. OF PERSONS HOSPITALIZED</u>
1) Malaria	16,603
2) Diarrheal disease (excludes bacillary dysentery)	9,303
3) Measles	5,260
4) Pneumonia	4,945
5) Bacillary dysentery	3,626
6) Helminthiasis	2,564
7) Bronchitis	2,223
8) Abortion	2,017

Source: 1982 Annual Report - MOH

Table 9.3: Nine Most Common Causes of Death in Hospital, Rwanda, 1982

<u>DISEASE/CONDITION</u>	<u>NUMBER OF DEATHS</u>
1) Measles	305
2) Abortion	274
3) Diarrheal disease (excludes bacillary dysentery)	224
4) Pneumonia	141
5) Malaria	116
6) Kwashiorkor	92
7) Bacillary dysentery	79
8) Chronic illness & cirrhosis	46
9) Tetanus	44

Source: Annual Report 1982 - MOH

It is clear from these figures that the CCCD diseases--particularly malaria, measles, diarrheal diseases and whooping cough--are very important causes of outpatient visits, hospitalizations and hospital death.

9.3. Diseases Preventable by Immunizations

The basic epidemiologic information on EPI diseases are the case and death reports in the Epidemiologic Bulletins. These reports give no information on age or vaccination status of the cases. Table 9.4 indicates that measles and whooping cough are the most common EPI diseases. Polio, diphtheria and tetanus are relatively uncommon.

Table 9.4: Reported Cases of EPI Diseases, Rwanda, 1979 - 1983.

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983 (Jan-June)</u>
Measles	61,094	80,402	58,163	36,792	7,841
Whooping cough	16,223	16,189	16,171	11,857	3,012
Tetanus	125	103	96	99	42
Polio (acute)	14	22	38	21	14
Diphtheria	21	3	8	-	-

Source: Bureau of Epidemiology - MOH

Measles is the EPI disease with the highest mortality reported in the Epidemiologic Bulletins with 570-710 deaths per year in 1979-81. Whooping cough deaths ranged between 14 and 38 in the same time period.

9.4. Diarrheal Disease

There are no simple diarrhea or dehydration reporting categories in the Epidemiologic Bulletins. It is therefore difficult to get a good epidemiologic picture of diarrheal disease in Rwanda. The most frequently reported diarrheal disease is dysentery--bloody diarrhea. If a microscopic examination of a stool sample from a dysentery patient is performed, the bloody diarrhea is categorized as "amoebic" if amoeba are seen and "bacillary" if white blood cells are common. Given the poor quality of microscopes, slides and technical training of laboratory workers, the quality of these diagnoses is uncertain. Bacterial stool cultures are only available at referral hospitals (especially Butare and Ruhengeri).

The numbers of cases of dysentery reported in the Epidemiologic Bulletins from 1980-1982 are large.

	<u>1980</u>	<u>1981</u>	<u>1982</u>
Amoebic dys.	15,359(14)*	14,773(15)	16,892(34)
Bacillary dys.	3,686(1)	4,616(44)	15,748(164)
Non-classified dys.	34,348(37)	43,884(83)	54,719(49)
Total	53,393(52)	63,273(142)	87,359(247)

* (reported deaths)

The epidemiologic explanation for the large number of non-classified dysentery cases is not clear. Epidemiologic studies to better define this group are of high priority.

A large, eventually nation wide epidemic of bacillary dysentery started in Gisenyi in 1981 having been introduced from Zaire. Stool cultures done in Ruhengeri and Butare identified Shigella dysenteriae (Shiga bacillus) as the cause. This bacteria caused explosive outbreaks of severe bloody diarrhea fortunately with low mortality rates. Because the shiga bacillus was resistant to most other antibiotics, large quantities of Bactrim were used to treat bacillary dysentery cases. By late 1983, the epidemic seems to have ceased.

Cholera cases have occurred since the mid 1970's. The cases in recent years:

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Cholera cases	<u>5</u>	<u>18</u>	<u>39</u>	<u>192</u>

A population based survey to determine the incidence and mortality of diarrheal disease was carried out by the Epidemiology Directorate (MOH) and WHO in November 1982. The survey covered the entire nation through the random selection of 30 secteurs as the clusters ("grappes") according to WHO recommendations for diarrheal disease surveys. A total of 1,741 households were interviewed which contained 3,109 children less than 5 years of age. The survey findings were:

- 329 (10.6%) of children had diarrhea during the 2 weeks prior to survey interview.
- 137 (4.4%) of the children less than 5 years old had died during the year before the survey.
- 26 (19%) of the deaths were reported to have had diarrhea.

There are several laboratories able to do bacteriologic and some virologic studies of diarrheal disease patients. The laboratories are located in Butare, Kigali, and Ruhengeri and a new laboratory in Gisenyi which should be operational in early 1984. The laboratories will be helpful in better defining the epidemiology of simple watery diarrhea and dehydration cases. Dr. de Mol is conducting a 2 year longitudinal study of diarrheal disease in 220 rural households with 430 children less than six years old, near Butare. The study is financed by WHO and Belgian cooperation. The study design includes weekly household visits to identify illnesses; collection of stool cultures from sick children and controls; collection of blood smears for malaria exams and the regular measurement of height and weight. This study should produce very useful data starting in 1984.

9.5. Malaria

Malaria is the most frequently reported disease in Rwanda. The data for recent years indicates an increasing trend during the last 4 years.

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>Jan-June 1983</u>
Malaria cases	137,047	123,882	173,430	190,863	127,484
Malaria deaths	50	115	147	78	-

These figures should be considered to represent fever cases that are compatible with malaria.

Limited data on 17,000 patients hospitalized for malaria in 1981 shows that 21% were less than 5 years old.

Altitude is an important determinant of malaria epidemiology in Rwanda. Malaria is endemic at altitudes below 1,500m and normally not found above 2,000m. Malaria is uncommon at the higher elevations of the North-South chain of mountains that form the watershed between the Nile and Zaire river basins. Malaria is common around Lake Kivu and the eastern half of the country. The abundant rains allow transmission throughout the year with some decrease toward the end of the dry season (June and July).

P. falciparum is the most common species of malaria in Rwanda. However, the very small number of malariometric studies (Annex 5) most of which are five or more years old severely limit the epidemiologic data available.

There are anecdotal reports of failure of chloroquine to cure malaria and to prevent the disease when used prophylactically. There is no conclusive proof of chloroquine resistance but the existence of confirmed chloroquine resistance in neighboring East Africa makes it possible. Epidemiologic studies to determine the prevalence of malaria in different geographic areas, age specific incidence of malaria and studies of the sensitivity to malarial parasites to anti-malarial drugs (especially chloroquine) are urgently needed.

10.0 Programs for Control of Childhood Communicable Disease

10.1 Expanded Program on Immunizations (EPI)

The EPI in Rwanda is a national immunization program that has effectively used international support from several sources (principally USAID, UNICEF and WHO) to achieve substantial increases in (a) vaccinations performed; (b) the coverage of the target populations of children less than 5 years old and pregnant women, and (c) has reduced the reported morbidity from measles and whooping cough. The morbidity reductions indicate that the EPI has prevented the deaths of thousands of Rwandan children from measles and whooping cough. EPI in Rwanda is managed by the National Division of Epidemiology. A WHO physician plays a critical role in the day-to-day management of the program. In 1980, the program created a new cadre of staff at the prefecture level, the EPI Regional Supervisors who are the first effective field supervisors of local level health facilities. In hospitals, health centers and dispensaries, vaccinations are carried out by health facility staff and 74 specialized staff of EPI, the vaccinator/technician. These vaccinators/technicians are

increasingly being assigned to and integrated into local level health facilities. EPI in Rwanda is an effective program that should be further supported to extend the benefits of vaccination to a larger number of young children in Rwanda. EPI can be expanded to include supervisory and management responsibility for national diarrheal disease and malaria control efforts.

10.1.1 History of EPI

As in many countries, EPI has its roots in the national smallpox eradication program. The last cases of smallpox occurred in 1969. Smallpox vaccination was continued until the late 1970's. The following events are important in the history of the Rwanda EPI:

- Efforts to increase the use of DPT, polio and measles vaccines in the 1970's were frustrated because of irregular supply of vaccines and poor cold chain practices making the vaccines ineffective.
- 1977 - The Rwandan government requests WHO and UNICEF to assist in forming EPI program for measles, polio, DPT and BCG vaccination of children 0-6 years old and tetanus toxoid for pregnant women.
- 1978 - EPI became operational with initial training of vaccinators.
- 1979 - WHO epidemiologist arrives in December.
- 1980 - EPI regional supervisors established in June.
- June 1981 - USAID/EPI project starts.
- May 30 - June 18, 1983, International Evaluation of EPI.

10.1.2 Resources of EPI

EPI has received resources from the MOH, supplemented by USAID, WHO and UNICEF.

a) Personnel - all paid by MOH:

- Director of National Division of Epidemiology
- 10 EPI regional supervisors (medical assistants)
- 74 vaccinators/technicians
- 12 chauffeurs
- 2 nurses

b) Financial Assistance:

- UNICEF has supplied vaccines, cold chain equipment, vehicles, syringes/needles, and operating expenses.

- WHO has supplied a physician epidemiologist, training and operating expenses.
- USAID has supplied technical assistance (from CDC), vehicles, cold chain equipment, training, motorcycles, syringes/needles, kerosene (for refrigerators), gasoline (for vehicles), per diem and other operating expenses.
- The MOH has paid the personnel costs of all Rwanda staff.

c) Transport

- 40 Honda 185 cc motorcycles
- 9 Toyota Stouts (3 built 1980, 6 in 1982)
- 1 Land Rover long chassis 1979
- 1 Jeep Suzuki 1981
- 1 Toyota Corolla 1982
- 230 bicycles

d) Cold Chain equipment

- 231 kerosene refrigerators
- 12 electric refrigerators
- 6 electric freezers
- 37 large cold boxes
- 177 vaccine carriers ("boites isothermiques")

e) Other

- 210 vaccination kits
- 140 megaphones

10.1.3 Objectives

When EPI was started in 1978 the following objectives for vaccination coverage of the target population were established:

<u>Year</u>	<u>Percent Coverage</u>
1978	5
1979	10
1980	15
1981	20
1982	30
1983	40
1984	50
1985	60

10.1.4 Evolution of EPI Strategy

During its development, the Rwanda EPI program has been flexible in altering strategy to meet existing conditions. At the start of the program (1978-79), a combined fixed and mobile strategy was envisaged. Existing health centers would serve as fixed vaccination sites while rural areas far from health facilities would be vaccinated by itinerant vaccinators. These vaccinators ("Technicien vaccineurs") were modeled on the smallpox program and supposed to hold outreach vaccination clinics and vaccinate house-to-house. It was planned to have one vaccinator for each of the 143 sectors. Experience has shown that the field work of individual vaccinators could not be adequately supervised. The vaccinators are being assigned to particular health facilities.

The target age groups have also been adjusted. Initially, the target age group was all children less than six years old. As the EPI has gained momentum and had vaccinated many older children, the target group has been narrowed to children less than one year of age.

10.1.5 Cold Chain

Rwanda has been well supplied with cold chain equipment and refrigerators which are being well utilized to protect vaccines. Because of the limited electrification of the country almost all of the refrigerators used at the local level are absorption type using kerosene. In October 1983, a total of 231 Electrolux kerosene refrigerators (140 Rak 36 and 91 Rak 66) had been delivered by EPI to local level health facilities. The kerosene refrigerators consume 12-20 liters of kerosene a month. Kerosene is supplied by EPI to health centers and dispensaries in 8 prefectures. The other 2 (Ruhengeri and Kigali) are supplied kerosene by French and Belgian Cooperation.

10.1.6 EPI Management Information

A vaccination report is prepared each month by health facilities performing vaccinations or by vaccinators for outreach locations. The forms include only the EPI vaccines. Since January 1982, vaccinations performed are reported by age groups (0-11 months, 12-23 months, and 2 years or older). Submission of forms is prompt and essentially complete.

10.1.7 Vaccinations Performed

The total number of vaccination performed for all ages annually from 1977 to 1983 is presented in Annex 6.

The increase in vaccinations is impressive. For example, comparing the totals of 1979 and 1982:

	<u>Doses in 1979</u>	<u>Doses in 1982</u>	<u>% Increase</u>
DPT vaccine	58,000	751,000	1,194
Measles vaccine	27,000	288,000	966

The rate of increase of vaccinations performed appears to have slowed in 1983. The slowing is due to several months of no stock of polio vaccine and to a shift of program priority from the larger group of children 0-5 years old to infants less than one year. For example, 45% of measles vaccinations given in the first 6 months of 1983 were given to infants less than a year old.

10.1.8 Vaccination Coverage

Vaccination coverage surveys have been performed in Rwanda since 1980 using the WHO recommend 30 cluster method. The most recent was carried out during the International EPI Evaluation in June 1983.

Of 212 children 12-23 months old, the percent vaccinated were

Measles	53%	BCG	49%
DPT-1	63%	Polio 1	57%
DPT-3	36%	Polio 3	25%

Seventy one percent of children had vaccination cards and 21 percent were fully vaccinated. These coverage levels compare favorably to other African countries particularly considering that the intensified phase started in 1980.

10.1.9 Disease Morbidity Reduction

These have been substantial reductions of reported cases of measles and whooping cough.

	<u>Cases</u> <u>1980</u>	<u>Cases</u> <u>1982</u>	<u>Percent</u> <u>1980-1982</u>	<u>Cases</u> <u>Jan-June</u> <u>1983</u>
Measles	80,402	36,792	54	7,841
Whooping cough	16,189	11,857	27	3,012

Because mortality reporting is so incomplete, the numbers of measles and whooping cough deaths are not known. Even so, one can estimate that several thousand deaths of young Rwanda children from measles and whooping cough have been prevented by the EPI program.

10.1.10 Vaccinators

The vaccinators ("Technicien vaccinateur") play an important role in the Rwanda EPI program. There are presently 74. Vaccinators receive six months of theoretical and practical training about vaccination. Vaccinators are employed on contract ("sous contrat") and can be relatively easily dismissed for poor performance compared to regular MOH employees such as medical assistants and nurses who are civil service ("sous statut"). The MOH pays the salaries of all vaccinators.

The job category of vaccinators was created in 1978 at the start of the EPI program. The original concept was that the vaccinators would cover areas that were far from health facilities. In practice, it was difficult to supervise the rural vaccination activity and vaccinators are now assigned to specific health facilities under the supervision of the person in charge of the health

center. This job category was modelled on the single purpose workers of the smallpox eradication campaign. In some cases, health centers personnel feel that vaccination cannot be done until a vaccinator is assigned to the center not realizing that vaccination is a basic part of integrated primary health care. As vaccinators resign or are dismissed new ones are trained to keep the total of 74 vaccinators. Although they presently perform a quite useful function, it is not clear what the long term role of vaccinators will be. To take on primary health care activities other than immunizations the vaccinators will need additional training.

10.1.11 EPI Regional Supervisors

The first five EPI regional supervisors were named by the Epidemiology Service in June 1980. Originally, each supervisor covered 2 prefectures (health regions) from the former Epidemiology headquarters in Rwamagana. At the present time, there are 10 EPI regional supervisors, one for each prefecture. All are posted at the regional headquarters. The Regional supervisors were originally trained as medical assistants. Their responsibilities include (a) maintaining and distributing the regional stock of vaccines, kerosene and small equipment; (b) visiting every health facility in the region at least once every three months, (c) collection and analysis of reports of communicable diseases and vaccination activities, and (d) investigation and control of epidemics and communicable diseases outbreaks (EPI diseases and meningitis, hepatitis, bacillary dysentery, etc.). The EPI regional supervisors prepare quarterly written reports on their activities and report on their activities every 3 months during meetings in Kigali with the Director of Epidemiology and the WHO medical officer assigned to EPI. Each EPI supervisor has a vehicle (most given by USAID) for field activities. They receive allotments of 400-500 liters of gasoline every three months (supported primarily by USAID).

Because of the high gasoline consumption of the Toyota vehicles presently in service, the supervisors report that they do not have enough fuel to carry out complete supervision of the health centers. The EPI International Evaluation recommended lighter weight vehicles with lower gasoline consumption and increased gasoline allotments for the supervisors.

Although its full potential has yet to be realized, the regional supervisors are presently functioning as an effective supervision system of EPI activities at the peripheral level. The system can easily take on supervision and management of diarrheal diseases and malaria control activities. Such a change is endorsed by MOH officials and the WHO medical officer.

10.1.12 EPI Training

Two WHO EPI courses have been put on in Rwanda:

<u>Date</u>	<u>Course</u>	<u>Participants</u>
March 1982	Mid Level EPI	25 EPI Supervisors and Vaccinators
December 1982	Senior EPI	18 Physicians and 5 Supervisors

In addition, vaccinators and their staff in charge of health facilities have received in-service training on the EPI program. BUFMAR has included topics related to the EPI in its quarterly weekend training sessions.

10.1.13 Immunization Coverage Targets

The international evaluation of the Rwanda EPI recommended that the program adopt more ambitious coverage goals than those established at the start of the program in 1978. The MOH EPI program has proposed the following new coverage targets:

<u>Vaccine</u>	<u>Target Group</u>	<u>PERCENT OF TARGET GROUP</u>			
		<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
DPT/Polio (three doses)	Children less than one year of age	65%	70%	75%	80%
Measles (one dose)	Children 9-11 months	65%	70%	75%	80%
BCG (one dose)	Newborns	75%	80%	85%	85%
Tetanus Toxoid (two doses)	Pregnant Women	10%	15%	20%	25%

Source: National Epidemiology Service, MOH

10.2 Diarrheal Disease Control

Many parts of the MOH (and other Ministries as well) are directly or indirectly involved in the prevention and treatment of diarrheal disease. The recent epidemics of shiga bacillary dysentery and cholera have made everyone aware of diarrheal disease. The Gisenyi Prefecture Hospital has recently constructed two new wards for patients with diarrhea and dysentery. The MOH made special purchases of Bactrim to treat shiga dysentery patients. Fortunately, the shiga and cholera epidemics appear to be over.

The emphasis of the CCCD diarrheal disease program is on the use of oral solutions to treat and prevent dehydration which is the most important cause of death in infants with diarrhea. Another objective is proper feeding of infants during and after diarrhea. The routine use of antibiotics and anti diarrheal mixtures to treat simple diarrhea is discouraged because it is costly, generally ineffective and sometimes harmful.

The use of oral solutions (ORS) of salts and glucose is generally recognized as beneficial and its use has been recommended by many sources in Rwanda during the last several years. Very limited supplies of oral rehydration salts (both in packets and in bulk) have been provided, intermittently, from a variety of sources in the last several years.

The Save Health Center (Catholic) near Butare is a good example of how treatment of diarrhea has changed in the last several years. An expatriate physician first explained the use of ORS in 1981. A small number (about 200) packets of ORS were received in 1982 but have been used up. In 1982, the routine use of sulfa drugs to treat watery diarrhea was stopped and beginning in late 1982 mothers were instructed how to prepare a salt (1/2 coffee spoon) and sugar (4 coffee spoons) solution in the volume of water of a beer bottle (the national brand Primus with a volume of 720 ml). Now some mothers who bring infants with diarrhea to the health center bring salt/sugar solution already prepared at home.

10.2.1 Historical

- 1978 Cholera epidemic UNICEF imports large number of packets of ORS which were not used.
- 1980 Dr. Myron Levine, WHO short-term consultant, demonstrated the use of ORS to rehydrate infants in the Kigali Hospital Center.
- June 1982 Dr. D. Barua of WHO, Geneva, advocated the writing of a national plan for diarrheal disease control.
- November 1982 national sample survey of 1,700 households on diarrheal disease incidence, mortality and treatment.
- 1983 UNICEF imports 150,000 packets of ORS

10.2.2. Supply of ORS Salts

ORS salts have been available in small amounts from a variety of sources in the last several years. For example, BUFMAR has produced ORS salts in bulk under the name "Apache solution" since 1979. The bulk salts were sufficient to prepare the following number of liters of ORS solutions.

<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983 (est)</u>
3,700	13,200	14,100	18,600	29,300

Belgian and French Cooperation programs have imported some ORS as have individual medical missions. UNICEF imported an unknown number of packets of ORS for the 1978 cholera epidemic that were not distributed until 1983.

UNICEF's first regular budget importation of ORS packets was 150,000 packets in 1983. OPHAR has purchased new materials to prepare ORS salts at the new Pharmaceutical Laboratory at Butare.

Because of the small amounts of ORS so far imported or produced most health centers visited had no stock of packets or prepared ORS salts.

10.2.3 Salt/Sugar Solutions

Many health workers know of and recommend the preparation of a salt/sugar solution. The instructions usually given are to mix

salt - 1/2 coffee spoon
sugar - 4 coffee spoons
water - Primus beer bottle (720ml)

There are other recipes recommended as well.

MOH officials feel that while salt will be available in most homes in Rwanda, sugar will be much less frequently available and may be a substantial limitation on the preparation of salt/sugar solutions in the home.

10.2.4. National Diarrheal Disease Survey

The November 1982 survey found that 10% of the 3,109 children had bad diarrhea in the 2 weeks prior to the survey. The treatment that the family reported giving to the children with diarrhea was

- traditional remedies	27%
- salt/sugar solution	23%
- ORS packet solution	24%
- intra venous	2%

The total of nearly one-half of children with diarrhea being treated with ORT is encouraging but surprisingly high considering the limited availability of packets and limited public education on the preparation of salt/sugar solutions. The survey should be repeated to confirm these remarkable findings.

10.2.5 Objectives for ORT use 1984-87

The overall objective within the CCCD project diarrheal disease component will be one half of all episodes of diarrhea in children less than five years old will be treated with oral therapy at the end of the project in 1987. Solution prepared from packets and from salt/sugar at home would contribute equally. Specifically, the percentage of diarrhea episodes treated by each method would be:

Percent of all diarrhea episodes (0-4 years) treated with	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Packets (2 per episode)	10	15	20	25
Salt/sugar (home solution)	10	15	20	25
Combined Oral Therapy	20	30	40	50

The strategy to accomplish these objectives would be to train health workers how to use ORT and provide an adequate supply of packets to health facilities. Packets would be used primarily in health facilities. An extensive public education campaign on the preparation and use of salt/sugar solutions at home would be started in the first year of the program.

10.3 Malaria Control

There is no organized, nationally coordinated program for malaria control in Rwanda. Antimalarial medicines are widely used to treat acute fevers which are presumed to be malaria in geographic regions known to be malarious. Vector control measures (insecticides and breeding site reduction) are limited to urban areas. Plasmodium resistance to chloroquine is suspected on the basis of some treatment failures.

10.3.1 Antimalarial Drugs

The primary antimalarial imported into Rwanda is chloroquine (Nivaquine). The Director of OPHAR estimates the need for Rwanda to be 10 million 100 mg tablets per year of which OPHAR imports about 5 million tablets annually. The Director believes the balance is imported by private pharmacies, foreign assistance to the health sector and BUFMAR.

BUFMAR has sold the following amounts of kilograms of chloroquine base annually.

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983 est.</u>
BUFMAR Kg Chloroquine base	151	138	296	221	291
Equivalent 1,000 100 mg tablets	1,510	1,380	2,960	2,221	2,910

The amount of chloroquine imported by private pharmacies and foreign cooperation agencies is unknown.

10.3.2 Present Use of Antimalarial Drugs

Attacks of febrile illness are usually treated with extended schedule of anti-malarial drugs. For adults typical anti-malarial treatment would be a total of 1.5-2.5 gms of chloroquine base over 4-5 days. This schedule requires much more drug than the internationally recommended single dose curative therapy of 10 mg/kg (700 mg for a 70 kg person). Given the likelihood of some chloroquine resistance in Rwanda (see Section 10.3.3), it is probable that a three day schedule with total of 25 mg chloroquine base/kg will be recommended for Rwanda. The principal objective of the CCCD project in Rwanda would be to standardize the treatment of acute malaria at an appropriate dosage. This standardization would be achieved by issuing specific MOH instructions, by training of health workers and through health education of the public on the recommended treatment schedule.

10.3.3 Reported Chloroquine Resistance in Rwanda

There are anecdotal reports from practicing physicians of the failure of chloroquine to cure patients with acute malaria. Given the quality of laboratory services available and the possibility of other causes of fever, these reports must be confirmed by adequate tests of the response of patients with proved P. falciparum infections to adequate doses of chloroquine. However, the existence of confirmed chloroquine resistance in the neighboring nations of Burundi, Tanzania, Kenya, and Zambia makes chloroquine resistance a distinct possibility.

While strains of P. falciparum from several countries in East Africa are resistant to chloroquine, this phenomenon is geographically localized in some countries and often frequently associated with non-immune expatriates than with the local population. For these reasons along with the higher cost and other problems of alternate anti-malarial drugs, many of the affected countries have continued to use chloroquine as a national health policy.

10.3.4 Estimate Acute Malaria Episodes

Dr. Ivorra Cano in Sante et Maladies au Rwanda estimated the number of acute malaria attacks in the rural population by assuming

- 90% of total population is rural
- that malaria affects 50% of the rural population
- that in the population affected: adults (16 years or more) have 2 acute attacks a year and children (less than 16 years old) have 4 acute attacks per year
- with a total population of 5,000,000 he estimated the rural population of 4,500,000 to include 2,250,000 children 0-15 years
- in the rural population he estimated the number of acute malaria episodes in children (0-15) to be 4,500,000 and in adults 2,250,000 episodes.
- If we assume that the CCCD target groups in the rural population are:

children (0-4 years)	-	1,145,700
pregnant women	-	326,000

- and that 50% of the children are affected by malaria each year with children having 4 attacks per year and pregnant women 2 attacks per year, we can estimate the number of acute malaria attacks in CCCD target population to be:

children (0-4 years)	-	2,291,400 episodes
pregnant women	-	326,000 episodes

10.3.5 Chemoprophylaxis

The MOH has considered a proposal ("Programme de Lutte Antipaludique") for a national chloroquine chemoprophylaxis program for children 0-6 years, primary school students and pregnant women. The MOH has decided that chemoprophylaxis is not feasible because of cost of medicines and the personnel required to execute such a program.

10.3.6 MOH Policy on Malaria Control

The MOH has adopted the other elements of the proposal. The proposal includes:

- The National Directorate of Epidemiology will manage and coordinate malaria control activities including the distribution of antimalarial drugs.
- A malaria laboratory will be established with a trained entomologist and other staff.
- Health education would be carried out by Bureau of Hygiene staff and community health agents.
- Insecticide spraying in homes would be carried out by Bureau of Hygiene staff.

10.4 Maternal and Child Health (MCH)

Although MCH services are fully integrated into MOH field activities, there is no MCH administrative unit. The MCH services include prenatal care, obstetrical care and well baby care including monitoring growth and development, vaccination and nutrition. The MCH services are most developed in association with hospitals. Foreign cooperation has specifically assisted the development of MCH centers and services in the prefectures of Butare (Belgium), Kigali (Belgium), Ruhengeri (France) and starting in late 1983 Gisenyi (France).

Review of the statistics published in the 1982 MOH Annual Report indicated reasonably good coverage for prenatal services and less complete coverage for well baby and delivery in a maternity. The number of children less than one year old in 1982 (292,000) is used to estimate the number of pregnancies, births and well babies to be served.

10.4.1. Prenatal Consultations

A total of 236,000 women were enrolled in prenatal clinics in 1982. Therefore about 80% of pregnant women were enrolled in prenatal clinics. There was an average of 2 visits for each women enrolled.

10.4.2. Delivery in Maternity Services

A total of 66,000 deliveries in maternity services was reported in 1982. Therefore about 20% of all births occurred in health facilities.

10.4.3. Well Baby Clinics

Well baby clinics ("nourrissons") reported 127,000 children enrolled and a total of 679,000 visits for an average of about 5 visits per enrolled child in 1982. Unfortunately, the age groups of the children enrolled are not given. If all the children are less than a year old the coverage is about 40%. The average of 5 visits per child indicates relatively long-term follow up of the children that are enrolled.

10.5 Nutrition Centers

In 1983, there were 153 nutrition centers in Rwanda. The nutrition centers are administered by the Ministry of Social Affairs and Community Development, not by the MOH. In 1983, official statistics on the Nutrition Centers were not available for 1981 or 1982. The following description of the centers was provided by staff of Catholic Relief Services (CRS), which administers USAID financed assistance to some centers.

There are about 67,000 children enrolled in the Centers. Most of the children are between 6 months and 3 years of age. Most centers limit a mother and child to three years attendance. A mother and children are scheduled to visit

the Centers once a month. The distribution of food, and sometimes medicines, are important incentives for attendance. In the 96 centers served by CRS, each mother receives the following rations every month:

- 1 kg - oil
- 2 kg - powdered skim milk
- 2 kg - corn flour

The schedule of activities for each monthly visit at a center include:

- 1) weighing the child
- 2) individual consultation with the mother
- 3) a talk to the mothers
- 4) demonstration of cooking of local and more exotic foods
- 5) demonstration of vegetable gardening
- 6) demonstration of raising of small animals (e.g., rabbits)
- 7) distribution of rations

Although health centers are supposed to offer nutrition center services. The majority of nutrition centers are physically at a distance from the nearest health facility. Nutrition centers offer an excellent means for health education of mothers and possibly the delivery of some services such as immunizations and treatment of diarrhea. Unfortunately, the assignment of nutrition centers to another Ministry complicates coordination of health education and delivery of services.

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10.6 Health Education/Information

There are several factors in Rwanda that are very favorable for the implementation of a health education program to support the CCCD project. Having a single language spoken throughout the country facilitates health education. Also, the Rwanda national radio system is listened to widely. The 1978 census found that 18.6% of all houses have radios.

Present health education activities include:

- talks ("causeries"): Staff of health facilities and nutrition centers speak for 10-30 minutes to patients and family members (usually mothers) who are waiting for services. These talks are routine daily activities in all health facilities and nutrition centers. As such they are the most regularly and widely performed health education activity.
- radio programs: The MOH and ORINFOR produce two weekly radio programs on health. The programs are 15 minutes long and are broadcast in Kinyarwanda on Friday and Sunday.
- posters: Posters on health topics are prepared by workshops in the MOH and BUFMAR.
- in-school programs: Programs of health education are conducted in primary and secondary schools.

- songs: Songs continue to be a valid oral tradition in Rwanda. They were used extensively to publicize the 1978 census.
- community groups: The decentralized governmental structure of Rwanda provides the opportunity for rapid dissemination of information to government and community leaders at the commune sector and cell level.

10.6.1 ORINFOR

The Rwanda Information Office (ORINFOR) is the most important governmental channel for information and education of the population. ORINFOR is under the jurisdiction of the President of Rwanda. France and Germany support ORINFOR with technical assistance and financial contributions.

ORINFOR has capabilities in: radio, press, film and photography. Radio Rwanda is the ORINFOR broadcasting station (short wave and FM). The popularity of Radio Rwanda is indicated by the 300 letters ORINFOR receives from its listeners every day. ORINFOR has a silk screen printing facility that produces posters.

10.6.2 Bureau of Health Education

The Bureau of Health Education is a section of the Directorate of Epidemiology staffed by a chief who has had extensive overseas (including United States) training and three other members. The Bureau produces two fifteen minute radio programs each week on health. The programs are in Kinyarwanda and are reported to be popular and effective. Other health education activities of the Bureau include (a) preparation and distribution of pamphlets to schools, (b) loaning films from the Canadian series "Sante Africaine", and (c) preparation and distribution of posters. Although the Bureau has very cramped quarters, its work is generally recognized as excellent. The Bureau has, to date, no field activities to (a) assess the impact of its health education activities or (b) investigate the attitudes and understandings rural of the population related to the diseases and interventions included in priority health programs.

10.6.3 BUFMAR

BUFMAR emphasizes health education in its quarterly training weekends ("recyclage") for staff from the church-affiliated health facilities. This is the only formal training of health workers in health education techniques in Rwanda. BUFMAR maintains a small workshop for the production of health education materials. The workshop has 3 staff members and 8-10 handicapped artists who prepare posters and flannographs. The materials produced so far primarily cover family planning and nutrition.

11.0 CCCD Bilateral Project Strategy for Rwanda

The strategy of a bilateral CCCD project in Rwanda is to maintain and strengthen the EPI structure in the National Directorate of Epidemiology. In particular, the continued improvement of the regional supervisor system is a priority. The Epidemiology Directorate will be assigned the additional responsibility for diarrheal disease and malaria control including (a) training of personnel; (b) supplying oral rehydration salts and supplementary chloroquine; (c) a management information system for diarrheal disease and malaria and; (d) supervision and evaluation of diarrheal disease and malaria control activities.

11.1 Proposed CCCD Activities in Rwanda

The following sections summarize the present situation of components of the Rwanda Health Sector and the proposed activities of the CCCD project in Rwanda.

11.1.1 Immunizations (EPI)

The EPI has been unusually successful in increasing services and reducing morbidity and mortality particularly for measles and whooping cough. A vital part of the CCCD Project is the support of EPI to facilitate achievement of the recently revised immunization goals (Section 10.1.13). The EPI model will be used for diarrheal disease and malaria control activities. CCCD assistance is coordinated with that supplied by other agencies (e.g. UNICEF will supply the vaccines). The MOH committed itself to implement the recommendation of the International Evaluation Commission that full time personnel for EPI be selected, namely:

- a medical officer
- a manager
- a secretary

Initially, these staff would have some responsibility for other CCCD activities. Additional training in repair and maintenance of refrigerators and freezers is needed. Cold chain technicians need tool kits, conversion kits and replacement parts. Although the cold chain is presently well implemented additional equipment to replace unrepairable equipment and for newly constructed facilities is required. The vehicles used by EPI regional supervisors (10) will be replaced as needed by smaller, more fuel efficient cheaper to operate vehicles (Suzuki or equivalent). There is no vehicle for the national EPI supervisor. Gasoline for vehicles and kerosene for refrigerators are sometimes not available from the MOH. Syringes, needles and sterilization equipment are insufficient.

The proposals are:

- Short-term training of 6 national cold chain technicians in refrigerator repair and maintenance
- 10 lightweight vehicles for the EPI regional supervisors

- One vehicle spare parts and fuel for the EPI national supervisor
- Refrigerators and vaccine carriers to replace damaged equipment and supply new facilities
- Tool kits to repair cold chain equipment and spare parts
- Syringes, needles and sterilization kits to supplement MOH supplies
- Kerosene for refrigerators to supplement MOH supplies
- Gasoline for vehicles to supplement MOH supplies

11.1.2 Diarrheal Disease Control

Although ORT has been introduced, supplies of packets have been limited. Training in the use of ORT has been limited particularly in government (MOH) health facilities. A wide range of methods are used to prepare sugar/salt solutions and there is uncertainty about the availability of sugar in rural areas. A national plan of operations has not yet been developed. The new pharmaceutical laboratory in Butare should be able to produce ORT in packets in 1984. The MOH plans to assign a full time physician manager to diarrheal disease control in the future.

The proposals for CCCD activities are:

- Importation of ORT packets to supplement other sources
- When feasible, purchase of raw materials for the pharmaceutical laboratory, Butare, instead of importation.
- Using the present EPI regional supervisor system to distribute ORS packets, supervise the use of ORS and the collection of management information on its use
- Training of health workers in use of ORT
- Operational research studies such as
 - availability of sugar and utensils to mix ORS at home
 - use of rice water and other types of home prepared solutions.
- Assistance to MOH and WHO to prepare a detailed national plan of operation
- One vehicle/spare parts and fuel for the program coordinator.

11.1.3 Malaria Control

Malaria is the most frequently reported communicable disease and appears to be rapidly increasing. There is widespread use of a wide variety of anti-malarial drugs to treat suspect malaria. There is little standardization of malaria treatment. Shortages and zero stock of anti-malarial medicines are

common. There is no coordination of malarial control activities. Resistance of P. falciparum is widely suspected because of treatment failures. The MOH will assign a coordinator for malaria activities in the future. The MOH has rejected chemoprophylaxis as a national policy.

The activities proposed during the 4 year life of the CCCD project are:

- Provision of supplemental chloroquine to assure a more regular supply at peripheral health facilities. The chloroquine would initially be imported. Later, if feasible, it would be obtained from the Pharmaceutical Lab in Butare.
- Using the present EPI regional supervisor system for distribution of the supplemental chloroquine, supervision of malaria control activities and collection of management information on its use.
- Assistance in the training and equipping of a MOH malaria reference laboratory to carry out epidemiologic studies and training/quality control of diagnosis of malaria by blood smears.
- In collaboration with the Malaria Reference Laboratory, WHO and bilateral technical cooperation set up ongoing monitoring of drug sensitivity of malaria parasites.
- Collaborate with MOH to establish a standardized treatment of malaria.
- Include standard treatment of malaria in training of health workers and health education activities.
- One vehicle, spare parts and fuel for the program coordinator.
- Support to operational research provided the proposals are acceptable to a CCCD Research Review Committee possibly including
 - study the impact of chemoprophylaxis for pregnant women
 - study of the proportion of fever cases that have acute malaria
 - study of the need for vector control
 - study of the effectiveness of breeding site reduction in reducing transmission.

11.1.4 Training of Health Workers

The WHO EPI senior level and mid-level courses have been given once each in Rwanda. The in-service training of health workers needs strengthening. Although one MOH official has attended the WHO CDD course, most health workers have not been trained in the use of ORT and other diarrheal disease control measures. Training on treatment of malaria, health education and health information systems is needed.

The activities proposed during the four year CCCD project include:

- Training 10 senior MOH staff in CCCD/WHO inter-country courses.
- Training regional medical officers and regional supervisors in the mid-level CCCD course.
- Training the senior staff person of every health facility and nutrition center on the CCCD project.
- Support the adaptation and printing of CCCD training materials to Rwanda.
- These adapted materials would be used for in-service training of all health workers in peripheral health facilities.
- Inclusion of CCCD training materials in the curricula of institutions training health workers.

11.1.5 Health Education/Information

Present health education activities include regular talks ("causeries") at health facilities and nutrition centers, two weekly radio programs on health, and production and dissemination of a variety of posters, pamphlets and other materials. BUFMAR takes the lead in providing health education training and materials to the private church affiliated facilities.

Visual aids are generally not available for the talks. Coordination of health education activities of the MOH, ORINFOR and BUFMAR could be improved. Field investigation (e.g. KAP surveys and focus groups) of public understanding of the CCCD target diseases and interventions have yet to be done.

The activities proposed during the 4 year CCCD project include:

- Analysis of the objectives and targets of the CCCD project to identify specific behaviors needed from health workers and the public to achieve the objectives. Design of an overall health education/information plan to promote the behavior needed to achieve project goals.
- Field studies to determine public knowledge attitudes and practices relevant to the health problems being addressed by the project.
- Coordination of MOH, ORINFOR, BUFMAR, ONAPO and other health education activities to assure consistency of messages related to the CCCD project.

- On the job training of health workers in health education technics.
- Development of health education materials for CCCD - including flannographs, posters, pamphlets, radio programs.
- Field monitoring of the impact of health education activities.
- Consultants to assist, as needed, in development of the CCCD health education program.
- One vehicle spare parts and fuel for supervisor of health education activities.
- One vehicle spare parts and fuel for field studies related to health education.

(NOTE: The MOH may have to add 2-4 new staff to the Bureau of Health Education to carry out field studies.)

11.1.6 Operational Research

As mentioned above, the project would support a number of small (less than \$10,000) operational research studies up to a total of \$50,000. These studies would be on questions of particular importance to the CCCD project in Rwanda and would be carried out by Rwandan investigators. Studies would have to be approved by a CCCD Research Review Committee.

11.1.7 Health Information System

To improve the data available on morbidity, mortality and the activities of the health services the project will support

- Consultations from CCCD Field Epidemiologists.
- The provision of a small micro-computer (with training of staff and maintenance of the equipment) to assist in the management and analysis of project data.
- Support for costs of field work and analysis of surveys to measure the impact of project activities.

11.1.8 Project Personnel

The CCCD project will provide the technical assistance of a CCCD Technical Officer from regional funds. The CCCD Technical Officer (TO) will either (a) be based in Rwanda and spend approximately 40% of his/her time in other countries on CCCD activities or (b) be based in another country having a regular schedule of time in Rwanda.

The MOH has requested that the TO be based in Rwanda if a bilateral project is approved. Although the MOH prefers a physician as the TO, a public health advisor with training in public health is definitely acceptable.

The project will also provide regular consultation from the CCCD Field Epidemiologist as part of the regional project.

11.1.9 Cooperation with Other CDA Countries

Belgium and France are the CDA members most actively involved in technical cooperation in health in Rwanda. Departing from the previous emphasis on hospital based curative technical cooperation, both countries have recently supported preventive medicine programs that will be closely linked to the CCCD project. Belgian cooperation supports the maternal and child health (MCH) activities in the Kigali Prefecture and at the University Center for Public Health (CUSP) in Butare. French cooperation supports MCH activities at all health facilities in Ruhengeri prefecture. France is supporting a similar project in Gisenyi Prefecture that is just getting underway. In these primarily MCH programs, Belgium and France provide long-term technical advisors, training, equipment remodeling of facilities, vehicules, supplies, fuel and other contributions. The programs have the same primary health care emphasis as CCCD and there will be close cooperation between the CCCD project and Belgian and French activities.

In addition, French cooperation has offered to support the training of the supervisor of the malaria reference laboratory at the Centre Muraz in Upper Volta.

11.1.10 International Evaluations

The bilateral CCCD project will support evaluation (to include participants from several countries) in the second and fourth years of the project.

11.2 Proposed Objectives and Targets for CCCD Activities

The CCCD strategy as stated in the Project description is "to build on existing systems and foster integration of activities within the primary health care framework". In view of the Government of Rwanda commitment to PHC and the progress achieved to date in its implementation (particularly as illustrated by the success of the EPI program), Rwanda offers an ideal setting for the CCCD program.

The following proposed objectives and targets for the CCCD project in Rwanda are based on the achievements already realized by Rwanda and the progress expected with the CCCD project. The CCCD assessment team is confident that the CCCD project will enable Rwanda to accomplish many PHC goals during the 4 year life of the project and that the 'momentum' of the program will be sustained after the completion of this project.

Objectives

Targets

- | | |
|--|---|
| 1. Collaborate with the Government of Rwanda in the training of senior MOH staff, supervisors and other workers in PHC and CCCD activities | Complete by the end of 1987 training of 40 senior MOH staff, 400 health facility and nutrition center supervisors and 600 health workers. |
|--|---|

2. Provide immunization services with DPT, measles, polio and BCG vaccine to children throughout Rwanda. Achieve by the end of 1987, the following coverage among children 12-23 months of age; OPV 80%, DPT 80%, measles 80%, BCG 85%.
3. Provide immunization services for neonatal tetanus prior to delivery to pregnant women throughout Rwanda. Achieve by the end of 1987, vaccination coverage of 25% of pregnant women with 2 doses of tetanus toxoid.
4. Decrease morbidity and mortality caused by the EPI diseases. Decrease, by the end of 1987, the morbidity and mortality among children less than 5 years as follows:

	<u>Morbidity</u>	<u>Mortality</u>
Pertussis	40%	30%
Measles	40%	30%
Polio	40%	30%
Tetanus	40%	30%
5. Increase utilization of ORT as primary therapy for diarrhea with dehydration. By the end of 1987, ORT is the primary treatment for diarrhea with dehydration in 80% of health facilities.
6. Increase utilization of appropriate home prepared ORS to prevent and treat dehydration caused by diarrhea. By the end of 1987, 25% of children with diarrhea receive appropriate home prepared ORS.
7. Decrease infant and childhood mortality. By the end of 1987, achieve a 25% reduction of infant and childhood (under 5) mortality in areas where the CCCD program has been implemented.
8. Improve the national health information system for more effective management and evaluation of the CCCD Project. Establish by the end of 1984 baseline morbidity and mortality data relevant to CCCD.
9. Answer operational research questions important to implementation of CCCD. By the end of 1987, have completed at least 5 operational research studies.
10. Improve health education activities to increase participate in CCCD programs. By the end of 1984, develop a coordinated strategy and workplan for health education to implement the CCCD project.

11.3 Proposed Workplan for CCCD Activities

<u>Activity</u>	<u>Proposed Time</u>	<u>Individual(s) Responsible</u>	<u>Source of Funding</u>
<u>. Training of Health Workers</u>			
- Short-term consultant to adapt and produce materials for use in Rwanda in-service training	1984	CCCD Technical Officer	Bilateral
- Short-term training for health facility and nutrition center supervisors to prepare for in-service training of all personnel	1984-1987	CCCD Technical Officer	Bilateral
- Sponsor Rwandan participants for interregional training courses: <ul style="list-style-type: none"> . CCCD Management Course . Mid-level Management/Training of trainers course . Cold-chain maintenance and repair course 	1984-1985	Regional Liaison Officer/Brazzaville	Regional
<u>. Health Education/Promotion</u>			
- Short-term consultant to assist in the design of field studies to assess public perceptions of target diseases	1984	CCCD Technical Officer	Regional Bilateral
- Field studies of knowledge attitudes and practices relevant to CCCD activities	1984-1987	CCCD Technical Officer	Bilateral
- Short-term technical assistance in development of radio and educational materials	1985	CDC-designated Training Consultant	Regional
- Production of Flannographs and other materials in EPI, diarrhea and malaria programs for use in health centers	1985	CCCD Technical Officer	Bilateral

<u>Activity</u>	<u>Time</u>	<u>Responsible</u>	<u>Funding</u>
<u>. Malaria Reference Lab</u>			
- Short-term training of Entomologist/supervisor at Center MURAZ, Upper Volta Proposed	1984- 1985	CCCD Technical Officer	Bilateral or French Cooperation Source of
	Individual(s)		
- Short-term consultant assistance in establishing Reference Lab in Kigali	1985	CCCD Regional Medical Epidemiologist/Kinshasa	Regional
<u>. Operational Research</u>			
- Support of approximately 5 small projects of particular operational importance to CCCD	1984- 1986	CCCD Technical Officer	Bilateral
Possible topics:			
. Safety and effectiveness of salt/sugar solutions prepared at home in treatment of dehydration			
. Likelihood that fever cases receiving presumptive treatment actually have malaria			
. Impact on mortality of children under 5 years of ORT and chloroquine therapy			
<u>. Health Information Systems</u>			
- Production and distribution of EPI, diarrheal diseases and malaria newsletter to all health facilities	1984 1987	CCCD Technical Officer	Bilateral
- Short-term technical assistance to evaluate and improve data collection	1984	CCCD Regional Medical Epidemiologist/Kinshasa	Regional
- Short-term consultations on health information system and use of micro-computer	1984- 1985	CCCD Technical Officer, CCCD Regional Epidemiologist	Regional
<u>. International Evaluations</u>			
- Conduct two evaluations of bilateral project in the second and fourth years of the project (other CDA members may wish to participate)	1984- 1987	CCCD Technical Officer	Bilateral (Partial)

12.0 Proposed CCCD Budget

A workplan (11.3) has been developed to implement the program strategy as described in Section 11. This workplan covers the four-year period of the project proposed for Rwanda. It includes both bilateral and regional assistance to assure optimum assistance to the Rwandan Ministry of Public Health. Funding for regional activities; including the cost of a CCCD Technical Officer; some training; and consultants' visits will be paid from the CCCD regional budget. These regional activities are therefore not included in the proposed bilateral budget.

12.1 Bilateral Budget

A budget of US \$1,926,971 is proposed in order to accomplish the activities described in Section 11. The bilateral donor contribution of USAID over the four-year life of the project is estimated to be \$1,030,797. Costs covered by these funds include training of health personnel; development of health education materials adapted to Rwanda; improvements in health information data collection and analysis; operational research; as well as some support for EPI, diarrhea diseases and malaria control equipment and materials. It is anticipated that UNICEF will continue to supply all vaccines required as well as part of equipment and supplies needed for EPI and diarrheal diseases control program. Costs to be met by the GOR include all salaries of Rwandan personnel, some pharmaceuticals and some fuel.

12.2 Recurrent Costs

The cost of anti-malaria drugs, oral rehydration packets, kerosene and gasoline constitute the major portion of recurrent costs of the Rwanda CCCD project. At the conclusion of the bilateral project in 1987, the cost of these commodities must be met through other financing mechanisms. Several factors clearly illustrate the GOR's capability and willingness to assure that these costs will be met after the bilateral assistance has been phased out.

First, the GOR has proposed to pay two thirds of the recurrent costs during the life of the project. This represents a modest 2% annual increase in the overall public health budget over the life of the project.

Secondly, the GOR has shown a healthy concern for the control of recurrent costs as shown by the budget surpluses in recent years. In response to its current economic problems (caused by the world recession), the GOR trimmed expenditures in the development budget; reduced its ordinary budget expenditures and increased revenues. Sound fiscal management has been, and will remain, a strong asset of this politically stable government.

Third, the GOR has shown commitment to the implementation of effective programs. The MOH has paid the costs of new personnel required for the expansion of the EPI program--a total of 87 new hires including 74 vaccinators, regional EPI supervisors for each of the ten prefectures, and

three national-level EPI staff in Kigali. In addition, the GOR has accepted the proposal for additional personnel and other costs required for the proposed CCCD program. This proposal includes three new staff for the national management of CCCD activities as well as staff to carry out "Field" research on perceptions and interventions aimed at the control of the target diseases, and a Malaria Reference Laboratory for which the CCCD program will provide partial support.

Finally, in response to the increasing costs of health care, the GOR has proposed several steps to increase its health revenues. The present nominal charges for outpatient and hospital care are likely to be raised. The GOR has also proposed charging modest fees for medicines (including ORS and chloroquine) sold at communal pharmacies.

Table 12.1:

<u>PROPOSED CCCD BILATERAL PROJECT RWANDA</u>					
CCCD Project Rwanda, Bilateral Budget					
Contributions in U.S. Dollars, 1984-1987					
<u>Item</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>Total</u>
Vaccine	-----to be provided by UNICEF-----				
ORS packets	50,000	55,000	60,000	65,000	230,000
	-----	23,335*	58,042	100,607*	181,984*
Chloroquine	21,000	23,000	25,000	27,000	96,000
	105,000*	115,000	125,000*	135,000*	480,000*
Refrigerators	18,600(30)	13,255(20)	4,380(10)	-----	36,235
Repair Kits	2,400(3)	2,640(3)	-----	-----	5,040
Conversion Kits	1,500(25)	1,650(25)	-----	-----	3,150
Burners	4,500(45)	3,300(50)	1,825(25)	-----	9,625
Chimneys	750(150)	550(100)	300(50)	-----	1,600
Vaccine carriers	1,440(60)	1,560(60)	1,120(40)	-----	4,120
Syringes	4,445	3,645	1,317	-----	9,417
Needles	1,560	1,275	460	-----	3,295
Sterilization Kits	8,000(100)	4,400(50)	4,850(50)	-----	17,250
Vehicles:					
Toyotas	42,240(4)	-----	-----	-----	42,240
Suzuki	88,660(13)	7,500(1)	-----	-----	96,160
Spare parts	-----	7,533	7,533	7,534	22,600
Fuel:					
Kerosene	19,388	14,541	9,694	4,847	48,470
	16,885*	21,720*	26,555*	31,390*	96,550*

<u>Item</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>Total</u>
Gasoline	27,640	20,730	13,820	6,910	69,100
	24,045*	30,955*	37,865*	44,775*	137,640*
National Training	19,740	21,420	22,275	24,300	87,735
Malaria Rel. Lab.	-----	4,000	3,000	3,000	10,000
Health Information System:					
Computer	5,000	-----	-----	-----	5,000
Supplies	2,000	2,000	2,000	2,000	8,000
Surveys	10,000	10,000	-----	-----	20,000
Health Education:					
Audiovisuals	3,000	3,000	-----	-----	6,000
Flannographs	3,000	-----	-----	-----	3,000
KAP surveys	15,000	10,000	-----	-----	25,000
Operational Research	25,000	18,750	6,250	-----	50,000
Evaluation	-----	14,000	-----	16,000	30,000
Subtotal	520,793	434,759	411,196	468,363	1,835,211
	-----	-----	-----	-----	-----
Contingency (5%)	<u>26,039</u>	<u>21,738</u>	<u>20,565</u>	<u>23,418</u>	<u>91,760</u>
PROJECT TOTAL	546,832	456,497	431,861	491,781	1,926,971
USAID	400,902	265,487	184,399	180,009	1,030,797
GOR	<u>145,930</u>	<u>191,010</u>	<u>247,462</u>	<u>311,772</u>	<u>896,174</u>
PROJECT TOTAL	546,832	456,497	431,861	491,781	1,926,971

* = to be provided by Government of Rwanda.

Explanation of Budget Calculations

1. Oral Rehydration Packets:

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
0-5 population (000)	1,145.7	1,186.9	1,229.6	1,273.9
Coverage rate	10%	15%	20%	25%
#of Episodes/yr	2	2	2	2
# of packets/episode	2	2	2	2
Total # of packets	500,000	712,140	983,680	1,273,900
Unit price	.10	.11	.12	.13
Total Price	\$50,000	\$78,335	\$118,042	\$165,607

2. Chloroquine: 326,000 pregnant women x 28 tablets during pregnancy x 40% coverage - 4,000,000 tablets; 1,145,700 children under 5 x 2 episodes x 2 tablets per episode x 40% coverage = 2,000,000 tablets
6,000,000 tablets x \$.021 per. - \$126,000.
3. Refrigerators: 60 refrigerators (1/3 electric, 1/3 kerosene, 1/3 convertible) x \$600 avg. cost.
4. Repair tool kits: 6 kits x \$840 avg. cost.
5. Refrigerator conversion kits (kerosene to electric): 50 kits x \$63 avg. cost.
6. Burners (for instrument sterilization): 120 x \$80 avg. cost.
7. Metal chimneys (for kerosene refrigerators): 300 x \$5.50 avg. cost.
8. Vaccine carriers: 160x \$25.75 avg. cost.
9. Syringes: 16,200 glass reusable x \$.60 avg. cost.
10. Needles: 5,679 dozen reusable needles x \$.60 avg. cost.
11. Sterilization kits (includes tray, forceps, pressure cooker, kidney dish, camp stove); 200 x \$86.25 avg. cost.
12. Vehicles: 4 Toyota Hilux double cabin X \$10,560 avg. cost and 14 Suzuki jeeps x \$6,820 avg. cost plus 5% of cost for repair parts.
13. Kerosene: 168 kerosene refrigerators x 5 liters/week x 52 weeks x \$.83 = \$36,255.

14. Fuel: 475 km x 12.5 liters/100 km x 18 vehicles x 52 weeks x \$.93 = \$51,685.
15. National Training: provides per diem and travel for training of supervisors of health facilities and nutrition centers and senior MOH staff. Provides \$16,500 for production costs of educational materials adapted for use in Rwanda.
16. Malaria Reference Laboratory: provides laboratory supplies and microscopes (3 at \$750.00 average cost).
17. Health Information System: provides \$5,000 for microcomputer and assession and \$2000 for supplies to improve data collection and analysis.
18. Health Education: provides support for field surveys of knowledge attitudes and practices relevant to CCCD target diseases and interventions; provides support for the production of flannographs and other materials for EPI, ORT and antimalaria efforts.
19. Operational Research: provides up to \$10,000 per project for pertinent research efforts to improve the delivery of EPI, ORT and antimalarial services. Studies will be conducted by Rwandans.
20. Evaluation: provides USAID/CDC support for program evaluations to be conducted in the second and fourth years in order to monitor and improve project performance.
21. Contingency: provides 5% of total project budget for unanticipated expenses.

13.0 Acknowledgements

The CCCD country assessment of Rwanda was carried out in 3 weeks (October 6-27, 1983). During that time, field visits to 4 health regions, a review of the health sector, a proposal for CCCD activities and a draft budget were prepared and thoroughly discussed with officials of the Ministry of Health and USAID. Completing the mission was only possible because of the hard work and kind cooperation of a large number of persons.

The team would particularly like to thank Dr. Francois Hakizimana, Directeur General de la Sante Base, and Dr. Anselme Mbugulize, Directeur de l'Epidemiologie of the Ministry of Health, for their patience and cooperation.

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ANNEXES

1. Map of Rwanda
 - A. Roads
 - B. Political and Hospitals
2. Institutions visited and persons contacted by CCCD Team
3. Documents reviewed by CCCD Team
4. Organization of health services in Rwanda
5. Organizational Chart of Ministry of Public Health
6. Malarimetric Studies, Rwanda, 1949 - 1975
7. Vaccinations performed, Rwanda, 1977 - 1983
8. Estimate of percent vaccination coverage of children less than one year age, by prefecture, Rwanda 1983
9. Outpatient visits and hospitalizations Kigali Hospital Center, January-June 1983
10. Population Estimates, Rwanda, 1978-1985

Geographical distribution of hospitals



ANNEX 2

INSTITUTIONS VISITED AND PERSONS CONTACTED BY CCCD TEAM

1. Ministere de la sante publique

- Minister
(Dr. Ildephonse Musafil)
- Secretaire General de la Sante
(Dr. Evariste Hakizamana)
- Direction General de la Santa de Base
(Dr. Francois Hakizamana)
- OPHAR
(Dr. Jean Baptiste Rwasine - Director)
- Division Nationale de l'Epidemiologie
(Dr. Anselme Mbugulize, Director)
- Bureau d'Education Sanitaire
(Mme. Bona Wategekimana)
- Bureau d'Hygiene
(M. Justin Musemakweli)

2. Ministere du Plan, Bureau de Statistiques

3. BUFMAR

(Dr. Rutser Hornikx - Executive Secretary)

4. Regions Sanitaires (prefectures)

a. Kigali Region

(Dr. Jean Gihana-Regional Director)
(M. Augustin Rwigimba - EPI Supervisor)

- PMI Kigali (Etatique)
(Dr. Michel Bossuyt)
- Centre Hospitalier de Kigali (Etatique)
(Dr. LePage)

b. Butare Region

(Dr. Antone Ntezil-imana - Regional Director)

- C/S Save (Agree)
- C/S Kigembe (Etatique)
- Disp. Mbazi (Etatique)
- Centre Universitaire de Sante Publique (Etatique)

- c. Gisenyi Region
(Regional Director)
(M. Fidele Nkundabanyanga - EPI Supervisor)
 - Hopital Gisenyi (Etatique)
 - Hopital Rural Kabaya (Etatique)
 - C/S Kivumu (Agree)
 - C/S Murara (Etatique)

- d. Ruhengeri Region
(Dr. P. Vimont-Vicary - Regional Director)
 - PMI Ruhengeri (Etatique)
 - C/S Kinigi (Etatique)

- 5. Universite Nationale de Butare, Faculte de Medecine
(Dr. Patrick De Mol)

- 6. Organisation Mondiale de la Sante (OMS/WHO)
(Dr. U. Tommasi - Representative)
(Dr. Roger Moulouba - EPI)

- 7. Cooperation Francaise
(Mme. Pujol)

- 8. Cooperation Belge
(M. Guy Parrant)

- 9. Catholic Relief Services
(M. Williams)

- 10. UNICEF
(M. Godwin Tete - Representative)

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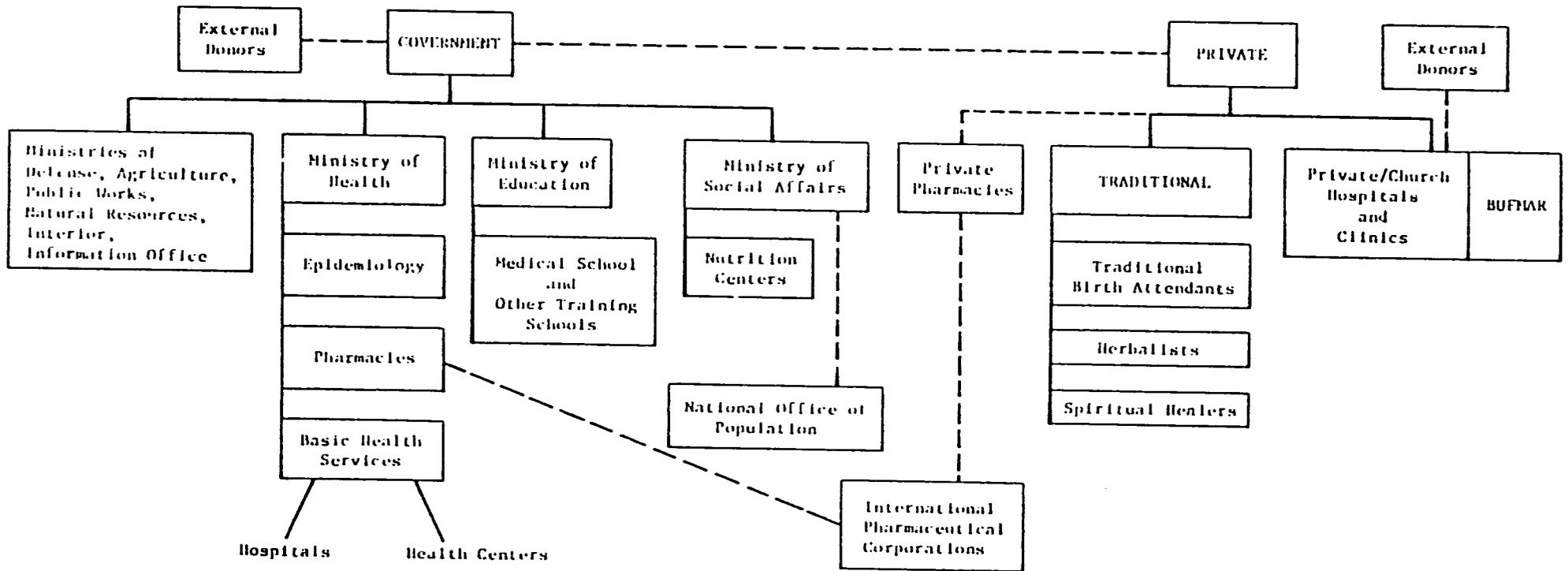
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E. Malaria

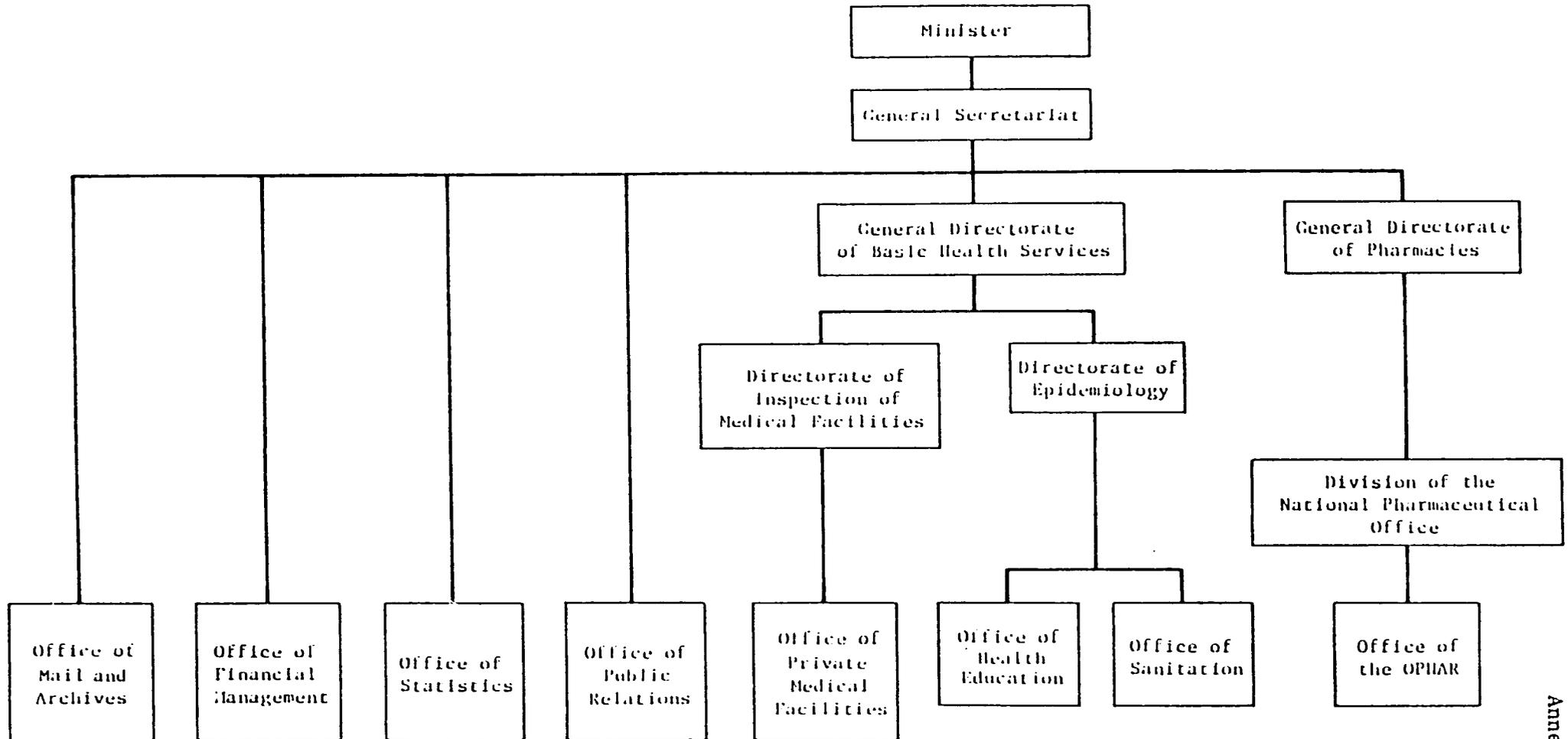
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ORGANIZATION OF HEALTH SERVICES IN RWANDA



Source: Health Services Development in Rwanda

ORGANIZATIONAL CHART OF THE MINISTRY OF PUBLIC HEALTH



Source: Rwanda, Ministry of Health

RELEVÉ DES ÉTUDES MALIOMÉTRIQUES
(DES POPULATIONS RURAUX DÉLIMITÉES), AU RWANDA, 1949-75

<u>Secteur</u>	<u>Année</u>	<u>No. Personnes</u>	<u>Age (ans)</u>	<u>% avec Plasmodium depistee</u>	<u>% avec spleno- megalie</u>	<u>Species des Plasmodia depistee</u>
Ngoma	1949	11,894	variable	51.2%	-	-
Ngoma	1949	410	6-13	39.0%	-	-
Bugarama	1974	555	2-9	47.7%	41.8%	Falciparum 80% Vivax 7%
Rusumo	1974	131	2-9	15.2%	12.2%	Falciparum Vivax
Bugesera Mayaga	1975	1,192	2-9	8.1%	13.9%	Falciparum
Commune Kiyovu	1975	449	2-9	7.6%	6.2%	Falciparum

RELEVÉ DES VACCINATIONS EXECUTEES, MILLIERS DE DOSES,
PAR ANNEE, LE RWANDA, 1977-1983

<u>Vaccins</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983 (Jan-Juin)</u>
Rougeole	6	11	27	170	238	288	119
DPT	34	45	58	244	563	751	368
Polio	16	26	43	225	571	668	266
Toxoïde Tétanique	7	1	11	42	71	115	78
BCG	132	141	117	252	383	380	156
Variole	136	126	89	8	-	-	-
Cholera	-	393	43	15	-	-	-

- = pas d'information

Source: Rapports Annuels MSP

ESTIMATE OF PERCENTAGE OF CHILDREN LESS THAN ONE YEAR OF AGE WHO HAVE
BEEN VACCINATED, BY VACCINE, BY PREFECTURE, RWANDA, 1983.

<u>PREFECTURE</u>	<u>BCG</u>	<u>ROUGEOLE</u>	<u>DPT-1</u>	<u>DPT-3</u>	1983 ESTIMATE No. CHILDREN <u>LESS THAN ONE</u>
Butare	40	29	45	28	35,500
Byumba	71	27	39	21	31,600
Cyangugu	66	34	56	15	20,800
Gikongoro	41	22	39	14	20,900
Gisenyi	58	36	59	35	29,000
Gitarama	71	53	70	51	35,800
Kibungo	46	30	48	16	23,200
Kibuye	46	36	45	24	20,000
Kigali	53	37	45	30	45,300
Ruhengeri	72	50	60	38	31,800
Ensemble du Pays	55	36	51	29	294,000

Source: Bureau of Epidemiology

Note: January - June 1983 vaccinations extrapolated by doubling. Divided by estimate of target population to give percent vaccinated.

PEDIATRIC SERVICE, KIGALI HOSPITAL CENTER
 JANUARY - JUNE 1983

A. DIAGNOSES OF OUTPATIENTS SEEN BY MEDICAL ASSISTANTS AND NURSES

	<u>Number</u>	<u>%</u>
1. Upper respiratory infection	5,432	22.3
2. Diarrheal disease	2,681	11.0
3. Malaria	2,355	.7
4. Abdominal pains	1,951	8.0
5. Worms	1,841	7.6
6. Bronchitis	971	4.0
7. Measles	173	0.7
Total all diagnoses	24,310	

B. DIAGNOSES OF HOSPITALIZED CHILDREN

	<u>Number</u>	<u>%</u>
1. Diarrheal Disease	172	13.6
2. Pulmonary Infections	147	11.6
3. Measles	141	11.1
4. Malaria	114	9.0
5. Prematurity	96	7.6
Total all hospitalizations	1,272	

Source: Dr. LePage, Kigali Hospital Center

ANNEX 10

Population Estimates (x1,000)
Rwanda, 1978 - 1985

<u>Year</u>	<u>Total Population</u>	<u>Less than one year</u>	<u>One-four years old</u>	<u>Less than five years</u>
1978	4,832	255	672	927
1979	5,006	264	696	960
1980	5,192	273	721	995
1981	5,388	283	747	1,030
1982	5,563	292	774	1,068
1983	5,766	304	802	1,106
1984	5,974	315	831	1,146
1985	6,189	326	861	1,187